

# A BUNDLE OF STICKS IN ZERO G: NON-STATE ACTOR MINING RIGHTS FOR CELESTIAL BODIES

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## INTRODUCTION

The Earth stood still the day Sputnik made history as the first man-made artificial satellite to orbit the planet. Humanity shook loose its terrestrial shackles and ventured into a final frontier of possibilities. In reaching the stars, however, humanity also discovered a new world of problems for international law as the Cold War threatened to seep into outer space. The United Nations responded to the new legal vacuum in 1958, and established the Committee on the Peaceful Uses of Outer Space (“COPUOS”),<sup>1</sup> making COPUOS a permanent body the following year.<sup>2</sup> COPUOS created two subcommittees, the Scientific and Technical Subcommittee and the Legal Subcommittee, to help regulate the newly-realized void. These committees have met in Geneva every year since 1962.<sup>3</sup>

In 1963, the U.N. drafted its first edict on space law, the Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space (“Declaration”).<sup>4</sup> The U.N. adopted the primary treaty on space law, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other

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1. G.A. Res. 1348 (XIII), at 6 (Dec. 13, 1958); *COPUOS History*, U.N. OFF. OUTER SPACE AFF., <http://www.unoosa.org/oosa/en/ourwork/copuos/history.html> (last visited Feb. 7, 2018).

2. G.A. Res. 1472 (XIV), at 5 (Dec. 12, 1959).

3. *COPUOS History*, U.N. OFF. OUTER SPACE AFF., *supra* note 1.

4. G.A. Res. 1962 (XVIII), *Declaration on Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space*, at 15 (Dec. 13, 1963) [hereinafter *Declaration*]; see generally *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. OFF. OUTER SPACE AFF., <http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html> (last visited Feb. 7, 2018).

Celestial Bodies (“Outer Space Treaty”) in 1967.<sup>5</sup> Concerned that the advent of manned space travel would expand the Cold War to the stars, the U.N. used the Outer Space Treaty to prevent the militarization and national appropriation of space and celestial bodies by State members,<sup>6</sup> including the U.S. and the Union of Soviet Socialist Republics (“U.S.S.R.”). The Outer Space Treaty, along with several later agreements, would create the legal framework that governs humanity’s forays off-world.<sup>7</sup>

The Outer Space Treaty lays out several approved uses of outer space in thirteen Articles. In Article I, the member states of the U.N. agree that outer space “shall be the province of all mankind.”<sup>8</sup> Article I further provides that outer space, the moon, and other celestial bodies “shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality, and in accordance with international law, and there shall be free access to all areas of celestial bodies.”<sup>9</sup> Article II establishes that States cannot appropriate outer space, the moon, or any other celestial body for themselves “by claim of sovereignty through use, occupation, or any other means.”<sup>10</sup> The remaining articles change the focus from property in space to property launched into space and include the proscription of military actions in outer space, a ban on the testing of nuclear or other weapons, good Samaritan duties for spacefaring states, and other international obligations designed to “promote international co-operation in the peaceful exploration and use of outer space[.]”<sup>11</sup>

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5. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

6. Article II of the Outer Space Treaty provides “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.” *Id.* art. II, 18 U.S.T. at 2413, 610 U.N.T.S. at 208. The Outer Space Treaty further states in Article IV that:

States Parties to the Treaty undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner. The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military [maneuvers] on celestial bodies shall be forbidden.

*Id.* art. IV, 18 U.S.T. at 2413-14, 610 U.N.T.S. at 208.

7. See Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fifty-Sixth Session, U.N. Doc. A/AC.105/C.2/2017/CRP.7 (2017) [hereinafter Status of International Agreements]. Today, 130 countries, all with space-faring capabilities, have signed the Outer Space Treaty, and, of those, 105 have ratified it. *Id.*

8. Outer Space Treaty art. I, *supra* note 5, 18 U.S.T. at 2412-13, 610 U.N.T.S. at 207-08.

9. *Id.*

10. *Id.*

11. See *id.* arts. III-XIII. Article III provides the purpose of the Outer Space Treaty, stating:

When the U.N. adopted Article II of the Outer Space Treaty, barring claims of sovereignty, the idea that a private actor<sup>12</sup> or, in fact, anyone besides the governments of the U.S. or U.S.S.R., could establish moon bases or asteroid mining operations was purely in the realm of science fiction. Because space exploration is no longer as highly prioritized for spacefaring governments following the end of the Cold War, states have largely left future space endeavors in the hands of private enterprises. Though non-state actors are experiencing difficulty getting off of the ground, science fiction is on the verge of becoming science fact, and crossing the Kármán line<sup>13</sup> is no longer exclusive to the governments of the world.<sup>14</sup> As non-state actors progress in their space exploration capabilities, should they be bound by Article II of the Outer Space Treaty as well?

The answer to this question is no—the obligations of the Outer Space Treaty, to which state actors are bound, should not apply to non-state actors in the commercial mining of celestial bodies. Four reasons lead to this conclusion. First, the rules of state responsibility for non-state actors do not apply to mining rights of celestial bodies. Second, no existing treaty binds the U.S. to limit the extraterrestrial activities of non-state actors. Third, in the absence of any legal prohibition, no appeal to policy or custom provide sufficient reasons to expand international law and limit the outer space activities of non-state actors. Fourth, currently enacted practices can be used as a potential framework for the legal oversight of private commercial mining of celestial bodies.

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States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding.

*Id.* art. III, 18 U.S.T. at 2412-13, 610 U.N.T.S. at 207-08. Regarding good Samaritan responsibilities, Article V requires:

States Parties to the Treaty shall regard astronauts as envoys of mankind in outer space and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of another State Party or on the high seas. When astronauts make such a landing, they shall be safely and promptly returned to the State of registry of their space vehicle. In carrying on activities in outer space and on celestial bodies, the astronauts of one State Party shall render all possible assistance to the astronauts of other States Parties.

*Id.* art. V, 18 U.S.T. at 2414, 610 U.N.T.S. at 208.

12. NAT'L INTELLIGENCE COUNCIL, NAT'L INTELLIGENCE OFFICER FOR ECON. & GLOBAL ISSUES, DR-2007-16D, NONSTATE ACTORS: IMPACT ON INTERNATIONAL RELATIONS AND IMPLICATIONS FOR THE UNITED STATES 2 (2007) (“Nonstate actors are non-sovereign entities that exercise significant economic, political, or social power and influence at a national, and in some cases international, level.”).

13. See MATTHEW J. KLEINMAN ET AL., THE LAWS OF SPACEFLIGHT 3 (2012) (stating that the Kármán line is commonly accepted as the divider between Earth's atmosphere and outer space and is at an altitude of approximately 62 miles (100 km) above sea level).

14. See Stephen Clark, *Sweet Success at Last for Falcon 1 Rocket*, SPACEFLIGHT NOW (Sept. 28, 2008), <https://spaceflightnow.com/falcon/004/index.html>.

While the U.S. is obligated to act in accordance with the provisions of the Outer Space Treaty, non-state actors acting within the jurisdiction of the United States are not state actors and should not be bound to the same obligations imposed on state actors, especially when it comes to the commercial exploitation of asteroids. Certain delegations<sup>15</sup> to the fifty-sixth session of the Legal Subcommittee of COPUOS voiced concern that allowing non-state actors to gather resources from asteroids will create the same sovereignty issues that the U.N. has curtailed in the past.<sup>16</sup> However, the concerns of these delegates are incorrect: Non-state actors do not create the same sovereignty concerns as state actors because commercial endeavors by private actors do not implicate or involve state activities. Therefore, non-state actors should not be subject to Article II, particularly with regard to commercial mining of celestial bodies.

Like the Space Race of the Cold War, the U.S. is also at the forefront of non-state actor space endeavors. Today, a variety of private space organizations range across an assortment of fields.<sup>17</sup> Several of these private space companies seek to gather resources from celestial bodies to bring back to Earth, with the majority of the space mining companies located in the United States.<sup>18</sup> The mining efforts of these American non-state actors could benefit the world as a whole, but the U.N. has attempted to hinder these efforts and bind these non-state, private actors to treaties that the U.S. has not signed. Moreover, the U.N. expressly attempted to expand the provisions of Article II of the Outer Space Treaty to include non-state actors in Article XI of the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (“Moon Treaty”).<sup>19</sup> Under Article XI of the Moon Treaty, the extended restrictions on property rights include any “international intergovernmental or non-governmental organization, national organization

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15. See U.N. Committee on the Peaceful Uses of Outer Space, Report of the Legal Subcommittee on its Fifty-Sixth Session, U.N. Doc. A/AC.105/1122, at 7 (2017) [hereinafter Legal Subcommittee Report 56] (“Some delegations expressed the view that the heightened pace of activities in outer space and the increased participation of States, international organizations and the non-governmental sector required continued reflection by the Subcommittee in order to enable further strengthening of the legal regime on outer space, including with respect to the need to review and revise the five United Nations treaties on outer space.”).

16. See *id.* ¶ 226.

17. *Company*, SPACE X, <http://www.spacex.com/about> (last visited Mar. 22, 2018); *Why Asteroids*, PLANETARY RES., <https://www.planetaryresources.com/why-asteroids/> (last visited Mar. 22, 2018); *Who We Are*, VIRGIN GALACTIC, <https://www.virgingalactic.com/who-we-are/> (last visited Mar. 22, 2018) (stating that types of private space companies include space tourism, cargo resupply for the International Space Station, and asteroid mining).

18. The main companies in this field are Planetary Resources and Deep Space Industries. See *Why Asteroids*, PLANETARY RES., <https://www.planetaryresources.com/#home-intro>.

19. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies art. 11, Dec. 5, 1979, 1363 U.N.T.S. 3 [hereinafter Moon Treaty].

or non-governmental entity or any natural person.”<sup>20</sup> However, the U.N. member States did not widely accept the Moon Treaty and only twenty-one members are signatories.<sup>21</sup> None of those signatories, however, are listed among the nations capable of independent-crewed space flight.<sup>22</sup>

In 2015, President Barack Obama signed into law the U.S. Commercial Space Launch Competitiveness Act.<sup>23</sup> Title IV under the Act, the Space Resource Exploration and Utilization Act of 2015 (“Space Resource Act”), authorizes U.S. citizens engaged in the commercial recovery of asteroid and space resources to “possess, own, transport, use, and sell the . . . resource.”<sup>24</sup> The Space Resource Act creates the legal framework for non-state actors based in the U.S. to gather resources from outer space and take another small step for man into the next level of species development.<sup>25</sup> Opponents of private space ventures argue that an issue arises because of the last line of the Act, which states that a U.S. citizen engaged in commercial recovery must act “in accordance with applicable law, including the international obligations of the United States,”<sup>26</sup> and Article II of the Outer Space Treaty.<sup>27</sup> However, America’s commitment to its international obligations in the Space Resources Act does not extend to its non-state actors because the U.S. is not a party to any international agreements limiting non-state actors’ activities in space.

## I. STATE RESPONSIBILITY FOR NON-STATE ACTORS

Non-state actors are not always bound by the same obligations as their state of origin.<sup>28</sup> The continued shift away from the state-centric international

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20. *Id.*

21. Status of International Agreements, *supra* note 7.

22. Will Gray, *Building off US law to Create an International Registry of Extraterrestrial Mining Claims*, SPACE REV. (Aug. 14, 2017), <http://www.thespacereview.com/article/3304/1>; Michael Listner, *The Moon Treaty: Failed International Law or Waiting in the Shadows?*, SPACE REV. (Oct. 24, 2011), <http://www.thespacereview.com/article/1954/1>.

23. U.S. Commercial Space Launch Competitiveness Act of 2015, Pub. L. No. 114-90, 129 Stat. 704 (codified at 51 U.S.C. § 10101); see *President Obama Signs Bill Recognizing Asteroid Resource Property Rights into Law*, PLANETARY RES. (Nov. 25, 2015), <https://www.planetaryresources.com/2015/11/president-obama-signs-bill-recognizing-asteroid-resource-property-rights-into-law/>.

24. Space Resource Act of 2015, Pub. L. No. 114-90, 129 Stat. 704 (codified at 51 U.S.C. § 51302).

25. Jolene Creighton, *The Kardashev Scale: Type I, II, III, IV, & V Civilization*, FUTURISM (July 19, 2014), <https://futurism.com/the-kardashev-scale-type-i-ii-iii-iv-v-civilization/>.

26. National and Commercial Space Programs, 51 U.S.C. §51303 (Supp. V 2017).

27. Outer Space Treaty art. II, *supra* note 5, 18 U.S.T. at 2413, 610 U.N.T.S. at 208.

28. Jean d’Aspremont et al., *Sharing Responsibility Between Non-State Actors and States in International Law: Introduction*, 62 NETH. INT’L L. REV. 49, 53-54 (2015).

legal order and the growing importance of non-state actors has highlighted the need to address the role of state responsibility for non-state actors.<sup>29</sup> Legal scholars have applied the due diligence principle and its contextual approach to help determine the appropriate response by states for the acts of their non-state actors.<sup>30</sup> The due diligence principle comes from the need to have an adaptable set of legal principles that are as varied as they are fundamental to international law.<sup>31</sup>

The four primary principles of responsibility<sup>32</sup> range across the intent spectrum, from requiring mens rea to strict liability.<sup>33</sup> States cannot directly engage in the exploitation of celestial minerals due to Article II's prohibition on national appropriation; therefore, the first principle of fault-based responsibility would not apply to non-state actors engaged in private commercial mining activities.<sup>34</sup> The second and third principles instead focus on the international obligation of the state, equating it to strict liability for the actions of an agent of the state while still distinguishing between relative and absolute responsibility.<sup>35</sup> The last principle differs in not requiring an unlawful act but only the establishment of a causal connection to the damages suffered.<sup>36</sup> The fourth principle of state responsibility is also not at issue here because there is a definitive act by non-state actors.<sup>37</sup>

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29. Robert P. Barnidge, Jr., *The Due Diligence Principle Under International Law*, 8 INT'L COMM. L. REV. 81, 82 (2006).

30. *See id.* at 81-82. For a more expansive discussion of the due diligence principle in international law, see *Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicar.)*, Judgment, 2015 I.C.J. Rep. 665 (Dec. 16) (separate opinion by Donoghue, J.) ("under customary international law, a State of origin has a right to engage in activities within its own territory, as well as an obligation to exercise due diligence in preventing significant transboundary environmental harm."); 1 JOHN BASSETT MOORE, HISTORY AND DIGEST OF THE INTERNATIONAL ARBITRATIONS TO WHICH THE UNITED STATES HAS BEEN A PARTY 572-73 (1898) (defining due diligence as "a diligence proportioned to the magnitude of the subject and to the dignity and strength of the power which is to exercise it; a diligence which shall, by the use of active vigilance[.]"), *quoted in* Int'l Law Comm'n, Rep. on the Work of Its Forty-Sixth Session, U.N. Doc. A/49/10, at 103, n.229 (1994); and Eric de Brabandere, *Host States' Due Diligence Obligations in International Investment Law*, 42 SYRACUSE J. INT'L L. & COM. 319 (2015) (due diligence requires States to exercise due diligence only in relation to certain specific conduct that is required from States under a set rule of international law. If a State is found in breach of its obligation to exercise due diligence, State responsibility may then ensue if the act in question is attributable to the State.").

31. Barnidge, *supra* note 29, at 82.

32. *See id.* at 82, 83-84.

33. *Id.* at 82-83.

34. Outer Space Treaty art. II, *supra* note 5, 18 U.S.T. at 2413, 610 U.N.T.S. at 208; Barnidge, *supra* note 29, at 82-83.

35. Barnidge, *supra* note 29, at 83.

36. *Id.* at 84.

37. *Id.* at 84-85 ("Which responsibility regime applies, whether subjective or objective responsibility . . . serves particular policy ends and in large part determines the extent to which a party can be held accountable for its acts or omissions.").

With these principles in mind, the context and particularized facts of the situation have an important bearing on the state's responsibility. The Outer Space Treaty does not prohibit non-state actors from engaging in commercial activities. Article II of the Outer Space Treaty states, "The States Parties to this Treaty . . . have agreed on the following . . . : 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."<sup>38</sup> This article places the emphasis on state action to assert sovereignty. Moreover, legal analysis of the Outer Space Treaty at the time of signing concluded that "the Treaty in its present form appears to contain no prohibition regarding individual appropriation or acquisition by a private association or an international organization, even if other than the United Nations."<sup>39</sup> Article VI states:

States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty.<sup>40</sup>

Importantly, the Outer Space Treaty applies only to non-state actors when they are acting on behalf of a State. The language of the Treaty and preceding Declaration was carefully chosen to ensure agreement among the parties. States are only bound to obligations to which the State has agreed to be bound.<sup>41</sup> Some delegates to the Legal Subcommittee believe that Article VI extends the obligations of the U.S. under to the treaty to non-governmental actors operating within the State's jurisdiction.<sup>42</sup>

However, as it is written, Article VI only requires that non-governmental actors carry out their actions in conformity with the provisions of the Outer Space Treaty when they are engaged in "national activities."<sup>43</sup> The objective assessment of state responsibility requires that the non-state actor act as an

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38. Outer Space Treaty art. II, *supra* note 5, 18 U.S.T. at 2413, 610 U.N.T.S. at 208.

39. Stephen Gorove, *Interpreting Article II of the Outer Space Treaty*, 37 *FORDHAM L. REV.* 349, 351 (1969).

40. Outer Space Treaty art. VI, *supra* note 5, 18 U.S.T. at 2415, 610 U.N.T.S. at 209.

41. *See* Vienna Convention on the Law of Treaties art. 11-16, May 23, 1969, 1155 U.N.T.S. 331 (outlining means by which a state can express its consent to be bound to international law obligations).

42. Legal Subcommittee Report 56, *supra* note 15, ¶ 245.

43. Outer Space Treaty art. VI, *supra* note 5, 18 U.S.T. at 2415, 610 U.N.T.S. at 209.

agent of the state,<sup>44</sup> and the fact that a non-state actor operates in outer space itself can hardly in turn the private actor into an agent of the State. The activities of non-governmental entities not engaged in national activities only require the authorization and “continuing supervision by the appropriate State Party to the Treaty.”<sup>45</sup>

The text of the treaty provides no further explanation of the terms “authorization” and “continuing supervision,” leaving them open to interpretation. In 2004 and 2009, the board of the directors of the International Institute of Space Law (“IISL”), an independent non-government agency focused on the development of space law,<sup>46</sup> released statements in non-professional capacities interpreting “authorization” and “supervision” to establish all non-governmental actions in outer space as “national activities.”<sup>47</sup> However, while all national activities are activities, not all activities are national. For example, a motorist requires a driver’s license (i.e., authorization) and is monitored by the police and traffic cameras (i.e., continuing supervision) as part of the process of traveling on the roadways, but these two factors alone neither make the motorist’s driving (activity) one that is done on behalf of the government (a national activity) nor make that motorist an agent of the state.<sup>48</sup> More is required. Applied to the space setting, NASA using a SpaceX rocket for a resupply mission is a national activity because it is done on behalf of the U.S. government, but SpaceX conducting a rocket test is not a national activity because the test is only done on behalf of SpaceX.

Additionally, for the mining activities of non-state actors to be prohibited under the Outer Space Treaty, the mining activity must amount to “national appropriation.” The term “appropriation” arises most frequently when there is a sense of permanence in the taking or exclusive use of property.<sup>49</sup> The actions of non-state actors engaged in commercial

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44. Barnidge, *supra* note 29, at 83, n.15.

45. Outer Space Treaty art. VI, *supra* note 5, 18 U.S.T. at 2415, 610 U.N.T.S. at 209.

46. *Introduction*, INT’L INST. SPACE L., <https://iislweb.org/about-the-iisl/introduction/> (last visited Feb. 3, 2019).

47. *2015 Position Paper on Space Resources Mining*, INT’L INST. SPACE L., <http://www.iislweb.org/docs/SpaceResourceMining.pdf> (last visited Feb. 3, 2019); *2009 Statement of the Board of Directors of the International Institute of Space Law*, INT’L INST. SPACE L. (Mar. 22, 2009), <http://www.iislweb.org/docs/Statement%20BoD.pdf>; *2004 Statement of the Board of Directors of the International Institute of Space Law on Claims to Property Rights Regarding the Moon and Other Celestial Bodies*, INT’L INST. SPACE L., [http://www.iislweb.org/docs/IISL\\_Outer\\_Space\\_Treaty\\_Statement.pdf](http://www.iislweb.org/docs/IISL_Outer_Space_Treaty_Statement.pdf) (last visited Feb. 3, 2019).

48. *See The United States: Traffic Regulations*, INTERNATIONS, <https://www.internations.org/usa-expats/guide/driving-in-the-united-states-15646/the-united-states-traffic-regulations-2> (last visited Feb. 3, 2019).

49. Gorove, *supra* note 39, at 352.

enterprises may constitute appropriation<sup>50</sup> and may occasionally even rise to national appropriation.<sup>51</sup> However, for national appropriation to occur, the non-state actors must be acting under the exclusive authority or jurisdiction of the responsible State.<sup>52</sup> If the controlling State lacks authority over the area in question, then it is unlikely that any appropriation by non-state actors is national in nature.<sup>53</sup> Currently, the U.S. has no agency with jurisdiction over activities conducted in low earth orbit and beyond,<sup>54</sup> making it unlikely that any appropriation by non-state actors in that region would be national in nature.

Dr. Stephen Gorove, a well-known scholar in the field of space law,<sup>55</sup> concluded that appropriation of outer space as a whole is also an unfeasible endeavor.<sup>56</sup> While it may be possible to appropriate the moon or an asteroid as a whole, any prohibition against commercial resource-gathering would be better served to focus on the appropriation instead.<sup>57</sup> However, an issue of scope arises under this interpretation. That is, when an object is traveling through space, such as a satellite, it will collect various traces of space dust, cosmic rays, gases, and solar energy, all of which are considered part of outer space.<sup>58</sup> At some point, the orbiting object will collect enough space dust and solar energy that it will violate Article II prohibition on national appropriation of “outer space.” It follows, then, that most objects launched into space will violate the Outer Space Treaty given enough time in orbit. This illustrates that the language that the Legal Subcommittee uses to restrict non-state actors is overbroad.

Thus, the need for particularized facts to find state responsibility makes it difficult to find state responsibility under a fault-based approach and also to find a state has failed to meet its obligations under the due diligence principle.<sup>59</sup> The requirement for authorization and supervision of an activity does not make a non-state actor engaging in a private activity an agent of the

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50. *Id.* (“[A]ny use involving consumption or taking with intention of keeping for one’s own exclusive use would amount to appropriation.”).

51. *Id.*

52. *Id.* at 352.

53. *Id.*

54. Jeff Foust, *FAA Review a Small Step for Lunar Commercialization Efforts*, SPACE NEWS (Feb. 6, 2015), <http://spacenews.com/faa-review-a-small-step-for-lunar-commercialization-efforts/>.

55. See Wolfgang Saxon, *Stephen Gorove, 83, Leader in Field of Space Law*, N.Y. TIMES (Sept. 1, 2001), <http://www.nytimes.com/2001/09/01/us/stephen-gorove-83-leader-in-field-of-space-law.html>.

56. Gorove, *supra* note 39, at 350.

57. *Id.*

58. *Id.*

59. Barnidge, *supra* note 29, at 85.

state. Further, employing an appropriation paradigm results in an unworkable and self-defeating standard.

## II. U.S. NON-ACCESSION TO UNITED NATIONS TREATY

The language of the agreements ratified by the U.S. do not restrict celestial body mining rights for its non-state actors. With regard to international space law, the U.S. has only ratified four of the U.N. treaties<sup>60</sup> and five of what the U.N. refers to as the “other agreements.”<sup>61</sup> Of the four treaties ratified by the U.S., only the Outer Space Treaty addresses property rights and Article II only concerns the actions of State actors.<sup>62</sup> While the language “by other means” in the phrase “by claims of sovereignty” may be interpreted to include the use of non-state actors to assert a state’s interests, non-state actors would still be required to act as agents of the State for any activities. Without a more express legal regime establishing inherent state responsibility for non-state actors, it cannot be maintained that the U.S. is responsible for ensuring that its non-state actors are bound by its obligations under Article II of the Outer Space Treaty.

To help determine the intent of the drafters when they prepared the Outer Space Treaty, the prior history and meeting records discussed below may be of use. Looking to the prior history of the Outer Space Treaty, the first appearance of the “national appropriation” provision in an international agreement is in the 1963 Declaration.<sup>63</sup> The draft proposals for the Declaration show a wide range of intentions by the participating States on

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60. See Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19.6 U.S.T. 7570, 672 U.N.T.S. 119; Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24.2 U.S.T. 2389, 961 U.N.T.S. 187; Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28.1 U.S.T. 695, 1023 U.N.T.S. 15; Outer Space Treaty, *supra* note 5; Status of International Agreements, *supra* note 7.

61. The other agreements include: Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, Aug. 5, 1963, 14.2 U.S.T. 1313, 480 U.N.T.S. 43; Convention Relating to the Distribution of Programme-Carrying Signals Transmitted by Satellite, May 21, 1974, TIAS 11078, 13 I.L.M. 1444; Agreement Relating to the International Telecommunication Satellite Organization, Aug. 20, 1971, 23 U.S.T. 4091, 10 I.L.M. 946; Convention on the International Maritime Satellite Organization, Sept. 3 1976, 31.1 U.S.T. 1, 15 I.L.M. 1051; and Constitution and Convention of the International Telecommunication Union (ITU), Dec. 22, 1992, S. TREATY DOC. 104-34, 1825 U.N.T.S. 3.

62. Outer Space Treaty art. II, *supra* note 5, 18 U.S.T. at 2413, 610 U.N.T.S. at 208.

63. *Declaration*, *supra* note 4 (“Outer Space and celestial bodies are not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means”). The first appearance of “national appropriation” of outer space was in G.A. Res. 1702 (XVI) where the State Members unanimously adopted “Outer space and celestial bodies . . . are not subject to national appropriation.” G.A. Res. 1702 (XVI), International Co-operation in the Peaceful Uses of Outer Space, (Dec. 20, 1961).

the subject of national appropriation. In the 1962 Report of the Legal Subcommittee on its First Session, the Soviets drafted the provision “no State may claim sovereignty over outer space and celestial bodies.”<sup>64</sup> The Soviet’s first draft also included the proposal that “[a]ll activities of any kind pertaining to the exploration and use of outer space shall be carried out solely and exclusively by States.”<sup>65</sup> The Soviet’s limitation matched the U.S.S.R. air code of the time<sup>66</sup> and did not make it into the final text of the Declaration.<sup>67</sup> The Soviet’s second draft, submitted the following year, simplified the provision to “sovereignty over outer space or celestial bodies cannot be acquired by use or occupation or in any other way,” while keeping the same restriction on non-governmental actors in space.<sup>68</sup>

The U.K. submitted a draft for the Second Session that outlined the national appropriation provision as “[o]uter space and celestial bodies are not capable of appropriation or *exclusive use* by any State. Accordingly, no State may claim sovereignty over outer space or over any other celestial body, nor can sovereignty be acquired by means of use or occupation in any other way.”<sup>69</sup> The British submission did not include the restriction of space exploration to State actors and clearly contemplates the sort of non-exclusive use involved in deep space mining.<sup>70</sup> Finally, the U.S. submitted the simple “[o]uter space and celestial bodies are not subject to national appropriation.”<sup>71</sup> The variation in proposals shows that, first, initially there was no consensus on the scope of the appropriation provision, and, second, that the wording of the finalized version was deliberately broad.

The overarching notion of the finalized Declaration is not that non-state actors are bound to the same obligations as State actors, but instead that non-state actors only require authorization and supervision by their State actor when engaging in non-national activities. The deliberate choice of wording shows that the Declaration prohibits appropriation by State actors rather than appropriation of any kind. Therefore, leading up to the Outer Space Treaty, the U.N.’s intention to restrict appropriation did not extend to non-state actors acting on their own initiatives.

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64. Report of the Legal Subcomm. on its First Session, ¶ 2, U.N. Doc. A/AC.105/6 (1962) [hereinafter Legal Subcommittee Report 1].

65. *Id.* ¶ 7.

66. DENIS A. COOPER, *THE AIR CODE OF THE U.S.S.R.* 47 n.1 (1966).

67. *See Declaration, supra* note 4; Legal Subcommittee Report 1, *supra* note 64.

68. Report of the Legal Subcomm. on its Second Session, annex I ¶ 1-2, U.N. Doc. A/AC.105/12 (1963) [hereinafter Legal Subcommittee Report 2].

69. *Id.*

70. *Id.*

71. *Id.*

Further, the U.N.'s only substantive change to the wording of the national appropriation provision from the Declaration to the Outer Space Treaty was to include the moon on the list of what is not subject to national appropriation.<sup>72</sup> The fact that the U.N. added the moon to the list shows that the drafters were willing to change the provision for the sake of clarity. At the same time, the lack of additional changes to the provision indicates the intentions behind it remained the same. Therefore, non-state actors are not bound by the same obligations as State actors under Article II of the Outer Space Treaty since the drafters were deliberate in their word choice, otherwise the U.N. would not have attempted to expressly extend the prohibition on appropriation to non-state actors as well in the 1979 Moon Treaty.

In response to the rapidly growing commercial spaceflight sector, the U.S. enacted the Space Resources Act in 2015 as part of the larger U.S. Commercial Space Launch Competitiveness Act of 2015.<sup>73</sup> Similar to the conduct Congress had authorized previously for deep seabed mining,<sup>74</sup> the Space Resources Act granted non-state actors the right to exploit space resources, including water and minerals. Within the Act, Congress specifically stated that the Space Act of 2015 is conditioned on the U.S.'s international obligations. However, as stated above, the U.S.'s international obligations do not extend to its non-state actors that are acting of their own accord. Congress is, perhaps, saying here that the activities of non-state actors from the U.S. shall not be understood as an assertion of sovereignty.

The Space Resource Act conflicts with the Moon Treaty, which curtails the use of the moon and any other celestial body within our solar system for anything other than peaceful scientific research.<sup>75</sup> However, neither the U.S. nor any other nation capable of independent crewed-spaceflight is a party to the Moon Treaty.<sup>76</sup> With only seventeen countries ratifying the treaty, and with only four additional signatories,<sup>77</sup> some scholars assert that the Moon Treaty is binding to the rest of the world as customary international law by

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72. *Id.*; cf. *Declaration*, *supra* note 4, ¶ 3, with Outer Space Treaty art. II, *supra* note 5, 18 U.S.T. at 2413, 610 U.N.T.S. at 208 (changing the provision from “[o]uter space and celestial bodies are not subject to national appropriation . . . [to] [o]uter space, including the moon and other celestial bodies, is not subject to national appropriation[.]”).

73. U.S. Commercial Space Launch Competitiveness Act, ch. 513, § 51301-03, Pub. L. No. 114-90 (codified as amended at 51 U.S.C. §51301-51303 (2015)).

74. Deep Seabed Hard Mineral Resources, 30 U.S.C. § 1412(a)-(b) (2012).

75. *See* Gray, *supra* note 22.

76. *Id.* Australia is the only nation capable of independent un-crewed spaceflight to have ratified the Moon Treaty, with Austria, Belgium, and the Netherlands being members of the European Space Agency. France and India are the only un-crewed spacefaring nations to have signed it. Listner, *supra* note 22.

77. Status of International Agreements, *supra* note 7.

virtue of its existence.<sup>78</sup> However, the standard practices of customary international law do not support this position because the Statute of the International Court of Justice require “evidence of a general practice accepted as law” before a rule of customary international law can be found.<sup>79</sup>

Other legal scholars do not support this position, reasoning that the existence of a treaty itself is not evidence of general practice and acceptance as law and certainly not when major nations of the world have not joined the treaty.<sup>80</sup> Even within the Legal Subcommittee, the use of the Moon Treaty as customary international law is divisive due to the treaty’s limited ratification.<sup>81</sup> The Convention on the Law of the Sea, with its much smaller scope of influence, did not come into force until after the sixtieth nation ratified it,<sup>82</sup> while the Moon Treaty only required ratification by five nations, without any need for the ratifying nations to be capable of spaceflight.<sup>83</sup> It is difficult to see how a treaty ratified by none of the major state actors in space can establish state practice. As of late 2017, non-state actors have yet to mine any celestial bodies<sup>84</sup> and without the recurring act of asteroid mining, it cannot be said that a general practice of acting in accordance with Article 11 of the Moon Treaty has been accepted as law at this point.

If the provisions of Articles II and VI of the Outer Space Treaty were sufficient to bind non-state actors to the same obligations as State actors, then there would have been no purpose in adopting Article 11 of the Moon Treaty. Since Article II of the Outer Space Treaty was specifically tailored for State actors, and since the Moon Treaty does not bind the U.S., there are no international obligations that would prohibit non-state actors from commercial asteroid mining under the Space Resources Act.

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78. Gbenga Oduntan, *Who Owns Space? US Asteroid-Mining Act is Dangerous and Potentially Illegal*, CONVERSATION (Nov. 25, 2015, 6:34 AM), <https://theconversation.com/who-owns-space-us-asteroid-mining-act-is-dangerous-and-potentially-illegal-51073>.

79. Statute of the International Court of Justice art. 38, ¶ 1(b) (“The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply . . . international custom, as evidence of a general practice accepted as law[.]”).

80. See Thomas Gangale, *The Legality of Mining Celestial Bodies*, 40 J. SPACE L. 187, 190 (2016); 2015 IISL Position Paper on Space Resource Mining, *supra* note 47.

81. Legal Subcommittee Report 56, *supra* note 15, ¶ 227.

82. Convention of the Law of the Sea art. 308, Dec. 10, 1982, 1833 U.N.T.S. 3.

83. Moon Treaty art. 19, *supra* note 19, 1363 U.N.T.S. at 27. Article 19 states:

This Agreement shall be open for signature by all States at United Nations Headquarters in New York. This Agreement shall be subject to ratification by signatory States . . . . This Agreement shall enter into force on the thirtieth day following the date of deposit of the fifth instrument of ratification.

*Id.*

84. See *About the Exploration Program*, PLANETARY RES., <https://www.planetaryresources.com/missions/arkyd-301/> (last visited Mar. 22, 2018).

### III. (IN)EQUALITY OF ACCESS

The explicit language, legislative intent, and ratification history show that Article II of the Outer Space Treaty only involves state actors and agents and that the Moon Treaty is not binding upon private entities as customary international law. In the alternative, if Article II of the Outer Space Treaty applies to non-state actors or if the Moon Treaty is binding customary international law, then the U.N.'s reasoning behind the enforcement of Articles II and XI defeats the purpose of the articles themselves, which is to ensure that all people have free and equal access to outer space. Opponents of commercial asteroid mining are concerned that any current use of celestial resources would prevent future generations and developing countries from reaping the benefits of their use later. However, their insistence that non-state actors are not permitted to engage in mining activities in outer space is at odds with their reasoning, that space is the domain of all people. By basing their exclusion of asteroid miners on the principle that everyone must be able to use outer space, the opposition is denying use to anyone in the name of equality for all.

The primary legal opposition to non-state actors' endeavors comes from members of the Legal Subcommittee, which quotes the Moon Treaty in stating that these natural resources are the "common heritage of mankind."<sup>85</sup> The delegates base their opposition on the moral concern that non-state actors' use of these resources will exclude developing countries from the benefits of space exploration and that this exclusion is contrary to the equality of access principle laid out in Article I of the Outer Space Treaty.<sup>86</sup> However, by trying to protect equal access to space, and by not allowing non-state actors to gather resources from celestial bodies, the U.N. disregards the spirit of the law by blocking exploitation of space by non-state actors. The U.N. sends the message that outer space is not actually the province of all mankind, as is stated in Article I of the Outer Space Treaty, but only of those that the U.N. deems worthy.

The opposition's argument boils down to the desire for everyone to wait until the whole world is ready to take to the stars to ensure equality of access. Their argument is akin to insisting that guests that have already arrived at a dinner party must wait to begin until everyone else arrives, even though it is highly likely that many of the guests will not be attending. Their concern

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85. Legal Subcommittee Report 56, *supra* note 15, ¶ 226; Moon Treaty art. 11, *supra* note 19, 1363 U.N.T.S. at 25.

86. Legal Subcommittee Report 56, *supra* note 15; Outer Space Treaty art. I, *supra* note 5, 18 U.S.T. at 2412-13, 610 U.N.T.S. at 207-08, ("Outer space . . . shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality . . . , and there shall be free access to all areas of celestial bodies.").

assumes that by allowing private use now, today's non-state actors will create a form of neo-colonialism and future generations will not have a chance to enjoy the benefits of its use. However, use today would not lessen the enjoyment of future generations, but instead broaden the scope of who may enjoy the benefits. Starting the development of the requisite technology today ensures wider spread use in the future.<sup>87</sup> Non-state actors' commercial endeavors will not create the national appropriation of outer space that the opposition fears since non-state actors are not agents of the State and therefore cannot nationally appropriate.

Enforcement of Article II violations by the U.N. against non-state actors would be contrary to customary international law. Most violations of Article II go unchecked, as evidenced by the 1993 auction of Soviet moon rocks.<sup>88</sup> The collection of moon rocks by Apollo missions violated the strict interpretation of Article II.<sup>89</sup> The U.S. only circumvented the issue by trading some of the Apollo rocks with moon rocks collected by the Soviets.<sup>90</sup> The U.N. then sanctioned the collection of moon rocks by the two space powers since it was done in the name of scientific investigation, even though these actions constituted an authorized use under Article I of the Outer Space Treaty.<sup>91</sup> The U.S.-Soviet trade showed that the U.N. is willing to set aside Article II of the Outer Space Treaty in favor of Article I, despite the "any other means" language of the second article.<sup>92</sup> By allowing appropriation, national or otherwise, to occur in some cases but not others, the U.N. is not protecting the equality of access to all mankind, but rather creating a most favored nations situation.

The opposition has good intentions, however, as its current view on the matter creates the exact situation it tries to prevent. Attempting to protect everyone's equality of access to outer space by prohibiting non-state actor

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87. See Ulrich Arlt, *Trickle Down Technology can be Disruptive – In a Good Way!*, ROCKWELL AUTOMATION (Nov. 14, 2016), [https://www.rockwellautomation.com/global/news/blog/detail.page?pagetitle=Trickle-Down-Technology-Can-be-Disruptive-In-a-Good-Way-%7C-Blog&content\\_type=blog&docid=ca83ed705b6a821c9693bebac1ed3b19](https://www.rockwellautomation.com/global/news/blog/detail.page?pagetitle=Trickle-Down-Technology-Can-be-Disruptive-In-a-Good-Way-%7C-Blog&content_type=blog&docid=ca83ed705b6a821c9693bebac1ed3b19).

88. See Douglas Martin, *Space Artifacts of Soviets Soar at \$7 Million Auction*, N.Y. TIMES (Dec. 12, 1993), <http://www.nytimes.com/1993/12/12/nyregion/space-artifacts-of-soviets-soar-at-a-7-million-auction.html>.

89. Amir Siraj, *Why Congress Must Act Quickly to Reform U.S. Space Law*, HARV. POL'Y REV. (Sept. 28, 2017), <http://harvardpolitics.com/united-states/the-dangers-of-stagnancy-and-the-need-for-norms-in-u-s-space-law/>.

90. Berin Szoka & James Dunstan, *How the U.S. can Lead the Way to Extraterrestrial Land Deals*, WIRED (Apr. 9, 2012, 1:59 PM), <https://www.wired.com/2012/04/opinion-space-property-rights/>.

91. *Id.*; Outer Space Treaty art. II, *supra* note 5, 18 U.S.T. at 2412-13, 610 U.N.T.S. at 208.

92. Outer Space Treaty arts. I & II, *supra* note 5, 18 U.S.T. at 2412-13, 610 U.N.T.S. at 207-08.

resource gathering infringes on the non-state actors' access to outer space. Non-state actors' "equality of access" then becomes not equal to those who may or may not come later.

From a further policy-based standpoint, the search for rare commodities has always spurred human innovation.<sup>93</sup> Non-state actors engaging in the commercial mining of celestial bodies would be beneficial to the world because it furthers the development of scientific progress and eases the strain on Earth's natural resources, such as water, platinum, nickel, gold, and other rare earth elements.<sup>94</sup> It also helps to realize the U.N.'s dream of equality of access to outer space for all through the development of more economical methods of space travel. History shows that if there is a profit to be made, then people will develop the technology necessary to make it.<sup>95</sup> Non-state actors bearing the burden of development costs for the new technology take the burden off of national budgets and reallocate the cost to the private sector. History also shows that innovation spurs once the masses discover the feasibility of new technologies and begin exploiting such technologies for themselves.<sup>96</sup>

Based on samples gathered from near-Earth asteroids, these celestial bodies have much higher concentrations of platinum group metals and even a smaller-sized one could contain tens of billions of dollars worth of materials.<sup>97</sup> Ninety-five percent of the world's rare earth minerals come from China, which has scaled back exportation in order to meet its own industrial demands.<sup>98</sup> Certain metal groups, like platinum, do not occur naturally on Earth, but are the result of prior meteorite impacts.<sup>99</sup> By extracting these resources directly from the source, the entire world has much greater access to materials needed for humanity's continued development. Further, by using off-world resources, such as rare earth elements used in green technologies, non-state actors increase the lifespan of the human race on Earth by decreasing the rate at which Earth's resources are consumed.

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93. Stephen Shaw, *Asteroid Mining*, ASTRONOMY SOURCE (Aug. 21, 2012), <http://www.astro.nomysource.com/tag/rare-earth-metals-from-asteroids/>.

94. Molly Wood, *Asteroid Mining and the New Economics of Outer Space*, MARKETPLACE (Sept. 18, 2017, 5:58 AM), <https://www.marketplace.org/2017/09/18/tech/economics-outer-space-marketplace-tech>.

95. Arlt, *supra* note 87.

96. See Martin Griswold, *Are Invention Inevitable? Simultaneous Invention and the Incremental Nature of Discovery*, LONG NOSE: TECH. & ECON. (Nov. 25, 2012), <https://mgriz.wordpress.com/2012/11/25/are-inventions-inevitable-simultaneous-invention-and-the-incremental-nature-of-discovery/>.

97. GHANIM ALOTAIBI ET AL., ASTEROID MINING, TECHNOLOGIES ROADMAP, AND APPLICATIONS FINAL REPORT 46 (2010); Wood, *supra* note 94.

98. Shaw, *supra* note 93.

99. *Id.*

The use of asteroids for commercial mining also increases humanity's ability to venture further into the void. The resources available within asteroids allow space explorers to use them as celestial pit stops to refuel and restock on necessities like water.<sup>100</sup> The intimate relationship between humans and water needs no explanation and water can even be converted into fuel for space-faring vessels. However, some of the current hindrances in space travel are the weight and space requirements of carrying enough water to ensure the astronauts' survival.<sup>101</sup> Without sources of water available off-planet, humanity will be unable to establish bases on the Moon or other planets, like Mars.<sup>102</sup>

The expansion of space exploration and exploitation into the private sector has markedly increased the efforts put into normalizing space travel. After the retirement of the space shuttle, a non-state actor, SpaceX, took over the U.S.'s responsibility for deliveries to the International Space Station.<sup>103</sup> Richard Branson and Virgin Galactic are getting closer every day to making outer space a tourist destination.<sup>104</sup> With each non-state actor and commercial field that expands into outer space, humankind takes one step closer to making extraterrestrial travel a daily occurrence. Allowing non-state actors to commercially mine asteroids gives them the impetus to develop the technologies needed to do so. Patents do not last forever and once they expire these new technologies will benefit those the opposition is looking to protect because everyone will be able to exploit the new technologies developed by the non-state actors.

With each small step that humankind takes into the void, the greater the chance humanity has to survive as a species once Earth's natural resources are no longer sustainable. The more private actors that are able to achieve lift off, the greater the likelihood the U.N. will realize its goal of equality of use of space by all. The commonplace use of certain technologies, like GPS, show trickle-down technology can raise the standard of living.<sup>105</sup>

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100. Wood, *supra* note 94.

101. *Water: The Key Resource in Space*, PLANETARY RES., <https://www.planetaryresources.com/products/> (last visited Mar. 22, 2018).

102. *Id.*

103. See Robin Seemangal, *SpaceX Launches its Twelfth Resupply Mission to the ISS*, WIRED (Aug. 14, 2017, 7:00 AM), <https://www.wired.com/story/spacex-launches-its-12th-resupply-mission-to-the-iss/>.

104. The VSS Unity completed another successful test flight in August of 2017. *Update from Mojave: VSS Unity Flies with Propulsion Systems Installed and Live*, VIRGIN GALACTIC (Aug. 4, 2017), <https://www.virgingalactic.com/update-from-mojave-vss-unity-flies-with-propulsion-systems-installed-and-live/>.

105. See Arlt, *supra* note 87.

#### IV. CURRENT PRACTICE AS A LEGAL FRAMEWORK TO OVERSEE COMMERCIAL MINING OF CELESTIAL BODIES

While the Legal Subcommittee's current approach is overreaching, there does need to be a legal framework to ensure that this legal vacuum does not turn into an extraterrestrial wild west. But the overbroad scope of Article II, which makes all travel through space a violation, is proof of the need for an updated framework. Acquiring space dust is simply a by-product of space travel and, as it is written, amounts to a violation of Article II<sup>106</sup> because such acquisition would be appropriation of the space dust by a State. However, the U.N. does not consider resources like space dust a subject of the non-appropriation provision, further exemplifying the subjective nature of the provision. If acquiring space dust is not a violation as national appropriation, but acquiring asteroids is, and space dusts and asteroids are made of much of the same substances, then there must be a point of distinction between the two. Further framework would either, one, resolve the concern in determining at what point does the resource become too large to be considered space dust and has entered the realm of celestial body, or, two, provide a middle ground between the two categories.<sup>107</sup>

Another issue in need of legal clarification is the exploitation of transitory resources. Currently, no U.S. agency claims jurisdiction over activities in Low Earth Orbit and beyond, besides those of communication and remote sensing,<sup>108</sup> though some non-state actors have proposed that the U.S. Federal Aviation Administration ("FAA") Office of Commercial Space Transportation should have jurisdiction over these activities.<sup>109</sup> Internationally, the intent of the outer space agreements preventing appropriation of extraterrestrial resources is to preserve them for future use. However, what happens if future use is not possible? Transitory resources, such as interstellar visitor asteroids, are those that through their nature or location are only available to humanity for a brief window of time. In other words, interstellar visitor asteroids are asteroids that have come from outside of the solar system to "visit" for a brief time before continuing on their journey.<sup>110</sup> Use of such asteroids in the present would not prohibit any future generations from exploiting those asteroids since future generations statistically would never encounter the celestial body again.

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106. See Gorove, *supra* note 39, at 349-50.

107. *Id.* at 350.

108. Foust, *supra* note 54.

109. See *id.*

110. *Small Asteroid or Comet "Visits" from Beyond the Solar System*, NASA, <https://www.nasa.gov/feature/jpl/small-asteroid-or-comet-visits-from-beyond-the-solar-system> (last updated Nov. 15, 2017, 9:15 PM).

Several members of the Legal Subcommittee have expressed the need and interest in the establishment of a codified set of legislation for governing commercial space ventures.<sup>111</sup> A middle ground can be found between extraterrestrial ecologists and non-state commercial actors by designating certain locations as off-limits to commercial exploitation. For example, the moon should be treated as a “space nature reserve” due to its proximity and the important role it has played in human history. While an inordinate amount of mining would be required for an effect on the earth, since the moon plays such an integral part to life on earth through its effect on tidal cycles, it is best that humanity abstain from interfering with the moon’s integrity.

Spacefaring States can apply a similar approach to mineral claims on celestial bodies as they did to those on the seabed.<sup>112</sup> One theory that would reach a compromise between the needs of humanity and the U.N.’s fears would be to grant exclusive mineral rights to commercial space miners, but only for limited durations.<sup>113</sup> By limiting the duration of a non-state actor’s exclusive right to mine, the concerns of appropriation are mitigated, if not eliminated, by the actor’s inability to maintain the right for perpetuity. The U.N. has successfully used this method before with the International Seabed Authority (“ISA”), which has approved twenty-six contracts over fifteen years.<sup>114</sup>

The Law of the Sea and the Moon Treaty were developed in parallel directions, based on the premise that both the seabed and space were the “common heritage of mankind,” and that both required U.N. approval for any commercial exploitation.<sup>115</sup> The U.S. referred to the Law of the Sea as “socialism” and reacted to the treaty by granting prospectors exclusive seabed mining rights.<sup>116</sup> After the U.S. enacted its legislation, other developed nations also granted seabed mining claims, and together they created a “framework of interlocking national laws recognizing each other’s licenses.”<sup>117</sup> The licenses did not grant permanent claims, which would be contradictory to the Law of the Sea Treaty, instead granting only the exclusive right to mine, limited in time and area.<sup>118</sup> Commercial enterprises

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111. Legal Subcommittee Report 56, *supra* note 15, at 5.

112. Szoka & Dunstan, *supra* note 90.

113. *See id.*

114. Rachel Mills, *Why are Countries Laying Claim to the Deep-Sea Floor?*, BBC NEWS (June 21, 2017), <http://www.bbc.com/news/world-40248866>; *Deep Seabed Mineral Contractors: Overview*, INT’L SEABED AUTH., <https://www.isa.org.jm/deep-seabed-minerals-contractors> (last visited Dec. 20, 2017).

115. Mills, *supra* note 114; Szoka & Dunstan, *supra* note 90.

116. Szoka & Dunstan, *supra* note 90.

117. *Id.*

118. *Id.*

in an international territory do not constitute “national appropriation” of said territory “any more than commercial activity in international waters implies a claim to ownership of the oceans.”<sup>119</sup> A similar approach could be taken to establish the legal framework for multilateral commercial space mining treaties.<sup>120</sup>

## V. CONCLUSION

Non-state actors in the U.S. should be free to mine celestial bodies and should not be bound by the same restrictions as state actors. The U.S. is not a party to any agreements that prevent non-state actors from mining celestial bodies. Forcing non-state actors to wait until the entire world is space-bound before they may begin exploitation of space-based resources is contrary to the equality of use principle. Allowing off-world mining and similar pursuits furthers the rate of technological development. While there is the need for a regulatory framework to facilitate these endeavors, it is needlessly detrimental to the advancement of human civilization to capriciously deter progress. The future of humanity is in the stars, and the sooner we begin our expansion outwards from Earth, the sooner we ensure our survival as a species.

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119. Peter B. de Selding, *New U.S. Space Mining Law's Treaty Compliance May Depend on Implementation*, SPACE NEWS (Dec. 9, 2015), <http://spacenews.com/u-s-commercial-space-acts-treaty-compliance-may-depend-on-implementation/>.

120. See generally Wayne N. White, *Proposal for a Multilateral Treaty Regarding Jurisdiction and Real Property Rights in Outer Space*, SPACE FUTURE (2001), [http://www.spacefuture.com/archive/proposal\\_for\\_a\\_multilateral\\_treaty\\_regarding\\_jurisdiction\\_and\\_real\\_property\\_rights\\_in\\_outer\\_space.shtml](http://www.spacefuture.com/archive/proposal_for_a_multilateral_treaty_regarding_jurisdiction_and_real_property_rights_in_outer_space.shtml).