

# Space Mining: The Need for International Global Governance

*Ermanno F. Napolitano\**

## Abstract

An international legal regime that comprehensively governs the exploitation of space resources is currently missing; nevertheless, the United States has enacted legislation specifically disciplining this activity. The US Space Act gives rise to the question of whether a State, through national law, can unilaterally discipline a specific use of commons over which States have joint stewardship, especially if, at the international level, such a use is not comprehensively disciplined and lacks consensus. This paper does not have the ambition to resolve the persisting academic debate surrounding the interpretation of international space law regarding the appropriation and utilization of space resources. Rather, it attempts to provide legal support for the concept that the international community is the sole subject in the position to further specify the rules to govern the use of outer space and celestial bodies, including of the resources thereof. In doing so, the US Space Act is analyzed in light of the key principles of the Outer Space Treaty relevant to the exploration and use of space resources. These principles are further subjected to critical analysis, the outcome of which is assessed against the Moon Agreement provisions. In its conclusion, the paper explores which legal steps States could possibly undertake to ensure a smooth and prosperous development of the space mining industry.

## Introduction

The interest of governments,<sup>1</sup> private entities,<sup>2</sup> and public private partnerships<sup>3</sup> in mining celestial bodies could mainly be attributed to their

---

\* PhD Candidate, McGill University, Faculty of Law (ermanno.napolitano@mail.mcgill.ca). The author would like to thank Dr. Jakhu and Mr. Stotler for the insightful comments. The views expressed and the responsibility for the content rest solely with the author.

1 Fabio 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" (2010) 36:2 J Space L 489 at 489-91 [hereinafter: Tronchetti, "The Moon Agreement"].

2 Paul B Larsen, "Asteroid Legal Regime: Time for a Change?" (2014) 39:2 J Space L 275 at 275 [hereinafter: Larsen, "Time for a Change"].

resources, which, to cite but some, include: platinum group metals, gold, silver,<sup>4</sup> iron, aluminium, chromium, and sources of energy such as Helium-3.<sup>5</sup> Such interest could be based on two reasons. The first is to bring back the mined resources to Earth. Fundamental natural resources of the Earth such as coal, oil, aluminium, silver and copper will be depleted before the close of this century<sup>6</sup> and resources such as Helium-3 could revolutionize the way energy is produced on Earth. The second reason would be to “[keep] the resources in space and [use] them to continue our exploration of the Solar System and beyond.”<sup>7</sup> Water, in fact, is another element that can be found on celestial bodies and is essential to keeping life there and to supporting space stations from where missions can be launched: water, broken into its two constituents, hydrogen and oxygen, provides the two most used elements in a rocket fuel.<sup>8</sup>

An international legal regime that comprehensively governs the exploitation of space resources is currently missing. This, however, doesn’t mean that there is absence of international law in this field. In fact, the Outer Space Treaty (OST)<sup>9</sup> fixes fundamental broad principles of space law, many of which constitute international customary law<sup>10</sup> binding *erga omnes*. As Ambassador Goldberg specified, “[the OST] is a treaty of general principles recognizing that we must develop specific [...] arrangements for specific

---

3 *Ibid* at 277.

4 Massachusetts Institute of Technology, “The Future of Strategic Natural Resources”, online: <<http://web.mit.edu/12.000/www/m2016/finalwebsite/solutions/asteroids.html>>. See also NASA, “Study: Asteroids Provide Sustainable Resource”, online: <[https://www.nasa.gov/mission\\_pages/asteroids/news/asteroidmining.html#Vub0-seTXwc](https://www.nasa.gov/mission_pages/asteroids/news/asteroidmining.html#Vub0-seTXwc)>. See also Nancy Atkinson, “What Are Asteroids Made Of?”, *Universe Today* (12 September 2015), online <<https://www.universetoday.com/37425/what-are-asteroids-made-of/>>.

5 Tronchetti, “The Moon Agreement” *supra* note 1 at 493-495.

6 Jim Keravala, “Space Industrialization and the Protection of Earth”, *Shackleton Energy Company*, online <[https://www.mcgill.ca/iasl/files/iasl/wef-mcgill\\_space-keravala.pdf](https://www.mcgill.ca/iasl/files/iasl/wef-mcgill_space-keravala.pdf)>.

7 Sarah Cruddas, “The Truth About Asteroid Mining” BBC (5 January 2016), online: <<http://www.bbc.com/future/story/20160103-the-truth-about-asteroid-mining>>.

8 *Ibid*.

9 Treaty on 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 (entered into force 10 October 1967) [hereinafter: OST].

10 Francis Lyall & Paul B. Larsen, *Space Law: A Treatise*, (Ashgate, 2009) at 60-70. See also *Statute of the International Court of Justice*, 26 June 1945, 892 UNTS 119 art 38 [hereinafter ICJ Statute]. See also Larsen, “Time for a Change” *supra* note 2 at 289. See also UNGA Res 1962 (XVIII) “Declaration of Legal Principles Governing Activities of States in the Exploration and Use of Outer Space” (13 December 1963).

uses [...].”<sup>11</sup> A first step towards the concretization of an international regime governing the exploitation of space’s natural resources has been made through the creation of the Moon Agreement (MA),<sup>12</sup> which in its Art. 11 para. 5 calls for the creation of an international regime to govern the exploitation of celestial bodies’ natural resources. The Agreement, however, has been ratified by only 18 States, none of which is a “major” space power.

On 25 November 2015, US President Barack Obama signed into law the US Commercial Space Launch Competitiveness Act.<sup>13</sup> The Act gave rise to the question of whether a State, through national law, can unilaterally discipline a specific use of commons over which States have joint stewardship, especially if, at the international level, such a use is not comprehensively disciplined and lacks consensus.

The aim of this paper is to support the concept that the international community is the sole subject in the position to further specify the rules to govern the use of outer space and celestial bodies, including of the resources thereof. In doing so, it analyzes the US Space Act against those OST principles relevant to the exploration and use of space resources. Further, the MA is critically analyzed to clarify its fundamental usefulness for the development of a comprehensive international regime and procedures to govern the exploitation of celestial bodies’ natural resources. Lastly, the author attempts to suggest potential regulatory steps that could be applied to the exploitation of these resources.

## 1. The US Commercial Space Launch Competitiveness Act

Title IV, sec. 402 (a) of the Act amends Title 51 of the US Code, adding to it Chapter 513 (named Space Resource Commercial Exploration and Utilization) and items 51301 to 51303. This chapter opens with a distinction of definitions: *asteroid resource* and *space resource*. The latter is defined as “an abiotic resource in situ in outer space”<sup>14</sup> and “includes water and minerals”;<sup>15</sup> the former is the same resource “found on or within a single asteroid.”<sup>16</sup> Therefore, asteroid resources seem to be categorized as a subset of space resources, with no real difference; the legislation, by indicating that

---

11 United States Senate, “Treaty on Outer Space, Hearings before the Committee on Foreign Relations” 19th Session on Executive D, 90th Congress, 1st Sess (US Government Printing Office: Washington, 1967) at 12 [hereinafter: Hearings].

12 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 5, 1979, 1363 UNTS 3, 18 ILM. 1434 [hereinafter: MA].

13 US, *Commercial Space Launch Competitiveness Act*, Pub. L. No. 114-90, § 401, 129 Stat. 70 (2015) [hereinafter: US CSLCA].

14 *Ibid* at §51301 (2)(a) (*in situ* means “in the original place”).

15 *Ibid* at §51301 (2)(b).

16 *Ibid* at §51301 (1).

asteroid resources are space resources, is redundant. Although, in doctrine, speculations have been made that the legal nature of asteroid was probably not that of celestial bodies,<sup>17</sup> the OST draft history and the ordinary meaning of celestial bodies does not allow for their exclusion.<sup>18</sup> The Act, therefore, unnecessarily clarifies that asteroids are celestial bodies (or, at least, that the resources extracted from asteroids are legally the same as those extracted from celestial bodies).

Under part 51303, the Act contains a clause that justifies the commercial recovery of space resources:

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 resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.<sup>19</sup>

In spite of the explicit provision of the US commitment to be consistent with its obligations under international law, the Act may not be in line with the international regime governing the exploration and use of outer space, especially with the US's international obligations arising from the OST.

Although the US is not party to the 1969 Vienna Convention on the Law of Treaties<sup>20</sup> and the Convention is not directly applicable to the OST,<sup>21</sup> some principles of the Convention have become customary international law<sup>22</sup> and thus fall within the sources of international law of Art. 38(b) of the ICJ's Statute.<sup>23</sup> Particularly, the rules of interpretation of articles 31 and 32 of the VCLT are considered as such. It is in accordance with those principles that a critical analysis of international space law below is provided.

---

17 For an exhaustive list of these and similar positions see: Philip de Man, *Exclusive Use in an Inclusive Environment* (Switzerland: Springer International Publishing, 2016) at 106-08 [hereinafter: De Man, *Exclusive Use*].

18 Hearings, *supra* note 11 at 14. See also: Manfred Lachs, *The Law of Outer Space: An Experience in Contemporary Law-Making*, (Martinus Nijhoff Publisher, 2010) at 44 [hereinafter: Lachs, *The Law of Outer Space*]. See also: Larsen, "Time for a Change?" *supra* note 2 at 277-80.

19 US CSLCA *supra* note 13 at §51303.

20 *Vienna Convention on the Law of Treaties*, 114 parties, 23 May 1969, 18232 (Entered into force in 1980) [Hereinafter VCLT].

21 *Ibid* Art. 4.

22 Case concerning The Territorial Dispute (Libyan Arab Jamahiriya v Chad) (Judgment) [1994] ICJ Rep 6, paragraph 41; Case concerning Maritime Delimitation and Territorial Question (Qatar v Bahrain) (Judgment) [1995] ICJ Rep 6, paragraph 33; Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory (Advisory Opinion) [2004] ICJ Rep 136, paragraph 94.

23 ICJ Statute, *supra* note 10, Art. 38.

## 2. The Outer Space Treaty

OST Art. I para. 1's phrases "for the benefit and in the interest of all countries" and "as a province of all mankind" express the so-called "common interest principle".

The phrase "as a province of all mankind" expresses the concept that States have joint stewardship over the exploration and use of outer space and celestial bodies, a matter of global concern.<sup>24</sup> Thus, the international community should make decisions multilaterally and inclusively when dealing with those issues of joint stewardship.<sup>25</sup> The wording that exploration and use of outer space and its celestial bodies "shall be carried out for the benefit and in the interest of all countries" aims to protect the inclusive interest of the international community as a whole: the exploration and use of outer space and its celestial bodies should not be undertaken only for the exclusive interest and advantage of specific States but also in the inclusive interest and benefit of the international community.<sup>26</sup> The "principle of common interest" applies irrespectively of countries' "degree of scientific or economic development",<sup>27</sup> demarcating how

[t]he spirit of compromise shown by the space Powers and the other Powers had produced a treaty which established a fair balance between the interests and obligations of all concerned, including the countries that had as yet undertaken no space activities.<sup>28</sup>

According to Hobe, in Art. I para. 1, the wording "irrespective of their degree of scientific or economic development" clarifies the general direction

24 Stephan Hobe, Bernhard Schmidt-Tedd & Kai-Uwe Schrogl (eds), *Cologne Commentary on Space Law*, Vol 1 (Koln: Carl Heymanns Verlag, 2009) at 37 para 45 [hereinafter: *Cologne Commentary*].

25 Evan J Criddle & Evan Fox-Decent, "Mandatory Multilateralism" 113 *American J of Int L* (2019 Forthcoming) at 28-29 (SSRN online: <[https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3328928&download=yes](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3328928&download=yes)>). See also: Ram Jakhu & Isavella Vasilogeorgi, "The fundamental Principles of Space Law and the Relevance of International Law" in Stephan Hobe and Steven Freeland, eds, *In Heaven as on Earth? The Interaction of Public International Law on the Legal Regulation of Outer Space*, (Cologne: IASL - Cologne University, 2013) 21 at 22 [hereinafter: Jakhu & Vasilogeorgi, "Fundamental Principles"].

26 *Cologne Commentary*, *supra* note 24 at 38 para 50-51.

27 According to Ambassador Goldberg, this wording "was added on the recommendation of the suggestion of the representative from Brazil to emphasize the universal reach of the phrase, "[a]ll countries" see: Hearings, *supra* note 11 at 55.

28 *United Nations treaties and principles on outer space - A commemorative edition Published on the occasion of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III)*, UN, 1492nd Meeting of the First Committee (A/C.1/SR.1492) (1999) at 69 online: <[http://www.unoosa.org/pdf/reports/ac105/AC105\\_722E.pdf](http://www.unoosa.org/pdf/reports/ac105/AC105_722E.pdf)>.

of the clause “for the benefit and in the interests of all countries” in the sense that

[t]he respective benefit of the activity in outer space shall not only be for those countries that have taken an investment or have undertaken the activity, but shall be done in the interest of all countries.<sup>29</sup>

Therefore, the non-space-faring States shall equitably participate in the benefits deriving from these activities.<sup>30</sup> Although the article lacks precision and details on how the benefit of exploration and use should be shared equitably, it seems unlikely that the specification of such inclusive interest can be identified by a single nation.

Art. I para. 2 provides the freedom of all activities related to exploration and use, whether they are carried out by States or by their public or private entities, and whether they are civilian, military or commercial.<sup>31</sup> However, this so-called “freedom principle” cannot be intended as unconditional freedom of action. Rather, it is subject to the “common interest principle”, which appears to be predominant over such a freedom.<sup>32</sup> Art. I para. 2 itself provides limits within which such freedom could be exercised, on which, however, the US Space Act does not elaborate:

1-“without discrimination of any kind”, which “implies that the delayed use by some States is not a reason for their freedom to be jeopardized by the first comers.”;<sup>33</sup>

2-“on a basis of equality”, which recalls the principle of sovereign equality of Art. 2(1)<sup>34</sup> of the UN Charter, and is intended as all States having equal rights under international law to explore and use outer space;<sup>35</sup>

3-(as further specified in Art. III) “in accordance with international law” which prevails over the freedom of action: States, in exercising their rights, must not infringe similar rights of other States and shall have due regard for the legitimate interests of these latter; a concept further specified in Art. IX. International law, indeed, is not anymore the law of “don’ts” which allows States’ co-existence, but, rather, it is the law which binds States to positive cooperation for common interest in what is a new interdependent dimension.<sup>36</sup>

---

29 *Cologne Commentary*, *supra* note 24 at 38 para 50.

30 *Ibid* para 51.

31 Jakhu-Vasilogeorgi, “Fundamental Principles”, *supra* note 25 at 22.

32 Ram S. Jakhu, “Legal Issues Relating to the Global Public Interest in Outer Space” (2006) vol. 32, JSL 31 at 41[hereinafter: Jakhu, “Global Public Interest”].

33 *Ibid* at 40.

34 *Charter of the United Nations*, 26 June 1945, Can TS 1945 No 7, Art. 2(1).

35 Jakhu, “Global Public Interest”, *supra* note 32 at 40.

36 Wolfgang Friedmann, “National Sovereignty, International Cooperation, and the Reality of International Law” (1963) 10:4 UCLA L Rev 739 at 747.

Art. II provides that outer space, including celestial bodies, “is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”<sup>37</sup> This article contains the so called “principle of non-appropriation” which constitutes a prerequisite for the principles of “common interest” and “freedom”: a State allowed to appropriate outer space and celestial bodies would defeat the free exploration and use by, and for the benefit of, all countries.<sup>38</sup>

One may conclude that the US Space Act

is simply about confirming and codifying the rights for U.S. private citizens/companies to peacefully explore, extract and own resources extracted, [...] explicitly codifying rights for the private sector that were only implicit in the 1967 Outer Space Treaty.<sup>39</sup>

In support of such interpretation, it has been asserted that OST’s Art. II principle of non-appropriation is balanced by the freedom of exploration and use of Art. I para. 2<sup>40</sup> and that

the situation of a private company wanting to extract resources from a sovereign-free celestial body is similar to a commercial fishing vessel in international waters [which is bound to the laws of the flag country and that,] [...] while it doesn’t own the water (land) or the fish (resources) in the water, it has a right to the ownership of the fish once extracted.<sup>41</sup>

However, as Lachs pointed out, notwithstanding that the activities carried out in outer space and its celestial bodies are subject to international law, “the mechanical transfer of institutions from one environment to another [...] may lead to distortions and even seriously stunt the development of the new branch of law”.<sup>42</sup> Certainly, general international law could be applied to space when a certain area is not regulated, but this must be done carefully:

[a]ny argument for an analogous interpretation of the regime on fishing on the high seas and the exploitation of celestial bodies would be oversimplifying and unjustified, as the peculiarities of both environments are too dissimilar to overlook the differences in the applicable rules of their regimes.<sup>43</sup>

---

37 OST, *supra* note 9, Art. II.

38 Ram S Jakhu, Joseph N Pelton & Yaw Otu Mankata Nyampong, *Space Mining and its Regulations*, (Switzerland: Springer International Publishing, 2017) at 120 [hereinafter: Jakhu, Pelton & Nyampong, *Space Mining*].

39 Tanja Masson-Zwaan & Bob Richards, “International Perspectives on Space Resource Rights”, *Space News* (2015) online: <<http://spacenews.com/op-ed-international-perspectives-on-space-resource-rights/>>.

40 *Ibid.*

41 *Ibid.* See also Tronchetti, “The Moon Agreement”, *supra* note 1 at 498.

42 Lachs, *The Law of Outer Space*, *supra* note 18 at 20.

43 De Man, *Exclusive Use*, *supra* note 17 at 8.

## As Jakhu points out, the innovative principles of the OST

must be understood and applied as originally conceived rather than from the perspectives of traditional international legal principles and rules adopted before the start of the space age or contemporary nationalistic policies and initiatives.<sup>44</sup>

One must be also aware that, in case of conflict between OST's provisions and general international law, apart from when the latter is a norm of *jus cogens*, the former will prevail under the rule that *lex specialis derogat legi generali*,<sup>45</sup> notwithstanding that, even in such a case, general international law guides the interpretation and application of the *lex specialis*' provisions.<sup>46</sup> One may further assert that because Art. II of the OST doesn't expressly mention private entities, those are free to appropriate portions of space.<sup>47</sup> Art. VI OST makes States internationally responsible for their national activities, whether they are carried out by governmental agencies, private entities, or international organizations of which the State is a party. It imposes on the State the obligation to authorize (license) and continuously supervise that such activities are carried out in conformity with the treaty. International responsibility arises where a breach of an international obligation is attributable to a State.<sup>48</sup> Article VI modifies the element of attributability, broadening its scope by including situations where a *genuine link* exists between a private entity and a State.<sup>49</sup> Such a link has to be found in the rules of international law related to the exercise of jurisdiction between the State and the subject who is carrying out the activity.<sup>50</sup>

Under Art. II States are prohibited from appropriating. It seems illogical that States could grant more power to their subjects, in such a case, private entities, than that which States themselves possess. Further, private appropriation of outer space and celestial bodies would defeat the purpose of the treaty and the principles of "common interest" and "freedom". Thus, under Art. VI States have the obligation to ensure that their private entities

44 Jakhu, "Global Public Interest", *supra* note 32 at 34.

45 Lachs, *The Law of Outer Space*, *supra* note 18 at 13.

46 See Report of the Study Group of the ILC, "Fragmentation Of International Law: Difficulties Arising From The Diversification And Expansion Of International Law", ILC 58th sess, A/CN.4/L.702 (2016) online: <[https://www.un.org/ga/search/view\\_doc.asp?symbol=A/CN.4/L.702](https://www.un.org/ga/search/view_doc.asp?symbol=A/CN.4/L.702)>.

47 Stephen Gorove, "Interpreting Article II of the Outer Space Treaty", (1969) 37 Fordham L Rev 349 at 351.

48 ILC, *Articles on Responsibility of States for Internationally Wrongful Acts*, UN Doc A/56/83 (2001) Art. 2 [hereinafter: ILC, ARS].

49 Jakhu & Vasilogeorgi, "Fundamental Principles", *supra* note 25 at 27.

50 *Ibid.* See also: Nottebohm Case, *Liechtenstein v. Guatemala*, ICJ Report 1955, P. 23; See also The Barcelona Traction Case, *Belgium v. Spain*, ICJ Reports 1970, §§ 85, 88.



comply with the provisions of the OST, including with the principle of non-appropriation of Art. II.

Following this interpretative context, the prohibition of appropriation, whether “national” (which includes both sovereign and private property rights<sup>51</sup>) or by “any other means”, and the interpretation of Art. II in conjunction with Art. VI, intend that

no action, either by a State(s) or a private entity or a natural person [...] will ever sustain a [valid legal] claim that gives rise to a right of ownership over any part of outer space, including [...] celestial bodies.<sup>52</sup>

This reflects the US Government’s position when, in the person of President Johnson, it submitted the OST to the Senate, requiring consent to ratification,<sup>53</sup> and it is further confirmed by the OST’s negotiation history which shows how the principle of non-appropriation was not intended to be circumvented by allowing private appropriation.<sup>54</sup>

In 2015 the IISL issued a Position Paper on Space Resource Mining which, in contradiction with the two previously issued positions on this topic,<sup>55</sup> affirms, in support of the US Space Act, that

in view of the absence of a clear prohibition of the taking of resources in the Outer Space Treaty one can conclude that the use of space resources is permitted.<sup>56</sup>

Such affirmations seem to rely on the concept “what is not prohibited is permitted” which the PCIJ used as *orbiter dictum* in the *Lotus Case*,<sup>57</sup> a concept subsequently rejected by the ICJ in *Fisheries* and *Nottebohm*,<sup>58</sup> and

---

51 Manfred Lachs, quoted by Cristol in Carl Q Christol, “Article 2 of the 1967 Principles Treaty Revisited” (1984) 9 Ann Air & Sp L 217 at 218.

52 *Cologne Commentary*, *supra* note 24 at 53 para. 32.

53 Hearings, *supra* note 11 at 105-106.

54 D. Goedhuis, *Legal Aspect of the Utilization of Outer Space*, (1970) 17 Neth Int’l & L rev 25 at 36.

55 IISL, “Statement by the Board of Directors of the International Institute of Space Law (IISL) on Claims to Property Rights Regarding the Moon and Other Celestial Bodies” (2004) online: <[http://iislwebo.wwwnlss1.a2hosted.com/wp-content/uploads/2015/03/IISL\\_Outter\\_Space\\_Treaty\\_Statement.pdf](http://iislwebo.wwwnlss1.a2hosted.com/wp-content/uploads/2015/03/IISL_Outter_Space_Treaty_Statement.pdf)>; IISL, “Statement by the Board of Directors of the International Institute of Space Law (IISL)” (22 March 2009) online: <<http://www.iislweb.org/docs/Statement%20BoD.pdf>>.

56 IISL, “Position Paper on Space Resource Mining” (20 December 2015) at 3 para 2, online: <[http://iislwebo.wwwnlss1.a2hosted.com/wp-content/uploads/2015/12/Space\\_ResourceMining.pdf](http://iislwebo.wwwnlss1.a2hosted.com/wp-content/uploads/2015/12/Space_ResourceMining.pdf)>.

57 The Case of the S.S. *Lotus* (*France v. Turkey*), 1927 P.C.I.J. (ser. A) No. 10 at 18 (Sept. 7).

58 Ian Brownlie, *Principles of Public International Law* (Oxford: Oxford University Press, 2003) at 301 [hereinafter: Brownlie, *Pub Int L*].

in successive international conventions,<sup>59</sup> dismissed by Lachs as “not valid today”<sup>60</sup> and widely criticized by numerous authorities.<sup>61</sup>

One may argue that the Art. II principle of non appropriation proscribes “acquisition of territory” i.e. territorial appropriation, in which case the question is whether the possession and ownership of resources can rise to the acquisition of territory. Exploitation of resources constitutes a form of use of outer space pursuant to Art. I para. 2; however, exploitation is also a form of use that under Art. II cannot amount to appropriation. In practice, even if Art. II were limited to “territorial appropriation”, it may be hard to clearly distinguish between “legitimate use and prohibited appropriation by use”:<sup>62</sup> for example, the exploitation of an asteroid until it is fully consumed may be unlawful.<sup>63</sup>

The Art. I para. 2’s right of use, and of exclusion of others in the use of space resources, is balanced by articles II and I para. 1, which seem to imply that any use should necessarily be temporary and that quantitative limitations on space resource exploitation and requirements of equitable distribution of the benefit derived from these activities should be applied.<sup>64</sup>

The above analysis attempts to demonstrate that the inclusive interests at stake render any national authority unfit to unilaterally define rules governing the exploration and use of this common, even if limited to their nationals. The legal nature of outer space and of the interests protected by the OST suggest that the international community should multilaterally define and establish rules to govern the activities of space resource exploitation.

### **3. The Moon Agreement: A Potential First Step towards a New International Regime Governing Space Exploitation**

The MA is a further elaboration of the OST principles<sup>65</sup> and offers an important mechanism to establish an exhaustive regime with regards to the exploitation of celestial bodies’ resources.

Under Art. 6 para. 2 MA, “[i]n “carrying out scientific investigations and in furtherance of the provision of [the] Agreement”,<sup>66</sup> States (or their private

---

59 Ram Jakhu, “Global Public Interest”, *supra* note 32 at 41.

60 Lachs quoted in V.S. Vereshchetin, “Against Arbitrary Interpretation of Some Important Provisions of International Space Law”, (1982) 25 Coll L Out Sp 153.

61 Brownlie, *Pub Int L*, *supra* note 58 at 301. See also Ram Jakhu, “Global Public Interest”, *supra* note 32 at 41-42. See also Jakhu, Pelton & Nyampong, *Space Mining*, *supra* note 38 at 124.

62 Ram S Jakhu & Yaw Otu Mankata Nyampong, “Some Legal Aspects of Space Natural Resources” (2016) 18:1 Eur J L Reform 86 at 93.

63 *Ibid.*

64 De Man, *Exclusive Use*, *supra* note 17 at 418.

65 MA, *supra* note 12, preamble.

entities authorized and continuously supervised) have the right to collect and remove samples of celestial bodies' resources and, in the course of their scientific investigation, to use mineral and other substances of celestial bodies in quantities appropriate to support their missions. This provision allows States to test the feasibility of exploitation and authorize missions to effectively mine and bring the results to Earth for verification, evaluation and study, granting the possibility to the States which extract the material to keep it.

Art. 11 para. 2, reiterates OST's Art. II's principle of non-appropriation, and Art. 11 para. 3, prohibits property rights over the surface, subsurface or any part thereof or natural resources *in place* of the Moon and other celestial bodies. From the combined reading of such articles, and especially of Art. 11 para. 3, it appears that the MA does not restrict the exploitation of celestial bodies' natural resources, which involves their removal. These provisions allow the initiation of the exploitation, understand its barriers, the availability of resources and procedures of extraction and are without prejudice to the establishment of an international regime to govern the exploitation of celestial bodies' natural resources once such exploitation is about to become feasible.<sup>67</sup>

Yet, the combination of Art. 11 paragraphs 1, 3, and 7(d) is probably the reason why many countries have not ratified the MA. However, the interpretation of such articles must be done carefully. Art. 11 para. 1 provides that the "common heritage of mankind" principle finds its expression in the provision of the Agreement, particularly in Art. 11 para. 5, which redirects to the establishment of an international regime and procedures when the exploitation is about to become feasible. Basically, the Treaty postpones the specification of the "common heritage of mankind" principle to a future determination at a possible future conference of States. As long as this principle is not determined, what is extracted under the MA would fall under a principle whose application is held in abeyance. Any attempt at interpreting such principles with analogies is misleading.<sup>68</sup> Further, the regime envisioned in Art. 11 para. 5 should be modelled after the unique peculiarities of space and should not necessarily resemble the deep seabed regime, which was criticized by the US and is one of the reasons the US has not adhered to the UNCLOS.<sup>69</sup>

---

66 *Ibid*, Art. 6 para. 2.

67 *Ibid*, Art. 11 para. 3.

68 Ram Jakhu & Maria Buzdugan, "Development of the Natural Resources of the Moon and Other Celestial Bodies: Economic and Legal Aspects" (2008) 6:3 *Astropolitics* 201 at 229-230.

69 Rüdiger Wolfrum, "Common Heritage of Mankind" (2009) Max Planck Encyclopedia of Public International Law-Oxford University Press at A. 1.

As per Art. 11 para. 7, according to Larsen, its purposes must be interpreted as guidelines to the envisioned regime which are not binding and which may be changed.<sup>70</sup> However, I believe that the term “shall”,<sup>71</sup> which precedes such purposes, means that they must be followed and that their respect does not hinder building an international regime that could facilitate resource exploitation and satisfy the interests of the international community. Particularly, Art. 11 para. 7(d) simply provides that an equitable (and not equal) sharing in the benefits derived from such resources must be realized and that the needs and interests of the developing countries, as well as the efforts of the countries that contributed to the celestial bodies’ exploration, must be taken into account. This provision avoids cutting out the developing countries from the benefits of celestial bodies’ resource exploitation. In fact, developing countries, once they have the capabilities to reach resources in space, would be exposed to greater efforts since the nearest and most feasible resources would probably have been already exploited. Art. 11 para. 7(d) is a basis to create a regime oriented to the concept that no country must be left behind, securing the “common interest principle”.

#### **4. A Possible Regime to Govern Space Exploitation**

A hybrid system between ITU and pre-privatized Intelsat would be ideal for the purposes of mining the celestial bodies and sharing their benefits. An international UN agency - ITU-like - in charge of dividing and classifying the areas where resources would be extracted would be optimal. The various areas could be classified as asteroids, the Moon, planets and their satellites. Further, each area of those bodies which is subject to exploitation could be subdivided on the basis of the type of material to be extracted. In this way, this independent UN body would monitor and ensure that mining activities respect the space environment and would measure the depletion of resources. In addition to such a body, an international Intelsat-cooperative-like network formed and administrated by all the mining companies would be ideal. All States would contribute to the cooperative on the basis of their needs and capabilities, and the distribution of the profit from the cooperative’s mining activities as well as the participation in its decision-making process would be based on the amount of contribution. Such a structure would ensure an equitable sharing of the celestial bodies’ resource benefits with all countries, respecting their needs and interests within the respect of the environment in space.

Nevertheless, recent geopolitical events have demonstrated a tendency towards unilateralism and nationalism. A potential starting point, as Hobe suggested, could be a United Nations General Assembly resolution that

---

70 Larsen, “Time for a Change”, *supra* note 2 at 292.

71 MA, *supra* note 12, Art. 11 para. 7.

further elaborates on the OST principles and provides a potential basis for a more advanced legal framework for uses of outer space and celestial bodies.<sup>72</sup>

## 5. The Next Step the US Could (or Should) Possibly Take

Art. 32 ILC Articles on State Responsibility<sup>73</sup> is modelled on Art. 27 VCLT, which states that: "A party may not invoke the provisions of its internal law as justification for its failure to perform a treaty [...]".<sup>74</sup> This principle constitutes international customary law.<sup>75</sup>

With regards to this principle, according to Brownlie, "[a]rising from the nature of treaty obligations and from customary [international] law, there is a general duty to bring internal law into conformity with obligations under international law".<sup>76</sup> This means that through the signature and ratification of an international treaty, States commit themselves to take all appropriate legislative and administrative actions necessary to implement national law in such a way that the provisions of the treaty are protected and ensured under domestic law. In some circumstances, national legislation could constitute a breach of a treaty provision. However, the fact that a State fails to bring such conformity to its national legislation "is not in itself a direct breach of international law".<sup>77</sup> In fact, "a breach arises only when the state concerned fails to observe its obligations on a specific occasion."<sup>78</sup> In light of this, despite the fact that it cannot yet be considered that a breach of international law has happened from the enactment of the US Space Act, the Act could constitute the basis to allow, in its whole or part, a breach of it. As a State Party to the OST, the US is obliged to make sure that any private company it authorizes will not violate the State's treaty obligations. As such it could ratify the Moon Agreement and push the international community to collectively regulate the exploitation of the resources of celestial bodies through the enactment of the legal regime envisaged in Art. 11 para. 5.

---

72 Stephan Hobe, "Adequacy of the Current Legal and Regulatory Framework Relating to the Extraction and Appropriation of Natural Resources in Outer Space" (2007) 32 *Ann Air & Sp L* 115 at 130. See also: *Report of the Legal Subcommittee on its fifty-fifth session, held in Vienna from 4 to 15 April 2016*, COPUOS Legal Subcommittee, UN Doc A/AC.105.1113, 250; See also: *Report of the Legal Subcommittee on its fifty-eighth session, held in Vienna from 1 to 12 April 2019*, COPUOS Legal Subcommittee, UN Doc A/AC.105.1203, 278-280.

73 ILC, *ARS*, *supra* note 48, Art. 32.

74 VCLT, *supra* note 20, Art. 27.

75 Mark Eugen Villiger, *Commentary on the 1969 Vienna Convention on the Law of Treaties* (Martinus Nijhoff Publishers: Leiden-Boston, 2009) at 374-375.

76 Brownlie, *Pub Int L*, *supra* note 58 at 35.

77 *Ibid.*

78 *Ibid.*

## **6. Conclusion**

Today, fundamental Earth resources are almost exhausted, and pollution, conflicts, and diseases are consequences of their over-exploitation. The world needs to find a valid alternative to such depletion, and outer space seems to offer it. Therefore, building an international legal framework in line with international space law principles is fundamental to guaranteeing an equitable distribution of such resources for the benefit of all humankind. The US Space Act provisions, at the moment, don't seem in line with the OST obligations. However, a breach of international law by the US cannot be claimed until a private US company commits a concrete action of appropriation without equitable distribution of its benefit on the ground of the US Space Act. Perhaps the international community can take action and join the MA as a first step towards the concretization of a comprehensive international legal framework governing the exploitation of celestial bodies' resources. Nevertheless, if countries act unilaterally regarding only their interests, the risk of chaos, disparities and a new space race (which could even lead to armed conflicts) would be inevitable.