REACHING FOR THE MOON: MINING IN OUTER SPACE

VIRGINIE BLANCHETTE-SÉGUIN*

I. INTRODUCTION

On August 3, 2016, the United States' Federal Aviation Administration (FAA) authorized the first private lunar mission.[1] It has permitted Moon Express, Inc. (MoonEx), a privately held American company, to travel beyond Earth's orbit and then land and navigate on the Moon's surface.[2] MoonEx has triumphantly claimed that "[t]his breakthrough U.S. policy decision" marked the beginning of "a new era of ongoing commercial lunar exploration and discovery, unlocking the immense potential of the Moon's valuable resources."[3] Indeed, the FAA's authorization issued last August is the first step allowing MoonEx to achieve its ultimate goal: mining the

* LL.M. in International Legal Studies, New York University School of Law, 2017. Special thanks to Raphael G. Toman and Aaron B. Gavin, my colleagues at the JILP, for their substantive comments and line edits on my drafts. All errors and omissions are my own.

1. Press Release, Fed. Aviation Admin., Fact Sheet—Moon Express Payload Review Determination (Aug. 3, 2016) [hereinafter FAA Fact Sheet], https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=20595; SPURRING PRIVATE AEROSPACE COMPETITIVENESS AND ENTREPRENEURSHIP ACT OF 2015, H.R. REP. NO. 114-119, at 8 (May 18, 2015) ("The Department of Transportation derives its authority over commercial space transportation from the Commercial Space Launch Act . . . and has delegated that authority to the FAA . . . .").

2. FAA Fact Sheet, *supra* note 1; MOON EXPRESS, MOON EXPRESS PRESS KIT (Aug. 3, 2016), http://www.moonexpress.com/files/moon-express-press-kit.pdf.

3. MOON EXPRESS, *supra* note 2.

Moon for valuable natural resources and bringing them back to Earth.[4]

This development raises the question of the legality of private ownership over lunar resources under the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies[5] (Outer Space Treaty) which the United States ratified in 1967.[6] While it is well settled according to international law that no territorial appropriation of the Moon by States is allowed,[7] the legal status of lunar natural resources that are extracted through human activities is far from clear. This Commentary, will (1) discuss the relationship between the concepts of territorial sovereignty and resource ownership, (2) present the current American approach to how private property is granted to U.S. citizens over extracted space resources, and (3) criticize the analogy that has been drawn between the legal regime applicable to mining in outer space and the one governing fishing on the high seas. Underlying these three sections is one ultimate question: Is American legislation compatible with international space law and the United States' international obligations?[8]

---

4. *Id.*

5. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, art. 1, Jan. 27, 1967, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

6. As of January 27, 2017, exactly 50 years after the date it opened for signature, 105 States were parties to the convention, while 24 others have signed but not yet ratified it. *See Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, U.N. TREATY SERIES, https://treaties.un.org/Pages/showDetails.aspx?objid=0800000280128cbd (last visited Apr. 1, 2017).

7. Outer Space Treaty, *supra* note 5, art. II.

8. It is useful to note that the mere fact that the FAA authorized a private exploration mission on the Moon is not problematic in itself from an international law perspective. Indeed, Article VI of the Outer Space Treaty directly envisions that lunar activities may be pursued by private entities by providing that "[t]he activities of non-governmental entities in outer space, including the Moon . . . , shall require authorization and continuing supervision by the appropriate State Party to the Treaty." Outer Space Treaty, *supra* note 5, art. VI. In this respect, the authorization of MoonEx's forthcoming lunar mission by the FAA is in direct compliance with the legal requirements set out by the Outer Space Treaty for private activities on the Moon. *See* Statement by the Board of Directors, International Institute of Space Law, On Claims to Property Rights Regarding The Moon and Other Celestial Bodies (2004) [hereinafter *IISL Board Statement of 2004*], http://

II. Distinction between Sovereignty and Resource Ownership in Outer Space

The Outer Space Treaty unequivocally provides for the non-appropriation of celestial bodies by States. Rather, it establishes a cooperative framework building on notions such as 'mankind' and all States' community of interests. Article I mentions that "[t]he exploration and use of outer space . . . shall be carried out for the benefit and in the interest of all countries . . . and shall be the province of all mankind." Immediately following, Article II establishes that the Moon cannot be subject to appropriation by a State: "Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." This far-reaching and comprehensive provision prohibit all States from annexing or claiming to exercise their sovereign jurisdiction over any space territories, unlike previous appropriations of non-sovereign territories on Earth. On July 31, 1969, the United States representative to the U.N. Committee on the Peaceful Uses of Outer Space, Mr. Herbert Reis, expressed the rationale behind this non-appropriation principle:

> The negotiating history of the [Outer Space] Treaty shows that the purpose of this provision [Article II] was to prohibit a repetition of the race for the acquisition of national sovereignty over overseas territories that developed in the sixteenth, seventeenth, eighteenth and nineteenth centuries. The Treaty makes clear that no user of space may lay claim to, or seek to establish, national sovereignty over outer space or a celestial body.[9]

For this reason, the Moon was not annexed by the United States, even though Neil Armstrong, like Columbus who

---

www.iislweb.org/docs/IISL_Outer_Space_Treaty_Statement.pdf; René Lefeber, *Relaunching the Moon Agreement*, 1 Air Space L. 41, 43 (2016); Sarah Jane Fox, *SPACE: The Race for Mineral Rights 'The Sky is No Longer the Limit' Lessons from Earth!*, 49 Resources Pol'y 165, 174 (2016).

9. Erik N. Valters, *Perspectives in the Emerging Law of Satellite Communication*, 5 Stan. J. Int'l Stud. 53, 66–67 (1970) (quoting Herbert Reis, U.S. Delegation Representative, Statement at the Second Session of the Working Group on Direct Broadcast Satellites (July 31, 1969)).

landed on the sands of a West Indies beach, planted the U.S. flag on the lunar surface on July 21, 1969.

If the Moon is "the province of all mankind" and therefore not under the national jurisdiction of any State, is it possible to exploit and own lunar natural resources? What legal regime governs land ownership and exploitation rights in outer space? As discussed in the following section, the ability to grant exploitation and property rights over natural resources is normally an attribute of a State's sovereign power over the territory in question. Unfortunately, the Outer Space Treaty does not directly address resource exploitation and property rights.[10]

In contrast to the elision of the Outer Space Treaty, the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies[11] (Moon Agreement) is the only international instrument arguably prohibiting private ownership over lunar natural resources. Article 11(3) provides that "[n]either the surface nor the subsurface of the Moon, nor any part thereof or natural resources in place, shall become property of any State, . . . or non-governmental entity or of any natural person." However, only a relatively small number of States—not including the United States[12] or any other major space-faring State—have ratified that convention.[13] The Moon Agreement therefore does not have any governing effect on the exploitation of space resources. In addition, even the much more explicit wording of the Moon Agreement (as compared with the Outer Space Treaty) has been found by some

10. Fox, *supra* note 8, at 174.

11. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 1363 U.N.T.S. 21.

12. According to some commentators, it is precisely because the Moon Agreement did not provide an opportunity for commercial exploitation of space resources that the United States decided not to become a party to that treaty. José Monserrat Filhot, *Outer Space as Private Property and Theater of War?*, *in* 8 PRIVATE LAW, PUBLIC LAW, METALAW AND PUBLIC POLICY IN SPACE 123, 128 (Patricia Margaret Sterns & Leslie I. Tennen eds., 2016); Fox, *supra* note 8, at 175.

13. As of March 29, 2017, 17 States were parties to the convention. The United States, China, Russia, France, Japan, the United Kingdom, Germany, India, Canada and Italy do not figure among those. *See Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, U.N. TREATY COLLECTION, https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXIV-2&chapter=24&clang=_en (last updated Mar. 29, 2017).

commentators not to prohibit resource ownership. Indeed, the words "in place" in Article 11(3) have given rise to an alternative interpretation that allows for ownership over resources that have been mined and that are therefore no longer "in place."[14]

In 2008, a number of States parties to the Moon Agreement that were concerned with its low participation level—namely Austria, Belgium, Chile, Mexico, the Netherlands, Pakistan, and the Philippines—issued a joint statement on the benefits of adherence to the agreement.[15] They notably wrote that the "Moon Agreement does not preclude any modality of exploitation, by public or private entities, or prohibit the commercialization of such resources, provided that such exploitation is compatible with the principle of a common heritage of mankind."[16] This suggested an understanding by these States that the appropriation of space resources on a mere 'first come first served' basis would be unlawful under the Moon Agreement. They rightly stressed that "[t]o date, no other solution allowing the possible exploitation of the natural resources of celestial bodies has been proposed under the provisions of the United Nations treaties on outer space."[17]

It is in this international context that the U.S. Commercial Space Launch Competitiveness Act[18] (Space Act of 2015) signed by President Obama on November 25, 2015 must be understood.

III. Property Rights over Space Resources: The American Approach

MoonEx's commercial ambitions are spurred by the American "pro-growth" policy of encouraging spatial commercial enterprises[19] as embodied in the Space Act of 2015. In this

14. Fox, *supra* note 8, at 174.

15. *See* Lefeber, *supra* note 8, at 42–44.

16. Comm. on the Peaceful Uses of Outer Space, *Joint Statement on the Benefits of Adherence to the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies by States parties to the Agreement*, ¶ 7(e) U.N. Doc. A/AC.105/C.2/L.272 (2008) [hereinafter *Joint Statement*].

17. *Id.*, ¶ 7(f).

18. U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat. 704 (2015).

19. Spurring Private Aerospace Competitiveness and Entrepreneurship Act of 2015, H.R. Rep. No. 114-119, at 22 (May 18, 2015).

respect, this Act is in line with its predecessor, the Commercial Space Launch Act of 1984[20] (Space Act of 1984) which already favoured space's commercialization by declaring that it would "enable the United States to retain its competitive position internationally, thereby contributing to the national interest and economic well-being of the United States."[21] For instance, the Space Act of 1984 instituted a legal framework allowing the private sector to develop, launch and operate space vehicles and orbital satellites. However, the Space Act of 2015 goes much further than its 1984 counterpart, most notably by allowing U.S. citizens to engage in commercial exploration and recovery of space resources, including water and minerals.[22]

Section 51303 of the U.S. Code—a new section added by Section 402 of the Space Act of 2015—provides for private ownership over the extracted space resources in the following terms:

> A United States citizen engaged in commercial recovery of . . . a space resource . . . shall be entitled to any . . . space resource obtained, including to possess, own, transport, use, and sell the . . . space resource obtained in accordance with applicable law, *including the international obligations of the United States.*

Furthermore, section 403 of the Space Act of 2015, titled "Disclaimer of Extraterritorial Sovereignty," cautiously adds: "It is the sense of Congress that by the enactment of this Act, the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body."[23]

---

20. Commercial Space Launch Act of 1984, 51 U.S.C. §§ 50901–50923 (2012).

21. *Id.*, § 50901(a)(5).

22. U.S. Commercial Space Launch Competitiveness Act, § 402 (adding section 51301(2)(B) (definition of space resources) and section 51302(a)(3) to Title 51 of the U.S. Code). It is interesting to note in this regard that any potential living space resources are "in general" not included in the exploitation right provided for in the Space Act of 2015 and therefore not subjected to potential private ownership. *Id.*, § 402 (adding section 51301(2)(A) to Title 51 of the U.S. Code).

23. This section has likely been included by Congress in the Space Act of 2015 out of an awareness that the approach taken in this act *vis-à-vis* resource rights would potentially raise international concern and discord. Fox, *supra* note 8, at 175.

The rationale of the American approach appears to be that it is possible to sever a State's assertion of national sovereignty over a territory in outer space—which is expressly prohibited[24]—from the ability of individuals or companies to claim ownership over the natural resources that they extract—which is not directly dealt with in the Outer Space Treaty. Indeed, a closer look at section 51303 of the U.S. Code shows that this provision does not technically purport to *grant* ownership over space resources. Indeed, this would necessarily imply that the United States would have sovereign authority to do so. By affirming that American citizens engaged in commercial exploitation of space resources would only have ownership over the resources, the Space Act of 2015 does not necessarily imply that the source of those property rights must be the United States' legal system.[25]

Because the legal source of property rights cannot be found in domestic legal regimes, the source of such rights—if they exist—must therefore be found in the international law framework. However, as explained in the previous section, there is currently no form of space ownership positively recognized at international law.[26] On the contrary, the entire space legal system is built upon the principle of non-appropriation of outer space,[27] which appears to preclude both sovereign claims and resource ownership. It is therefore highly questionable that the United States can unilaterally pretend that its citi-

---

24. Outer Space Treaty, *supra* note 5, art. II.

25. *Contra* Lefeber, *supra* note 8, at 43. (arguing that "[t]he power of a state to issue private property rights on celestial bodies cannot but be derived from the exercise of sovereign rights by that state"). Lefeber does not consider the possibility that such property rights may exist in the absence of States' sovereign powers to issue them. For a similar argument to Lefeber's, see Board of Directors of the International Space Law (IISL), *Statement by the Board of Directors of the International Institute of Space Law (IISL)* (Mar. 22, 2009), http://iislweb.org/docs/Statement%20BoD.pdf.

26. Fox, *supra* note 8, at 175.

27. *See* Fabio Tronchetti, THE EXPLOITATION OF NATURAL RESOURCES OF THE MOON AND OTHER CELESTIAL BODIES—A PROPOSAL FOR A LEGAL REGIME 217–18 (2009) ("The commercialization of outer space cannot start with the erosion or the abrogation of the fundamental concept on which the entire system of space law has been built upon, namely the non-appropriative nature of outer space.").

zens can benefit from property rights over space resources without breaching its international obligations.[28]

The proposition that space resources can be privately owned, while States are prohibited from asserting jurisdiction over the territory where they are found, is profoundly counter-intuitive. On Earth, the exploitation of terrestrial resources is subjected to the sovereign jurisdiction of the State where the resources in question are located.[29] A notable exception to this general principle is Antarctic mineral resources, which are covered by a unique legal regime.[30] However, the situation in Antarctica does not give rise to the same concerns that apply to lunar resources since Article 7 of the Protocol on Environmental Protection to the Antarctic Treaty[31] provides that "[a]ny activity relating to mineral resources, other than scientific research, shall be prohibited."

IV. Does the Analogy with the High Seas' Legal Regime Hold?

Nonetheless, there is one circumstance where the exploitation of natural resources results in private ownership even when States have no jurisdiction over the territory: fishing on the high seas. According to one of MoonEx's co-founders, Mr. Naveen Jain, "the idea of exploiting the moon's resources for private gain should not be a concern." He points out that the United States has "already brought back moon rocks to our country without any other country fighting war over it." He further expresses the opinion that "the moon will be treated no differently than the international waters in our oceans . . . [because no] one really owns the water but any

28. Filhot, *supra* note 12, at 129–30; Fox, *supra* note 8, at 175. *Contra* Letter from Berin Szoka, Pres., TechFreedom, to Rep. Bill Posey, Florida, & Rep. Derek Kilmer, Washington 1 (May 19, 2015), http://docs.techfreedom.org/TF_Letter_Re_Amendments_to_HR_1508.pdf ("Effective space property rights are not only consistent with international law, they are required by it.").

29. Subject to certain nuances that are beyond the scope of the present commentary.

30. *See generally* Antarctic Treaty, Dec. 1, 1959, 402 U.N.T.S. 71; Protocol on Environmental Protection to the Antarctic Treaty, Oct. 4, 1991, 30 I.L.M. 1455.

31. Protocol on Environmental Protection to the Antarctic Treaty, Oct. 4, 1991, 30 I.L.M. 1455.

company or country can mine the resources . . . from the international water as long as they follow certain safety/moral guidelines."[32]

The high seas include waters located beyond any national jurisdiction.[33] According to Article 89 of the United Nations Convention on the Law of the Sea[34] (UNCLOS), "[n]o State may validly purport to subject any part of the high seas to its sovereignty." That provision is quite similar to Article II of the Outer Space Treaty which prohibits sovereign claims over the Moon. Nevertheless, Article 116 of the UNCLOS provides that "[a]ll States have the right for their nationals to engage in fishing on the high seas" subject to certain environmental limits. Despite the impossibility for States to assert sovereignty over the high seas, it is unquestionable that fishers own their high seas catches.

However, the argument that the same legal regime should apply to resources mined on the Moon and other celestial bodies rests on shaky foundations. The UNCLOS explicitly provides for a right to fish on the high seas.[35] Moreover, the freedom of fishing on the high seas is the result of an immemorial practice protected by customary international law.[36] By contrast, there is no such provision in any international treaty, nor an established custom regarding the exploitation of space resources.

Rather, the exploitation of space resources is more similar to collecting mineral resources of the seafloor beyond the continental shelf; the resources' geographical location is in a territory where no national sovereign claim is allowed, such exploitation has been absolutely impossible until recent times for technical reasons, and the resources being exploited are non-

---

32. W. J. Hennigan, *MoonEx Aims to Scour Moon for Rare Materials*, L.A. Times (Apr. 8, 2011), http://articles.latimes.com/2011/apr/08/business/la-fi-moon-venture-20110408.

33. More specifically, the high seas are defined as "all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State." United Nations Convention on the Law of the Sea art. 86, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS].

34. *Id.*

35. *Id.*, art. 116.

36. *See, e.g.*, Francisco Orrego Vicuña, The Changing International Law of High Seas Fisheries 1 (1999).

renewable. The natural resources of the seabed[37] are governed by a complex legal regime of the so-called "Area"[38] that is set out in the UNCLOS. Echoing the preamble of the Outer Space Treaty, Article 136 of the UNCLOS provides that "[t]he Area and its resources are the common heritage of mankind."[39] Unlike the legal regime applicable to high seas' fish resources, there is no general exploitation and appropriation rights for private entities over the natural resources of the Area. On the contrary, private appropriation of Area's resources is explicitly prohibited except in accordance with UNCLOS' regulations and with the approval of the authority set up under that convention to administer the Area's resources on behalf of mankind as a whole.[40]

For these reasons, the argument that the same legal regime should apply to the products of high seas fishing and outer space mining is quite weak. Along with many commentators,[41] I agree that the prohibition on national appropriation of space territories enshrined in the Outer Space Treaty logically entails a ban on free private appropriation of the natural resources. To draw a distinction between national and private appropriations seems artificial, especially since the Outer Space Treaty requires States to authorize and bear international responsibility[42] for space activities undertaken by their nationals. It is thus possible to consider, as convincingly argued by the Board of Directors of the International Institute of Space Law, that "the activities of non-governmental entities

37. The "resources" of the Area are defined as "all solid, liquid or gaseous mineral resources *in situ* in the Area at or beneath the seabed, including polymetallic nodules." UNCLOS, *supra* note 33, art. 133(a).

38. The "Area" is defined as "the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction." UNCLOS, *supra* note 33, art. 1(1).

39. In the preamble of the Outer Space Treaty, the State Parties recognize "the common interest of all mankind in the progress of the exploration and use of the outer space for peaceful purposes" and affirm to believe "that the exploration and use of outer space should be carried on for the benefit of all peoples." Outer Space Treaty, *supra* note 5, pmbl.

40. "All rights in the resources of the Area are vested in mankind as a whole, on whose behalf the Authority shall act. The minerals recovered from the Area, however, may only be alienated in accordance with the Part . . . ." UNCLOS, *supra* note 33, art. 137(2).

41. *See, e.g.*, *IISL Board Statement of 2004*, *supra* note 8; Lefeber, *supra* note 8, at 43; Fox, *supra* note 8, at 174.

42. Outer Space Treaty, *supra* note 5, art. VI.

(private parties) are national activities. The prohibition on national appropriation by Article II thus includes appropriation by non-governmental entities."[43]

Nevertheless, the absence of an explicit provision on this matter in a widely accepted international instrument allows the current confusion with respect to private ownership of space resources to persist.

V. Conclusion

The focus of this Commentary was to discuss the potential existence and legality of property rights over space resources. This Commentary does not, however, claim to answer the question of whether resource ownership would be, in fact, desirable. In this respect, it is possible to argue that, "[w]ithout effective property rights, the vast resources of the moons, planets and asteroids of our Solar System will benefit no one."[44] At the opposite side of the spectrum, there is a valid argument that "the vast wealth likely to flow to Earth from outer space will cause ever-greater inequality and instability in our already unequal and unstable world."[45] That being said, this Commentary contends that a clear legal framework governing space resources exploitation and ownership, if any, is absolutely necessary in order to avoid international tensions as evidenced by the current irresolution surrounding the U.S. Space Act of 2015.

The debate about ownership over lunar resources is, for now, a purely theoretical question. There are still many scientific developments that must occur before we see the first rock being mined on the Moon. However, we are clearly moving in that direction. Outer space is rich of materials that are rare and extremely valuable on Earth such as platinum-group metals.[46] There is therefore an important financial incentive for innovative mining companies to develop the technical equipment necessary to mine in outer space. As MoonEx and its competitors invest massively in this venture, we will probably see spatial mining activities in the not too distant future. In-

43. *IISL Board Statement of 2004*, *supra* note 8.

44. Szoka, *supra* note 28, at 1.

45. Edythe Weeks, Outer Space Development, International Relations and Space Law, at xiii (2012).

46. *Id.*

deed, the authorization issued in August by the FAA for the first private lunar mission is a significant progress towards commercial exploitation of space resources.

In order to avoid international conflicts, it is crucial that the legal uncertainty regarding the possibility for private entities to own space resources be resolved and that a legal framework ensuring the orderly development of space activities be established. A proactive response by the international community in this respect would therefore be highly desirable. This will ensure that the international community will not face different national legislations that reflect States' potentially conflicting understandings of the state of the law. The desire for commercialization of space resources is nothing new or unique, but we have now reached a point where it is about to become feasible and is not merely an unachievable dream.[47]

To paraphrase President Nixon,[48] the sky may soon no longer be the limit.

47. Lefeber, *supra* note 8, at 47; Fox, *supra* note 8, at 175.

48. Pres. Richard Nixon, Remarks at a Dinner in Los Angeles Honoring the Apollo 11 Astronauts (Aug. 13, 1969), http://www.presidency.ucsb.edu/ws/?pid=2202.