

Regulation of Commercial Mining of Space Resources at National and International Level: An Analysis of the 1979 Moon Agreement and the National Law Approach

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States and companies have demonstrated a growing interest in the possibility of mining and utilising space resources, both for their use on Earth and in outer space. However, the biggest obstacle seems to be the lack of clear international rules regulating the exploitation of space resources. The OST provides the current legal framework for the exploration and use of outer space but lacks serious consideration of space resources. The MA does impose specific obligations on parties undertaking the exploitation of space resources but has only been ratified by a limited number of States due to its controversial nature. To promote legal certainty, States have decided to act unilaterally and adopt national space legislation to define the conditions for authorisation of space mining activities, despite the risk of creating international discord. That said, this paper analyses the *status quo* and the current legal framework for the exploitation of space resources, both at international and national level. It focuses on the relevant provisions of international law and outlines the subsequent national law approach, including the relationship between national and international law. Finally, it summarises some concrete proposals for the establishment of more realistic rules on an international framework for the exploitation of space resources.

1. Introduction

According to NASA, there are almost 850,000 known asteroids in the Solar System¹. Their classification is based on their composition, mostly determined

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by infrared spectrometry and radar observations from ground-based telescopes.² Despite their sheer number, asteroids are difficult to find. Scientists at NASA's Jet Propulsion Laboratory are developing the near-Earth Object Camera (NEOCam) to find evidence of asteroids and potentially hazardous near-Earth objects. Once the target is identified, companies interested in mining space resources must figure out how to extract and recover them. Several scientific sample-collection-and-return missions are currently investigating asteroids to find out ways to overcome the immense technical challenges. These missions are crucial to determine resource availability, as current knowledge does not justify the commitment of financial resources to implement commercial space mining activities.³

It is easy to assume that metallic asteroids would have the most economic potential, as they contain resources for the construction of habitats and industrial infrastructure in orbit and on planetary surfaces. Water, however, is arguably the most valuable resource, not only critical for the maintenance of life in space, but also for its potential use as rocket fuel for the servicing and refueling of spacecraft in space.

Despite all the economic potential – a market of USD 1 to 3 trillion, as mining picks up⁴ – these projects may never come to fruition without a clear legal framework enabling commercial space mining activities, in which rights and obligations of both governmental and non-governmental organisation are clearly defined. States and companies are reluctant to finance and perform space mining activities until they are assured that they will have a legal claim over what they extract from celestial bodies.

2. The International Legal Framework

2.1. The Outer Space Treaty

The OST forms the foundation of international space law and provides the basic principles States must abide in the exploration and use of outer space.⁵ However, the OST has no serious consideration of space resources, as the

1 Hubble Watches Spun-Up Asteroid Coming Apart, 28 March 2019 <https://www.nasa.gov/feature/goddard/2019/hubble-watchesspun-up-asteroid-coming-apart> (accessed 30.09.2019).

2 Asteroids <https://solarsystem.nasa.gov/asteroids-cometsand-meteors/asteroids/in-depth/> (accessed 30.09.2019).

3 S. A. Bailey, *Developing a New Space Economy Through Lunar Resources and Their Utilization*, Lunar Resource Prospecting, Lunar ISRU 2019 July 15-17, 2019, Columbia.

4 The Massive Prize Luring Miners to the Stars, 8 March 2018 <https://www.bloomberg.com/graphics/2018-asteroid-mining/> (accessed 30.09.2019).

5 R. Jakhu, 'UN Doc. A/AC.105/C.2/1997/CRP, Application and Implementation of The 1967 Outer Space Treaty', IISL/ECSL Symposium (1997).

treaty was not originally intended to establish specific rules on the matter.⁶ As opposed to the general practice, the OST does not contain a list of basic definitions.⁷ This vagueness and the possibility to interpret an international legal norm in distinct ways causes uncertainty, especially for potential investors in space mining activities.

Article I (1) declares the ‘exploration and use of outer space’ to be ‘the province of mankind’, ‘carried out for the benefit and in the interests of all countries’. It remains unclear, however, whether there is a legal obligation to share the benefits of space resources activities with all other countries and, if so, to what extent or how they should be shared.⁸ In Article I (2), it is controversial whether the term ‘use’ can be interpreted as encompassing the exploitation of space resources. Furthermore, States are free to explore and use outer space and shall have access to all areas of celestial bodies. However, it is difficult to imagine mining a celestial body without asserting some level of exclusive rights over it, at least temporarily. Article 1 (3) guarantees the freedom of scientific investigation but not commercial recovery and utilisation of space resources, which remains moot.

The non-appropriation principle in Article II, despite being considered a rule of customary international law, has been subject to two diverging interpretations. On the one hand, it is not clear whether the prohibition on national appropriation applies to space resources contained within celestial bodies, capable of being extracted. Furthermore, the OST does not define ‘celestial body’ and makes no reference to size. Small celestial bodies, which could nonetheless contain precious resources and be the target of exploitation, might end up being mined ‘out of existence’, having their resources exhausted. In the opinion of Steve Freeland, even though it could be argued that the exploitation of a small celestial body out of existence “might not constitute an act of appropriation within the scope of Article II, it may still be unlawful under the current legal regime”.⁹

On the other hand, it can be inferred that the exploitation of space resources is permitted in the absence of an explicit ban in the OST¹⁰, an interpretation which finds support in the freedom to explore and use outer space, laid down in Article I (2). Article II refers to ‘national appropriation’ which could, *a priori*, indicate that other forms of appropriation would be legally possible.

6 F. von der Dunk and F. Tronchetti. *Handbook of Space Law*. Cheltenham, UK: Edward Elgar Publishing, 2015, 778.

7 C. Brünner and A. Soucek, *Outer Space in Society, Politics and Law*. Vienna: Springer, 2011, 309.

8 F. Lyall, *Article 1 of the Outer Space Treaty and the International Telecommunication Union*, 46 Proceedings of the International Institute of Space Law 96-106 (2003).

9 S. Freeland & R. Jakhu, Article II, I in *Cologne Commentary of Space Law*, 53 (S. Hobe, B. Schmidt-Tedd, K. Schrogl, and G. Meishan, 2009).

10 Brünner and Soucek, 2011, 696. See: IISL Position Paper.

However, according to Article VI, States are under the international obligation to authorise and supervise the space activities of non-governmental entities in outer space and shall bear international responsibility for the activities of their nationals. All space activities, either carried out by governmental or non-governmental entities, are to be regarded as 'national activities.' What is not clear, however, is whether the term 'national' also extends to claims of private ownership of space resources, extracted from celestial bodies. In addition, it is still debatable whether a State can authorise, by means of national legislation, private entities to undertake space mining activities and recognise private property rights over space resources.

Article IX calls States to protect the outer space environment to avoid its harmful contamination and the harmful interference to the space activities of other States. States should pay due regard to the corresponding interests of all other States Parties and be guided by the principle of cooperation and mutual assistance. As all States have equal rights to access, explore and use outer space, they should not prevent others from doing the same. However, in practice, it might be difficult for States not to interfere with the free access rights of others when performing their own space mining activities.

The OST only establishes general principles in the use and exploration of outer space, without laying down specific rules to govern the exploitation of space resources. The principles, however, are not comprehensive enough to guarantee the safe development of commercial mining activities. Ultimately, it is possible to argue in favour of the legality of commercial utilisation of space resources based solely on the OST, but not without controversy and diverging interpretations from different States.

2.2. The Moon Agreement

The MA was established to clarify the legal status of space resources and it is the only treaty dealing with the exploitation of the natural resources in space, both for scientific and commercial purposes. It echoes many of the provisions of the OST, with little or no amplification.¹¹ Consequently, it suffers from similar quandaries; similar to the OST, the MA does not have a list of definitions. Nonetheless, it does define its scope of application, applying to the Moon, including lunar orbits and trajectories, and other celestial bodies within the Solar System.

The MA extends the 'province of all mankind' concept in the sense that such exploration and use must be carried out with due regard to the interests of present and future generations, and the need to promote higher standards of

11 S. E. Doyle, "Using Extraterrestrial Resources under the Moon Agreement of 1979," *Journal of Space Law* 26, no. 2 (1998), 111-128.

living, conditions of economic and social development (Article 4).¹² It further elaborates the concept of freedom of scientific investigation (Article 6) and other rules concerning the environmental preservation of outer space and the need to avoid the disruption of the lunar environment (Article 7). States are free to land their space objects on the Moon, place their personnel, vehicles, equipment, facilities on or below the surface of the Moon (Article 8), and establish manned and unmanned stations on the Moon, as long as they do not prevent the free access to all areas of the Moon by other States (Article 9). None of these so-called ‘Moon freedoms’, however, creates any private property rights or rights of ownership ‘over the surface of the subsurface of the Moon or any areas thereof.’

Article 11 is the most contentious provision of the MA and commonly regarded as the primary reason both States have rejected the treaty. Article 11 (1) declares ‘the Moon and its natural resources’ to be ‘the common heritage of mankind’ (CHM). This means that any exploitation of such resources must be carried out under that concept, despite the lack of a formal definition and interpretation of the principle under current international law. The term received unprecedented attention in 1967, at the Third Conference on the Law of the Sea when the delegate of Malta, Arvid Pardo, first proposed a regime for the exploitation of the resources of the sea considering ‘the interest of humanity.’¹³ In space law, it was first proposed by the Argentinean delegate Aldo Armando Cocca in 1970 when he presented the first draft agreement on the use of the natural resources of the Moon¹⁴, backed by Western countries, including the US. Socialist countries, however, under the leadership of the Soviet Union, rejected the CHM arguing that the notion of ‘heritage’, based on concepts of inheritance and succession, is not found in the substance of Soviet civil law.¹⁵ Nevertheless, despite divergent interpretations and prolonged negotiations, States, including the US and the Soviet Union, reached a consensus and agreed on the inclusion of the CHM concept in the MA.

Article 11 (1) specifies that the CHM principle ‘finds its expression in the provisions of this Agreement’, a clear indication that the interpretation of the concept should be made by taking into consideration only the MA, with no

12 L. Viikari, *From Manganese Nodules to Lunar Regolith: a Comparative Legal Study of the Utilization of Natural Resources in the Deep Seabed and Outer Space*. Rovaniemi: University of Lapland, 2002.

13 <https://cil.nus.edu.sg/database/cil/1970-general-assembly-resolution-2749-xxv-on-declaration-of-principles-governing-the-sea-bed-and-the-ocean-floor-and-the-subsoil-thereof-beyond-the-limits-of-national-jurisdiction> (accessed 30.09.2019).

14 S. Hobe, B. Schmidt-Tedd, K. Schrogl, and P. Stubbe, *Cologne Commentary on Space Law, Volume II Rescue Agreement, Liability Convention, Registration Convention, Moon Agreement*. Cologne: Carl Heymanns Verlag, (2009), 342.

15 F. Tronchetti, *The Exploitation of Natural Resources of the Moon and Other Celestial Bodies: a Proposal for a Legal Regime*. Leiden: Nijhoff, 2009, 50.

reference to principles and rules laid down by any other treaty. Notwithstanding, States continue to have opposing views regarding its correct interpretation. On the one hand, developing countries argue that areas beyond national jurisdiction, such as outer space, should be subject to a shared ‘common management’ regime in which the profits derived from exploitation should belong to all humanity and be distributed among all States, irrespective of their level of participation in the space mining activities. On the other hand, developed countries reject this interpretation arguing that only the States exploiting the resources are entitled to decide how to share the benefits.¹⁶

Article 11 (2) confirms the *res communis* character and the non-appropriative nature of outer space. Article 11 (3) refers to ‘natural resources in place’, which seems to suggest that once natural resources are extracted and no longer in place, they can be appropriated.¹⁷ Most scholars agree that once natural resources contained within celestial bodies have been removed from their original location, they can become the property of whoever extracted them. Others, however, fear that the words ‘in place’ could potentially be used to circumvent the prohibition against national appropriation. If the prohibition applies insofar the resource remains ‘in place’, States would be able to mine a celestial body ‘out of existence’, extracting all the resources.

In addition, the MA only calls for States to establish an international regime to govern the exploitation of space resources when ‘such exploitation is about to become feasible.’ However, this provision does not create an international regime and is not considered a legally binding obligation to agree on one at whatever cost.¹⁸ Furthermore, as, *a priori*, Article 11 (5) presupposes that an international regime must predate the exploitation, it has been debated whether the MA introduced a moratorium on the exploitation of space resources. Even if there is no *legal* moratorium, it is argued that a *de facto* moratorium is in place, as investors and private operators are understandably reluctant to make the significant investments in space mining activities if there is a risk that an undesirable regime could nullify or hinder their efforts.¹⁹ Be it as it may, it seems that the MA cannot be interpreted as establishing any kind of moratorium; if one was intended, it would have been explicitly provided for.

Finally, Article 11 (7) indicated the main purposes of the international regime. Paragraph 7 (d) calls for the ‘equitable sharing by all States in the benefits derived from those resources, whereby the interests and needs of the

16 Ibid. 108.

17 P. de Man, *Exclusive Use in an Inclusive Environment The Meaning of the Non-Appropriation Principle for Space Resource Exploitation*. Cham: Springer International Publishing, 2018, 172.

18 F. Tronchetti, 2009, 108.

19 K. N. Metcalf, *Activities in Space: Appropriation or Use?* Uppsala: Justus, 1999, 179.

developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the Moon, shall be given special consideration.’ According to Stephen E. Doyle, the language of Article 11 (7) (d) “is in direct contradiction with the language of Article I (1) OST and Article 4 (1) MA.”²⁰ He argues that ‘either activities in outer space are carried out ‘in the interests of all countries irrespective of their degree[s] of economic and scientific development,’ or the benefits derived from space resources are shared given special consideration to ‘the interests and needs of the developing countries’ and those which have contributed to the effort. Also, the MA requires an ‘equitable’ sharing of benefits without defining either ‘equitable’ and ‘benefits’, resulting in States having divergent interpretations of their meaning.

The States Parties to the MA claim that it offers a viable basis for the commercial exploitation of space resources as the treaty does not prevent commercial space mining activities, as long as an international regime is set up. In fact, it is generally agreed that without any international regime, commercial exploitation could result in conflict. However, despite being drafted to prevent the Moon from becoming an area of international conflict due to the exploitation of space resources, most States have decided not to adopt the MA. The OST remains the most relevant regulator of space resource activities in practice, although general consensus seems to indicate that the OST alone is not adequate to provide legal certainty.

3. The Unilateral Approach

The US was the first country to adopt a national regulatory framework for the commercial exploration and recovery of space resources. In November 2015, President Barack Obama signed into law the US Commercial Space Launch and Competitiveness Act (Space Act)²¹ to provide legal clarity as to whether commercial operators would be entitled to property rights over extracted space resources, thus ensuring potential investors in the US that would be able to reap the financial benefits of their investments. According to the Space Act, only individuals who are US citizens, entities organised or existing under American laws, or entities organised or existing under foreign law but with a controlling interest held by US citizens²² shall be entitled to

20 S. E. Doyle, 1998, 123.

21 Public Law 114-90. *See also*: F. Tronchetti, *The Moon Agreement in the 21st Century: Addressing Its Potential Role in the Era of Commercial Exploitation of the Natural Resources of the Moon and Other Celestial Bodies*, *Journal of Space Law* 36, no. 2 (Winter 2010), 489-524.

22 51 USC § 50902: Definitions, <https://uscode.house.gov/view.xhtml?hl=false&edition=prelim&req=granuleid%3AUSC-prelim-title51-section50902&num=0&saved=%7CZ3JhbnVsZWlkOIVTQy1wcmVsaW0tdGl0bGU1MS1zZWNOaW9uNTA5MDQ%3D%7C%7C0%7Cfalse%7Cprelim.>

any space resource obtained, including the right to possess, own, transport, use and sell the space resources. The operators must obtain prior authorisation and be subject to continuing supervision by the US authorities, a nod to Article VI OST. The Space Act recognises that any property rights allocated to US citizens must be in accordance with and in manners consistent with both domestic and international legal obligations of the US. Nevertheless, the Space Act has caused reactions and discussion among the international community, especially concerning a possible violation of the non-appropriation principle. Many States reject a permissive interpretation of the non-appropriation principle and believe that space mining constitutes a *de facto* national appropriation, in violation of the OST.²³ The debate reached the 2016 Session of the Scientific and Technical Subcommittee of UNCOPUOS, where Russia submitted a Conference Room Paper stating that '[t]he United States vividly demonstrated a connection between diminishing the Committee's role and powers, on the one hand, and manifestations of total disrespect for international law order, on the other, by adopting the Commercial Space Launch Competitiveness Act on 25 November 2015.'²⁴ During the Legal Subcommittee of the same year, Belgium expressed its concern with the global economic imbalance that space resource exploration could entail, stated its preference for an international approach rather than a unilateral one, and concluded that 'space resources cannot be appropriated by extension of national jurisdiction', insofar States are prohibited from claiming sovereignty over celestial bodies by any means, and should therefore be unable to authorise their nationals to own space resources extracted from celestial bodies.

On the other hand, the IISL published a Position Paper addressing 'the legal situation relating to space resource exploitation', stating that it is unclear whether the prohibition of national appropriation under Article II OST also includes space resources. Yet, the IISL adds that 'in view of the absence of a clear prohibition of the taking of resources in the OST, one can conclude that the use of space resources is permitted under international law.'²⁵ The US Space Act is a possible interpretation of the OST, although it is yet to be seen 'whether and to what extent this interpretation is shared by other States.'

23 Luxembourg's Asteroid Mining is Legal Says Space Law Expert, <https://www.inverse.com/article/34935-luxembourg-s-asteroid-mining-is-legal-says-space-law-expert> (Accessed 07.10.2019).

24 UN Doc A/AC.105/C.1/2016/CRP.15, at www.unoosa.org/oosa/en/ourwork/copuos/stsc/2016/index.html (Accessed on 07.10.2019).

25 Position Paper of the International Institute of Space Law on Space Mining (IISL Position Paper) of 20 December 2015, s II(1)(b), www.iislweb.org/html/20151220_news.htm (Accessed 07.10.2019).

Inspired by the US model, Luxembourg adopted the Law on the Exploration and Use of Space Resources²⁶ in 2017 to address the ownership of space resources and create the conditions for authorisation of space mining activities. The law has attracted to Luxembourg several companies who want to benefit from this legal framework, part of the large plan of the Government of Luxembourg to establish the country as Europe's centre for space exploration and research. It deals with space resources in general by stating in Article 1 that 'space resources are capable of being appropriated.' Contrary to the Space Act, the application of the law is not restricted to citizens of Luxembourg. Even legal entities owned in full by non-Luxembourgers or fully controlled by legal entities domiciled outside Luxembourg are entitled to benefit from the law if they are themselves registered in Luxembourg. In addition, Article 2 (3) states that an authorised operator may only 'carry out the activity' 'in accordance with the conditions of authorisation and the international obligations of Luxembourg'.

Much like the Space Act, the law raises questions regarding its conformity with the non-appropriation principle. Nonetheless, the US and Luxembourg argue that Article II applies to outer space as a territory, and not the resources contained within celestial bodies, an analogy with the rules governing the high seas. Luxembourg, however, is committed to engaging other countries to establish an international legal framework within the context of the UN for the exploitation of space resources and it has concluded several bilateral cooperation agreements, including on 'the exchange of information on all the issues related to the exploration and commercial utilisation of space resources, including legal, regulatory, technological, economic, and other aspects.'²⁷

Japan and the UAE are in the process of adopting national legislation to regulate space resources activities. In 2016, the Nishimura Institute of Advanced Legal Studies published a report in which it considers 'whether private operators can have ownership rights in the resources they mine and obtain in the course of space resource development.' The Study Group calls the Japanese Government to clarify, under Japanese law, the issue of ownership of the space resources, and to establish a framework of authorisation and supervision regulations regarding space resource activities.²⁸ The UAE is enabling and fostering commercial space activities and is interested in developing a framework for commercial space activities,

26 Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace, <http://data.legilux.public.lu/file/eli-etat-leg-loi-2017-07-20-a674-jo-fr-pdf.pdf> (Accessed 07.10.2019).

27 <https://space-agency.public.lu/en/agency/international-collaboration.html> (Accessed 07.10.2019).

28 Japan Joins Race for Space Resource, at <https://www.wsj.com/articles/japan-joins-race-for-space-resources-1481874269> (Accessed 07.10.2019).

including commercial space mining. It is only a matter of time before they implement national legislation, which could, in turn, encourage other States to also regulate space resources activities at national level.

3.1. The Relation Between National and International Law

First, it is disputable whether States have the capacity to legislate over areas beyond national jurisdiction and recognise private property over space resources. Second, a regime dominated by national legislation rather than an international regime agreed by consensus, could fuel a ‘race to the bottom’ regarding domestic regulation, leading to the problem of ‘flags of convenience’ as space mining companies move to more favourable jurisdictions with laxer requirements. In addition, when trying to provide further legal certainty at national level for space mining activities, States might disagree with each other on the interpretation of core principles of international space law. As States might have diverging interpretations whilst implementing their international legal obligations, they can create national laws that are not harmonised, leading to the fragmentation of international space law.

However, Tanja Masson-Zwaan and Neta Palkovitz argue that these laws are just a necessary first step to provide regulatory certainty, as they do not preclude subsequent international agreements.²⁹ The permissive interpretation of Article II OST is not the only possible interpretation, but it attempts to promote the interests of States interested in exploiting space resources. Ultimately, State practice will have to evolve further to provide more clarity on the matter and as the international community is still divided on the matter.³⁰

4. International Efforts

Even if States can have their interpretation when regulating space mining, an international framework is still desirable. Thus, UNCOPUOS has an agenda item entitled ‘general exchange of views on potential legal modes for activities in the exploration, exploitation and utilisation of space resources’ since 2015.

The Hague International Space Resources Governance Working Group was established to serve as a forum to discuss and propose possible solutions for the current lack of a legal framework for the use of space resources. In

29 T. Masson-Zwaan and N. Palkovitz, *Regulation of space resource rights: Meeting the needs of States and private parties*, http://www.qil-qdi.org/regulation-space-resource-rights-meeting-needs-states-private-parties/#_ftn27 (Accessed 07.10.2019).

30 *Report of the Legal Subcommittee on its fifty-sixth session, held in Vienna from 27 March to 7 April 2017*, COPUOS, 60th Sess., at 30-33, U.N. Doc A/AC.105/1122 (2017).

November 2019, the WG concluded the Building Blocks for the Development of an International Framework on Space Resources Activities' whereby the group emphasises that a future international framework should create an enabling environment for space resources activities, that takes into account all interests and is in the benefits of all countries and humankind. Also, the envisioned international framework should enable the unrestricted exploration for 'space resources; the attribution of priority rights to operators to search and/or recover space resources *in situ* for a maximum period within a maximum area upon registration in an international registry; provide for the international recognition of such property rights; and resolve the question concerning the sharing of benefits arising out of the utilisation of space resources by recommending an international framework with no required compulsory monetary benefit-sharing. The BB should serve as a basis for negotiations on an international framework and recommendations on an implementation strategy and it is yet to be seen how these practical rules will affect the UNCOPUOS discussions.

As both the geostationary orbit and space resources are considered limited natural resources that share the need to be managed and allocated to prevent their wasteful use and maximise their value, the ITU model has been proposed as a basis for the future international regime regulating space resources activities. However, successful as it may be, it may require alternative procedures for allocation in place of the 'first-come-first-serve' and the '*a priori*' procedures for the global radio frequencies and orbits, to be able to ensure efficiency, compliance and equitable opportunities for all States in the exploitation of space resources.

Sarah Coffey proposes a system of credits allocated amongst States based on Edwin Paxson's first proposal to the credit trading system of the Montreal Protocol – and later the Kyoto Protocol – to space mining. However, the proposal does not resolve whether space resources can become private property once extracted in the first place. While the proposal suggests that they can, it would still be important to have an international agreement to ensure that space resources can legally become the property of whoever extracts them.

Fabio Tronchetti proposes the establishment of an international authority and legal regime in a whole new legal instrument, such as a treaty, explicitly addressing the issue of the commercial exploitation of space resources, based on the solutions adopted by the New York Agreement³¹, despite the difficulties in negotiating a new treaty under the current political circumstances. Similarly, Jeremy L. Zell proposes the creation of a 'Space Resources Authority'³² charged with overseeing space mining operations and

31 F Tronchetti, 2010, 489-524.

32 J. L. Zell, *Putting a Mine on the Moon: Creating an International Authority to Regulate Mining Rights in Outer Space* (2006). Minnesota Journal of International Law. 99, 489-519.

designed to ‘create economic incentive for nations and companies to simultaneously invest in outer space and developing nations.’ Although similar in nature, both proposals diverge in several aspects, including the inclusion of the CHM concept into the new legal regime. While Tronchetti does not recommend it, due to its controversial nature, Zell proposes upholding the core of the CHM concept by giving meaning to it by providing methods through which stakeholders who invest in developing nations can maximise their return on investment.

Finally, the Space Law Committee of the International Law Association³³ analysed the current status of the MA and prepared concrete proposals on possible amendments considering the commercial mining of space resources. Frans von der Dunk, the Special Rapporteur, advanced the replacement of the CHM concept with the ‘province of all mankind.’ Also, he suggests the deletion of the expression ‘or natural resources in place’ in Article 11 (3) and rejects a legal moratorium, recommending that exploitation and use of space resources should be permitted until an international regime is established, provided it does not seriously harm the interests of other States. Finally, he suggests that Article 11 (7) (d) be suppressed as regards the equitable sharing of benefits. According to the Committee, this change ‘implies, rather than a radical change, a down-to-earth adjustment of the original text’, which could boost the acceptability of the MA, even though it would take time and long negotiations to reach an agreement on amendments, especially due to the current international political situation.

5. Conclusion

Space mining plans cannot be viable until operators can be assured that their exploitation activities are legal and that their return on investment is safeguarded. The OST is too vague to provide a safe regulatory framework. The MA was designed to fill in the gaps and, address the ownership of space resources. However, its success is hampered by ideological differences. States bound by the MA are trying to make it the starting point of future international regulation, although this approach is paralysed by the constant opposition of the US, which does not even recognise the MA within the group of the Space Treaties.³⁴

The US and Luxembourg, in an attempt to provide legal certainty, enacted national legislation allowing the exploitation of space resources. These laws

33 Proposed Amendments to the Moon Agreement - Report of the International Law Association (ILA) New Delhi Conference (2002), <https://www.black-holes.eu/resources/ILA.pdf>. (Accessed on 30.09.2019).

34 E. Reaven, *The United States Commercial Space Launch Competitiveness Act: The Creation of Private Space Property Rights and the Omission of the Right to Freedom from Harmful Interference*, 94 Wash. U. L. Rev. 233 (2016), 239.

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can be seen as a way of interpreting the OST, but many States have demonstrated their dissatisfaction with the unilateral approach. Besides, diverging interpretations can create ‘flags of convenience’, a ‘race to the bottom’ when it comes to international standards for the regulation of commercial mining activities, and the fragmentation of international space law.

Finally, proposals for a possible international regime to govern the exploitation of space resources are being discussed. The Hague WG finalised the BB in 2019 and discussions on the legality of mining activities are expected to take a clear form and shape in the next sessions of UNCOPUOS. Ultimately, however, State Practice and States’ interpretation of the provisions of the OST will dictate the next steps and enable the commercial utilisation of space resources, as laws and institutions must go hand in hand with the progress of the human mind.³⁵

35 <https://www.nps.gov/thje/learn/photosmultimedia/quotations.htm> (Accessed on 30.09.2019).