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### Cover Page Footnote

The author thanks Comments Editor Kristin P. Abbinante for her advice and skill, and he dedicates this comment to his parents, whose patience should in some small way at last be rewarded.

# STAKING A CLAIM IN THE TWENTY-FIRST CENTURY: REAL PROPERTY RIGHTS ON EXTRA-TERRESTRIAL BODIES

Ryan Hugh O'Donnell\*

## I. INTRODUCTION

On June 21, 2004, *SpaceShipOne* became the first entirely privately developed vehicle to reach outer space.<sup>1</sup> The spacecraft reached an altitude of roughly 60 miles during its brief suborbital flight, yet this relatively modest statistic belies the magnitude of the achievement.<sup>2</sup> When *SpaceShipOne* soared into suborbital space, it launched a new age for the human species, reminiscent of Columbus's first voyage into the West. Others had gone before, but they did not succeed in opening North America to the societies from which they came.<sup>3</sup> Columbus set sail at a time when many sailors still feared that sea monsters lurked in the depths of the Atlantic Ocean.<sup>4</sup> Today, would-be explorers of space must confront monsters of a different kind: indifference, hostility, technological challenges, burdensome regulation, and uncertainty. Yet, the same dreams of bountiful profits and limitless new vistas inspire modern explorers to cast their glances skyward.

Those who dream of planting their flags on the surfaces of new worlds must confront real obstacles, no less daunting than the fangs and claws of the scaly sea serpents which populated the nightmares of the first trans-Atlantic mariners. Technological and political challenges remain to be overcome, but equally as significant, the legal framework for the settlement of space haFs yet to be built.<sup>5</sup> Government-sponsored exploration of space has, indeed, yielded a wealth of new knowledge, but such exploration offers little prospect of opening space to commercial ventures.<sup>6</sup> Much as the

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<sup>1</sup> John Schwartz, *Manned Private Craft Reaches Space in a Milestone for Flight*, 153 N.Y. Times A1 (June 22, 2004).

<sup>2</sup> *Id.*

<sup>3</sup> Carl Waldman & Alan Wexler, *Who Was Who in World Exploration* 166-67 (Facts on File, Inc. 1992).

<sup>4</sup> Donald S. Johnson, *Charting the Sea of Darkness: The Four Voyages of Henry Hudson* 6 (Intl. Marine 1993).

<sup>5</sup> See Nandasiri Jasentuliyana, *International Space Law and the United Nations* ch. 1-2 (Kluwer Law Intl. 1999).

<sup>6</sup> Henry R. Hertzfeld, *Economic, Market, and Policy Issues of International Launch Vehicle Competition*, in *International Space Policy: Legal, Economic, and Strategic Options for the Twentieth Century and Beyond* 203, 204 (Daniel S. Papp & John R. McIntyre eds., Quorum Books 1987).

United States can trace its origin to the early colonies in Virginia, future extra-terrestrial colonies will find their origins in the first commercially developed settlements on the Moon and Mars.<sup>7</sup>

To the entrepreneur seeking fortune in humanity's last and greatest frontier, the present state of space law provides only unanswered questions, rather than a system of principles with which to plan for the future.<sup>8</sup> In order to facilitate the commercial development of space, the law must supply the philosophical and regulatory framework by which private actors can acquire and hold real property rights on extra-terrestrial bodies. The logical approach is to award such property rights to the first possessor.

This Comment will advocate the extension of certain property rights on celestial bodies to the first possessor and a limited extension of the sovereignty of terrestrial nations to private, extra-terrestrial settlements. The principles of first possession offer economic incentives to private industry, and a first possession regime would allow for efficient and simple regulation. Section II covers the history and present state of piloted spaceflight, as well as pending developments. Section III begins with a brief discussion of a historical parallel, continues with a survey of the five major United Nations treaties governing the exploration of space, and concludes with a summary of two analogous treaty systems. Finally, Section IV begins with a discussion of common arguments in support of human colonization of space and then moves to an analysis and an assessment of the two particularly important United Nations space treaties; it concludes with several proposals for a system by which to recognize claims of limited national sovereignty on celestial bodies.

## II. SPACEFLIGHT

### A. *Historical Overview of Spaceflight*

Rocketry began more than 2,000 years ago with the development of fireworks in China.<sup>9</sup> In fact, despite the boggling mechanical complexity of modern rocketships, they work on the same simple principle: Newton's Third Law.<sup>10</sup> The Third Law holds that for every action there is an equal and opposite reaction.<sup>11</sup> A rocket flies because of the controlled explosion of its fuel; the explosive force, directed through an exhaust, propels the rocket in the opposite direction.<sup>12</sup> Capitalizing upon this principle, Dr.

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<sup>7</sup> See David B. Quinn, *Explorers and Colonies: America, 1500-1625* (Hambleton Press 1990); *Discovering the New World: Based on the Works of Theodore de Bry* 190 (Michael Alexander ed., 1st ed., Harper & Row 1976).

<sup>8</sup> See Jasentuliyana, *supra* n. 5, at ch. 1-2.

<sup>9</sup> Courtlandt Canby, *A History of Rockets and Space* vol. 1, 9-10 (1st ed., Hawthorn Books, Inc. 1963).

<sup>10</sup> *Id.* at 11.

<sup>11</sup> *Id.*

<sup>12</sup> *Id.*

Robert Goddard launched the world's first liquid-propelled rocket in 1926, inspired by a dream of flying to Mars.<sup>13</sup>

Thirty-one years later, the U.S.S.R. sparked the so-called Space Race when it launched *Sputnik 1* on October 4, 1957.<sup>14</sup> The United States followed four months later with *Explorer 1* on January 31, 1958.<sup>15</sup> For the next 11 years, the two powers raced to be the first to land a man on the Moon.<sup>16</sup> The race ended when American astronaut Neil Armstrong stepped out of the *Apollo 11* lunar excursion module and onto the surface of the Moon on July 20, 1969.<sup>17</sup> Although the race to the Moon had ended, human exploration of space has continued.<sup>18</sup>

Many space exploration enthusiasts, particularly at NASA, expected that the Apollo program would be the long-awaited first step in a commercial space travel revolution that would quickly lead to the colonization of the Moon and Mars, much like the steamship had revolutionized international commerce and facilitated great waves of immigration to the United States.<sup>19</sup> For example, Werner Von Braun, the German astronautical engineer who immigrated to the United States following World War II, had published a proposal for a manned mission to Mars in 1954.<sup>20</sup> Political realities and insufficient public support, however, not only foreclosed the possibility of landing astronauts on Mars but also led to the cancellation of the Apollo program in 1972—three missions sooner than planned.<sup>21</sup>

### B. Present State of Spaceflight

Three nations currently have piloted space programs: the United States, Russia, and China.<sup>22</sup> All three nations have begun to invest seriously in further exploration of the Moon and Mars, with the goal of eventually

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<sup>13</sup> Milton Lehman, *This High Man* 3, 26 (1st ed., Farrar, Straus & Co. 1963).

<sup>14</sup> Donald W. Cox, *The Space Race: From Sputnik to Apollo . . . and Beyond* 3 (1st ed., Chilton Books 1962).

<sup>15</sup> *Id.* at 30.

<sup>16</sup> Robert Reeves, *The Superpower Space Race: An Explosive Rivalry Through the Solar System* 139 (Plenum Press 1994).

<sup>17</sup> *Id.*

<sup>18</sup> Apart from human exploration of space, a number of remarkable automated probes have contributed mightily to exploration. Unmanned probes have reached all of the planets but Pluto. Roger D. Launius, *Frontiers of Space Exploration* 39-40, 43 (Greenwood Press 1998). The *New Horizons* mission presently speeds its way to Pluto, and it should arrive in July 2015. NASA, *New Horizons, Pluto-Kuiper Belt Mission*, [http://www.nasa.gov/mission\\_pages/newhorizons/main/index.html](http://www.nasa.gov/mission_pages/newhorizons/main/index.html) (last updated Apr. 12, 2007).

<sup>19</sup> See e.g. David S. F. Portree, *Humans to Mars: Fifty Years of Mission Planning, 1950-2000*, Monographs in Aerospace History Series No. 21 (NASA History Div. Feb. 2001).

<sup>20</sup> Werner von Braun & Cornelius Ryan, *Can We Get to Mars?* 133, no. 9 *Collier's* 22 (Apr. 30, 1954).

<sup>21</sup> See Reeves, *supra* n. 16, at 216.

<sup>22</sup> Martin J. L. Turner, *Rocket and Spacecraft Propulsion: Principles, Practice and New Developments* 6-7, 10 (2d ed., Praxis Publ., Ltd. 2005). Additionally, Brazil, Japan, India, and Pakistan all have unmanned space programs, as does the European Space Agency. *Id.* at 6-8; Glenn Harlan Reynolds, *International Space Law: into the Twenty-first Century*, 25 *Vand. J. Transnatl. L.* 225, 231 (1992).

sending human explorers.<sup>23</sup> In addition to this governmental investment, the private sector also has begun to invest in human space travel.<sup>24</sup> These efforts to establish a continuing, permanent human presence in space mean that formerly speculative legal issues, such as property rights on extra-terrestrial bodies, will soon become practical problems.

From the Apollo-Soyuz Test Project in 1975, until the launch of the first Space Shuttle, *Columbia*, in 1981, the United States sent no astronauts into space.<sup>25</sup> The United States's space program still relies on the Space Shuttle, although the program rapidly nears its end.<sup>26</sup> On January 14, 2004, the Bush Administration announced a comprehensive reformulation of national space policy.<sup>27</sup> Quickly embraced by NASA, the policy outlines the space program's key goals for the near future: completion of the International Space Station; replacement of the Space Shuttle at the end of the decade; robotic lunar missions beginning no later than 2008; the return of astronauts to the Moon no later than 2020; and the landing of astronauts on Mars at an unspecified time after the return to the Moon.<sup>28</sup> Recently, NASA awarded a contract to Lockheed Martin to build the replacement for the Space Shuttle, dubbed "Project Orion."<sup>29</sup> Specifications for the partly reusable Orion spacecraft call for it to be adaptable for use in transporting astronauts to and from the International Space Station, the Moon, and eventually Mars.<sup>30</sup> At present, NASA's schedule calls for the shuttle program to end in 2010 and the first piloted Orion mission to launch in 2014.<sup>31</sup>

The Soviet Union abandoned its attempt to land cosmonauts (the Russian word for *astronauts*) on the Moon after 1969, but it sent many into Earth orbit to conduct research aboard a series of space stations almost continuously from 1971 until 1999.<sup>32</sup> Russia now uses the latest incarnation

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<sup>23</sup> See e.g. David E. Sanger & Richard W. Stevenson, *Bush Backs Goal of Flight to Moon to Establish Base*, 153 N.Y. Times A1 (Jan. 15, 2004); Leonard David, *Russia's Kliper Spacecraft Showcased in Paris*, [http://www.space.com/news/050615\\_kliper\\_pas.html](http://www.space.com/news/050615_kliper_pas.html) (June 15, 2005); Xinhua, *Full Text: China's Space Activities in 2006*, [http://news.xinhuanet.com/english/2006-10/12/content\\_5193446\\_5.htm](http://news.xinhuanet.com/english/2006-10/12/content_5193446_5.htm) (Oct. 12, 2006) [hereinafter Xinhua, *Full Text*].

<sup>24</sup> See e.g. Schwartz, *supra* n. 1; X Prize Foundation, *X Prize Cup 5 Year Vision: 2005-2010*, [http://www.xprizecup.com/event.php?sub=event\\_history\\_future](http://www.xprizecup.com/event.php?sub=event_history_future) (accessed Apr. 13, 2007); Bigelow Aerospace, *America's Space Prize*, [http://www.bigelowaerospace.com/multiverse/space\\_prize.php](http://www.bigelowaerospace.com/multiverse/space_prize.php) (accessed Apr. 13, 2007) [hereinafter *America's Space Prize*].

<sup>25</sup> Launius, *supra* n. 18, at xxv, 52. The Apollo-Soyuz Test Project was a largely symbolic mission during which an American Apollo spacecraft and a Soviet Soyuz spacecraft docked in Earth orbit. Daniel S. Papp & John R. McIntyre, *The Diplomatic and Legal Dimensions of International Space Policy*, in *International Space Policy*, *supra* n. 6, at 102.

<sup>26</sup> Sanger & Stevenson, *supra* n. 23.

<sup>27</sup> *Id.*

<sup>28</sup> *Id.*

<sup>29</sup> Warren E. Leary & Leslie Wayne, *Lockheed Wins Job of Building Next Spaceship*, 155 N.Y. Times A1 (Sept. 1, 2006).

<sup>30</sup> Sanger & Stevenson, *supra* n. 23.

<sup>31</sup> *Id.*

<sup>32</sup> See Robert Zimmerman, *Leaving Earth* 21, 237-38 (Joseph Henry Press 2003).

of its long-lived Soyuz spacecraft to boost cosmonauts into orbit.<sup>33</sup> In 2004, the Russian Federal Space Agency unveiled its reusable *Kliper* vehicle (in English, *clipper ship*).<sup>34</sup> Like the American Orion spacecraft, Kliper would be adaptable for travel to the International Space Station, the Moon, and even to Mars.<sup>35</sup> Russia clearly has ambitions to land cosmonauts on the Moon, but it has announced no official plans or timetables.<sup>36</sup>

The China National Space Administration has launched two piloted missions into Earth orbit aboard its Shenzhou spacecraft.<sup>37</sup> China's *Shenzhou VII*, its third piloted orbital spacecraft, will launch in 2008.<sup>38</sup> In coming years, the Chinese government plans to build a space station and to fly robotic probes to the Moon, including a sample-return mission slated for no later than 2020.<sup>39</sup> Although the director of China's lunar exploration program has acknowledged that piloted missions lie years away, a government-issued white paper indicates that China's long-term goal is to send taikonauts (the Chinese word for *astronauts*) to the Moon.<sup>40</sup>

Along with this strong revival of interest among government agencies in sending piloted missions to the Moon and Mars, private actors have begun to invest seriously in commercial, piloted space travel. In October 2004, the Ansari X Prize Foundation awarded a \$10 million prize to Burt Rutan and his company, Scaled Composites, for winning its competition to launch a privately developed vehicle capable of carrying three passengers to an altitude of at least 100 kilometers twice within two weeks.<sup>41</sup> The Foundation followed up with the 2006 Wirefly X Prize Cup, offering \$2.5 million in prizes in competitions for lunar landers, vertical takeoff and landing vehicles, and space elevators.<sup>42</sup> Bigelow Aerospace has offered a \$50 million prize (called America's Space Prize) to any contestant domiciled in the United States who can launch a vehicle twice within 60

<sup>33</sup> See Reeves, *supra* n. 16, at 197, 201; Zimmerman, *supra* n. 32, at 151, 235, 415.

<sup>34</sup> James Oberg, *Next-generation Russian Spaceship Unveiled*, <http://www.msnbc.msn.com/id/6623693> (updated Dec. 1, 2004, 10:03 a.m. EST).

<sup>35</sup> David, *supra* n. 23.

<sup>36</sup> Vladimir Isachenkov, *Russia's Top Space Company Targets Moon*, [http://www.usatoday.com/tech/science/space/2006-04-11-russia-moon\\_x.htm](http://www.usatoday.com/tech/science/space/2006-04-11-russia-moon_x.htm) (posted Apr. 11, 2006).

<sup>37</sup> Xinhua, *China's Shenzhou VII Spacecraft Under Assembly*, [http://news.xinhuanet.com/english/2006-11/02/content\\_5282520.htm](http://news.xinhuanet.com/english/2006-11/02/content_5282520.htm) (Nov. 2, 2006).

<sup>38</sup> *Id.*

<sup>39</sup> Xinhua, *Chinese Man on Moon Far Off*, [http://news3.xinhuanet.com/english/2005-12/30/content\\_3987886.htm](http://news3.xinhuanet.com/english/2005-12/30/content_3987886.htm) (Dec. 30, 2005) [hereinafter Xinhua, *Chinese Man*].

<sup>40</sup> Xinhua, *Full Text*, *supra* n. 23; Xinhua, *Chinese Man*, *supra* n. 39.

<sup>41</sup> Schwartz, *supra* n. 1.

<sup>42</sup> X Prize Foundation, *supra* n. 24; A space elevator is a vehicle that ascends into space by traveling along a cable anchored at one end on Earth's surface and on the other end to some orbiting object. NASA, *Audacious & Outrageous: Space Elevators*, [http://science.nasa.gov/headlines/y2000/ast07sep\\_1.htm](http://science.nasa.gov/headlines/y2000/ast07sep_1.htm) (posted Sept. 7, 2000) [hereinafter *Audacious & Outrageous*].

days that can carry five passengers into orbit and dock with a Bigelow Aerospace “expandable space habitat.”<sup>43</sup>

Partly in response to this surge of commercial investment in space, the United States Congress has passed legislation to promote private innovation, such as the recent Commercial Space Launch Amendments Act of 2004.<sup>44</sup> The first of the act’s stated purposes is “to promote economic growth and entrepreneurial activity through use of the space environment for peaceful purposes.”<sup>45</sup> In addition to such legislative promotion of private space activity, NASA has undertaken cooperative ventures with the private sector.<sup>46</sup> For example, NASA has partnered with Bigelow Aerospace in the development of Bigelow’s expandable space habitat.<sup>47</sup> This combination of governmental and private interest in a permanent human presence in space, and specifically in a permanent human presence on the Moon and Mars, suggests that commercial activity in orbital space and on extra-terrestrial bodies will become an important fact of life in the foreseeable future.

### C. Pending Developments in Spaceflight

The major barrier to commercial activity in space, for instance, space tourism, is the cost of delivering a payload (i.e., passengers and cargo) into orbit.<sup>48</sup> Delivery of a Space Shuttle payload into orbit, for example, costs approximately \$10,000 per pound (meaning that the cost of sending a 150-pound human being into orbit is approximately \$1.5 million).<sup>49</sup> The high cost of using rockets to deliver payloads into orbit results from the need for a large mass of fuel relative to the mass of the payload to be delivered.<sup>50</sup> For example, *Mars Reconnaissance Orbiter*, which arrived at Mars on March 10, 2006, launched aboard an Atlas V rocket.<sup>51</sup> At liftoff, the total

<sup>43</sup> *America’s Space Prize*, *supra* n. 24. The expandable space habitat is so named because it is essentially an inflatable space station. Constructing the habitat with some inflatable components saves money by reducing weight at launch (relative to the use of entirely rigid components) and allows for a comfortably spacious environment in orbit. Alicia Chang, *Spacecraft Successfully Inflates in Orbit*, [http://www.usatoday.com/tech/science/space/2006-07-13-private-spacecraft\\_x.htm?csp=34](http://www.usatoday.com/tech/science/space/2006-07-13-private-spacecraft_x.htm?csp=34) (updated July 13, 2006); NASA, *Bigelow Aerospace Continues Relationship with NASA-JSC for Space Habitat Technology and Private Sector Space Development*, [http://technology.jsc.nasa.gov/bigelow\\_story.cfm](http://technology.jsc.nasa.gov/bigelow_story.cfm) (accessed Apr. 13, 2007) [hereinafter *Bigelow Aerospace Continues Relationship with NASA*].

<sup>44</sup> 49 U.S.C. §§ 70101-70121 (2000).

<sup>45</sup> *Id.* At § 70101(b)(1).

<sup>46</sup> See e.g. *Bigelow Aerospace Continues Relationship with NASA*, *supra* n. 43.

<sup>47</sup> *Id.*

<sup>48</sup> Howard E. McCurdy, *Faster, Better, Cheaper 4* (Johns Hopkins Univ. Press 2001). See Turner, *supra* n. 22, at 16, 34.

<sup>49</sup> NASA, *The Space Launch Initiative: Technology to Pioneer the Space Frontier, 2nd Generation Perspective: a Look Back and Forward*, <http://www.nasa.gov/centers/marshall/news/background/facts/slifactstext02.html> (last updated Apr. 2, 2007).

<sup>50</sup> See McCurdy, *supra* n. 48, at 1-4; Turner, *supra* n. 22, at 16, 34.

<sup>51</sup> NASA, *Spacecraft and Instruments*, [http://www.nasa.gov/mission\\_pages/MRO/spacecraft/launch.html](http://www.nasa.gov/mission_pages/MRO/spacecraft/launch.html) (last updated Mar. 8, 2006) [hereinafter *Spacecraft and Instruments*]; NASA, *NASA’s Mars*



weight of the mated orbiter and rocket was 333,000 kilograms, of which 305,000 kilograms, or 91.6%, was fuel.<sup>52</sup> Technologies presently in development, however, have the potential to reduce this cost dramatically, thereby making space travel and permanent settlement on extra-terrestrial bodies commercially viable.

Alternatives to chemical propulsion would largely eliminate the need for space vehicles to carry on-board chemical propellants (i.e., rocket fuel), thereby reducing the cost of reaching orbit. Although the practical application of these alternative launch systems remains years away, their potential effect on the market for space travel can hardly be overestimated. One alternative is a magnetic levitation track.<sup>53</sup> A spacecraft would be mounted on a device superficially resembling a railroad track, but the ship would be propelled by the interaction of magnetic fields generated by the track and by the spacecraft.<sup>54</sup> Lofted by the magnetic rail, the craft would require only a minimal amount of chemical propellant to escape Earth's gravity and continue into space.<sup>55</sup>

Another alternative is the so-called space elevator.<sup>56</sup> A space elevator would employ a tether anchored at one end to the surface of the Earth and at the other end to some orbiting object.<sup>57</sup> The orbiting anchor would be placed in an orbit such that its motion would maintain tension along the tether, while keeping the tether itself motionless relative to Earth's surface.<sup>58</sup> Objects would then be hauled into space along the tether much like a chairlift carries skiers along a cable.<sup>59</sup>

Ground-based lasers offer still another alternative to chemical propulsion.<sup>60</sup> High-intensity lasers would fire pulses at a specially designed cavity on the rear of a spacecraft; the blast of energy would cause air trapped in the cavity to explode, propelling the craft into space.<sup>61</sup> These technologies, and others, might seem exotic at present, but they represent humanity's next step into outer space.

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*Reconnaissance Orbiter, Providing an Unprecedented Look at Mars*, [http://www.nasa.gov/mission\\_pages/MRO/main/index.html](http://www.nasa.gov/mission_pages/MRO/main/index.html) (last updated Mar. 22, 2007).

<sup>52</sup> *Spacecraft and Instruments*, *supra* n. 51, at *Details about the Launch Vehicle*.

<sup>53</sup> NASA, *Maglev: Launching Rockets Using a Magnet*, <http://liftoff.msfc.nasa.gov/News/1999/News-MagLev.asp> (Oct. 25, 1999).

<sup>54</sup> *Id.*

<sup>55</sup> *Id.*

<sup>56</sup> *Audacious & Outrageous*, *supra* n. 42.

<sup>57</sup> *Id.*

<sup>58</sup> *Id.*

<sup>59</sup> *Id.*

<sup>60</sup> NASA, *Far Out Propulsion Conference Blasts Off: Advanced Propulsion Research Conference Opens Today in Huntsville*, [http://science.nasa.gov/newhome/headlines/prop06apr99\\_1a.htm](http://science.nasa.gov/newhome/headlines/prop06apr99_1a.htm) (Apr. 6, 1999).

<sup>61</sup> *Id.*

### III. BACKGROUND

#### A. *European Colonization of the Western Hemisphere*

The history of human settlement of Earth offers numerous examples, and important lessons, that should guide the design and implementation of any policy structure for the settlement of space. Competition among nations for land and resources led to vicious conflict and loss of life, and the prospect for a repetition of this cycle of expansion and warfare looms as humanity looks to other worlds as potential new homes.<sup>62</sup> The following brief discussion of European colonization of North and South America posits that a mechanism for the exploration and development of new territory established and agreed upon in advance by all concerned, can help to restrain competition from escalating into violence.

Following Columbus's first voyage to the Western Hemisphere in 1492, the monarchs of Spain and Portugal disputed their respective rights to colonize lands in South America.<sup>63</sup> To settle the dispute, they ratified the *Treaty of Tordesillas* in 1494.<sup>64</sup> The treaty granted dominion over all lands west of a specified line (approximately longitude 47° 27' W) to Spain and all lands east of the line to Portugal.<sup>65</sup> Today, the cultural distinctiveness of Brazil reflects this division.<sup>66</sup> Although neither of the parties had yet seen the vast expanse of territory covered by the treaty (or had even known its true extent), they avoided armed conflict over competing claims to sovereignty in South America, arguably because they had established in advance a framework for the resolution of such claims.<sup>67</sup>

The history of the colonization of North America presents a marked contrast to Spanish and Portuguese settlement of South America. Competing British, French, and Spanish colonization led to a series of wars: King William's War, Queen Anne's War, King George's War, and the French and Indian War.<sup>68</sup> Although partly an extension of conflicts among France, Spain, and the United Kingdom in Europe, these wars (particularly Queen Anne's War and the French and Indian War) resulted from

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<sup>62</sup> See generally Fred Anderson & Andrew Cayton, *The Dominion of War: Empire and Liberty in North America, 1500-2000* at 51, 87, 106, 119 (Viking 2005).

<sup>63</sup> See Johnson, *supra* n. 4, at 9-12.

<sup>64</sup> Modesto Seara Vázquez, *Cosmic International Law* 223-24 (Wayne St. U. Press 1965).

<sup>65</sup> Johnson, *supra* n. 4, at 11.

<sup>66</sup> For example, Brazilians speak Portuguese, and most of the rest of South Americans speak Spanish. See *Frommer's South America* (Marc Nadeau & Jennifer Reilly eds., Wiley Publ. 2006); E. Bradford Burns, *A History of Brazil* 37 (3d ed., Columbia U. Press 1993). Brazil's present western border distantly reflects the *Treaty of Tordesillas*, having been modified by the *Treaty of Madrid* of 1750 to account for, among other things, natural boundaries such as mountains. *Id.* at 60. Significantly, with the *Treaty of Tordesillas* in place, the subsequent dispute was resolved by adoption of another treaty, as opposed to warfare.

<sup>67</sup> See Johnson, *supra* n. 4, at 9-12.

<sup>68</sup> See generally Anderson & Cayton, *supra* n. 62.

competing, unsettled interests in North American possessions.<sup>69</sup> In fact, the French and Indian War began in North America and then spread back to Europe.<sup>70</sup> In North America, unlike in South America, the competing colonial powers had not reached any advance agreements regarding the division of territory and the recognition of claims to sovereignty.<sup>71</sup> Many variables affected the history of European colonization in the Americas, but the impact of the Treaty of Tordesillas in South America suggests that recognition of national sovereignty over new territories need not be a counterproductive influence but, on the contrary, can be a stabilizing influence.<sup>72</sup>

### B. Legal Background

When the Soviet Union launched *Sputnik 1* in 1957, mere intellectual interest in the establishment of an international legal framework to govern human activity in outer space transformed into diplomatic and legislative action in the United Nations.<sup>73</sup> In 1958, the United Nations General Assembly created the Committee on the Peaceful Uses of Outer Space.<sup>74</sup> The General Assembly then adopted the *Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space* (“*Declaration of Legal Principles*”) in 1963.<sup>75</sup> The *Declaration of Legal Principles* states, among other things, that “[t]he exploration and use of outer space shall be carried on for the benefit and in the interest of all mankind, . . . , [o]uter 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,” and that “[s]tates bear international responsibility for national activities in outer space, whether carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried on in conformity with the principles set forth in the present Declaration.”<sup>76</sup> This statement of basic principles provided the ideological cornerstone for the later United Nations treaties regarding the activities of states in space and on celestial bodies.<sup>77</sup>

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<sup>69</sup> See *id.*

<sup>70</sup> *Id.* at 118.

<sup>71</sup> See Quinn, *supra* n. 7; Alexander, *supra* n. 7, at 60-64.

<sup>72</sup> See Henry Folmer, *Franco-Spanish Rivalry in North America: 1524-1763* (Arthur H. Clark Co. 1953).

<sup>73</sup> Cox, *supra* n. 14, at 3; Jasentuliyana, *supra* n. 5, at 1-2.

<sup>74</sup> Jasentuliyana, *supra* n. 5, at 3.

<sup>75</sup> *Id.*; Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, GA Res. 1962 (XVIII), UN GA, 18th Sess., UN Doc. A/RES/1962 (1963) [hereinafter *Declaration of Legal Principles*].

<sup>76</sup> *Declaration of Legal Principles*, *supra* n. 75, at ¶¶ 1, 3, 5.

<sup>77</sup> See Jasentuliyana, *supra* n. 5, at 3. See also E.R.C. van Bogaert, *Aspects of Space Law* 41 (Kluwer L. & Taxn. Publishers 1986).

Today, five United Nations treaties constitute the most important provisions of international space law.<sup>78</sup> Of these, the first and the last speak most directly to the issue of property rights on extra-terrestrial bodies.<sup>79</sup> Following a survey of the five space treaties is a discussion of two other treaties, the *International Telecommunication Convention*, the *Antarctic Treaty* and the *United Nations Convention on the Law of the Sea* (“*Law of the Sea*”), each of which shares principles in common with the space treaties.<sup>80</sup>

The first of the five space treaties, ratified in 1967, was the *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies* (“*Outer Space Treaty*”).<sup>81</sup> Article I of the *Outer Space Treaty*, which calls the Moon and other celestial bodies “the province of all mankind,” states that “[t]he exploration and use of outer space, including the moon [sic] and other celestial bodies, shall be carried out for the benefit . . . of all mankind.”<sup>82</sup> Under Article II, “[o]uter space, including the moon [sic] 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>83</sup>

The precise meaning of the Article II prohibition of “national appropriation” has been the subject of some debate.<sup>84</sup> Some interpret the

<sup>78</sup> See Nathan Goldman, *Transition of Confusion in the Law of Outer Space*, in *International Space Policy*, *supra* n. 6, at 157.

<sup>79</sup> *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies* art. II (Oct. 10, 1967), 18 U.S.T. 2410 [hereinafter *Outer Space Treaty*]; *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* art. 11, ¶¶ 2-3 (July 11, 1979), 18 I.L.M. 1434 [hereinafter *Moon Treaty*].

<sup>80</sup> *Antarctic Treaty* (June 23, 1961), 12 U.S.T. 794; *Third United Nations Conference on the Law of the Sea: Final Act* (Dec. 10, 1982), 21 I.L.M. 1261 [hereinafter *Law of the Sea*].

<sup>81</sup> *Outer Space Treaty*, *supra* n. 79. The countries which had ratified the *Outer Space Treaty* as of January 1, 2006, are: Afghanistan, Algeria, Antigua and Barbuda, Argentina, Australia, Austria, Bahamas, Bangladesh, Barbados, Belarus, Belgium, Benin, Brazil, Bulgaria, Burkina Faso, Canada, Chile, China, Cuba, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Fiji, Finland, France, Germany, Greece, Guinea-Bissau, Hungary, Iceland, India, Indonesia, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Kazakhstan, Kenya, Kuwait, Lao People's Democratic Republic, Lebanon, Libyan Arab Jamahiriya, Madagascar, Mali, Mauritius, Mexico, Mongolia, Morocco, Myanmar, Nepal, Netherlands, New Zealand, Niger, Nigeria, Norway, Pakistan, Papua New Guinea, Peru, Poland, Portugal, Republic of Korea, Romania, Russian Federation, Saint Vincent and the Grenadines, San Marino, Saudi Arabia, Seychelles, Sierra Leone, Singapore, Slovakia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Syrian Arab Republic, Thailand, Togo, Tonga, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States of America, Uruguay, Venezuela, Viet Nam, Yemen, and Zambia. Twenty-seven other countries have signed without ratifying. United Nations Office for Outer Space Affairs, *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2006*, [http://www.unoosa.org/pdf/publications/ST\\_SPACE\\_11\\_Rev1\\_Add1E.pdf](http://www.unoosa.org/pdf/publications/ST_SPACE_11_Rev1_Add1E.pdf) (accessed Apr. 13, 2007).

<sup>82</sup> *Id.* at art. I.

<sup>83</sup> *Id.* at art. II.

<sup>84</sup> *Id.* at art. II; see e.g. Jasentuliyana, *supra* n. 5, at 59, 135; Nathan Goldman, *Transition of Confusion in the Law of Outer Space in International Space Policy*, *supra* n. 6, at 159 [hereinafter Goldman, *Transition of Confusion*]; Gennady Zhukov & Yuri Kolosov, *International Space Law* 46 (Boris Belitzky trans., Praeger Publishers 1984); Carl Q. Christol, *The Modern International Law of Outer Space* 42

provision to prohibit only the exercise of state sovereignty, leaving private actors free to assert property rights on extra-terrestrial bodies.<sup>85</sup> Others interpret it to be an outright prohibition of any assertion of sovereignty and of any appropriation of property at all, be it government or private.<sup>86</sup> Even under this interpretation, however, by which the exercise of property rights would be permissible, the exercise of national sovereignty would yet be forbidden.<sup>87</sup> Additionally, the *Outer Space Treaty* contains, among others, provisions prohibiting the placement of weapons in Earth orbit or on extra-terrestrial bodies;<sup>88</sup> requiring the rescue of astronauts;<sup>89</sup> assigning responsibility and liability for activities in space;<sup>90</sup> granting jurisdiction over moving objects (and anyone aboard) launched into space to the government of the nation in which the object is registered;<sup>91</sup> and requiring states to report their activities in space.<sup>92</sup>

Next came the *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space* ("Rescue Agreement").<sup>93</sup> In short, the *Rescue Agreement* deals with the rescue and return of astronauts after they return to Earth.<sup>94</sup> For example, if an astronaut from the United States were to land inadvertently in Russia, the

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(Pergamon Press, Inc. 1982) [hereinafter Christol, *Law of Outer Space*]; (Eric Husby, *Sovereignty and Property Rights in Outer Space*, 3 D.C.L. & Prac. 359, 368-70 (1994); Glenn Harlan Reynolds, *International Space Law: into the Twenty-first Century*, 25 Vand. J. Transnatl. L. 225, 230 (1992); Carl Q. Christol, *Article 2 of the 1967 Principles Treaty Revisited*, IX Annals of Air and Space Law 217, 244 (1984) [hereinafter Christol, *1967 Treaty Revisited*].

<sup>85</sup> See e.g. Christol, *Law of Outer Space*, *supra* n. 84, at 230; Christol, *1967 Treaty Revisited*, *supra* n. 84, at 42.

<sup>86</sup> See e.g. Zhukov & Kolosov, *supra* n. 84, at 46; Reynolds, *supra* n. 84, at 244.

<sup>87</sup> Ricky J. Lee & Felicity K. Eylward, Student Author, *Article II of the Outer Space Treaty and Human Presence on Celestial Bodies: Prohibition of State Sovereignty, Exclusive Property Rights, or Both?* in Proceedings of the Forty-eighth Colloquium on the Law of Outer Space 95, 97 (Am. Inst. of Aeronautics & Astronautics 2006).

<sup>88</sup> *Outer Space Treaty*, *supra* n. 79, at art. IV

<sup>89</sup> *Id.* at art. V

<sup>90</sup> *Id.* at arts. VI-VII

<sup>91</sup> *Id.* at art. VIII

<sup>92</sup> *Id.* at art. XI.

<sup>93</sup> *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space* (Dec. 3, 1968), 19 U.S.T. 7570. The countries which had ratified the Rescue Agreement as of January 1, 2006, are: Antigua and Barbuda, Argentina, Australia, Austria, Bahamas, Barbados, Belarus, Belgium, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Cameroon, Canada, Chile, China, Cuba, Cyprus, Czech Republic, Denmark, Ecuador, Egypt, El Salvador, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Greece, Guinea-Bissau, Guyana, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Japan, Kazakhstan, Kuwait, Lao People's Democratic Republic, Lebanon, Madagascar, Maldives, Mauritius, Mexico, Mongolia, Morocco, Nepal, Netherlands, New Zealand, Niger, Nigeria, Norway, Pakistan, Papua New Guinea, Peru, Poland, Portugal, Republic of Korea, Romania, Russian Federation, Saint Vincent and the Grenadines, San Marino, Serbia and Montenegro, Seychelles, Singapore, Slovakia, Slovenia, South Africa, Spain, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Thailand, Tonga, Tunisia, Ukraine, United Kingdom, United States of America, Uruguay, and Zambia. Twenty-five others have signed without ratifying. United Nations Office for Outer Space Affairs, *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2006*, [http://www.unoosa.org/pdf/publications/ST\\_SPACE\\_11\\_Rev1\\_Add1E.pdf](http://www.unoosa.org/pdf/publications/ST_SPACE_11_Rev1_Add1E.pdf) (accessed Apr. 13, 2007).

<sup>94</sup> *Id.*

Russian government would be obligated to effect rescue and to return the astronaut to the United States.<sup>95</sup>

The *Convention on International Liability for Damage Caused by Space Objects* (“*Liability Convention*”) followed four years later.<sup>96</sup> Under the *Liability Convention*, strict liability for damage caused by the impact on Earth of objects launched into space attaches to the government of that nation in which the launched object was registered.<sup>97</sup> Liability for damage caused in space, however, attaches on the basis of “fault”.<sup>98</sup> In 1975 came the *Convention on the Registration of Objects Launched into Outer Space* (“*Registration Convention*”).<sup>99</sup> The *Registration Convention* requires that a government which launches an object into space, procures the launching of an object, or allows the launching of an object from within its jurisdiction must create a registry listing all such objects and notify the Secretary-General of the United Nations of the registry and its contents.<sup>100</sup>

Finally, the United Nations approved the *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* (“*Moon Treaty*”) in 1979.<sup>101</sup> In the *Moon Treaty*, the Moon and “its natural

<sup>95</sup> *Id.* at art. 2.

<sup>96</sup> *Convention on International Liability for Damage Caused by Space Objects* (Oct. 9, 1973), 24 U.S.T. 2389 [hereinafter *Liability Convention*]. The countries which had ratified as of January 1, 2006, are: Antigua and Barbuda, Argentina, Australia, Austria, Belarus, Belgium, Benin, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Canada, Chile, China, Cuba, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Fiji, Finland, France, Gabon, Germany, Greece, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Japan, Kazakhstan, Kenya, Kuwait, Lao People’s Democratic Republic, Liechtenstein, Luxembourg, Mali, Malta, Mexico, Mongolia, Morocco, Netherlands, New Zealand, Niger, Nigeria, Norway, Pakistan, Panama, Papua New Guinea, Peru, Poland, Qatar, Republic of Korea, Romania, Russian Federation, Saint Vincent and the Grenadines, Saudi Arabia, Senegal, Serbia and Montenegro, Seychelles, Singapore, Slovakia, Slovenia, Spain, Sri Lanka, Sweden, Switzerland, Syrian Arab Republic, Togo, Trinidad and Tobago, Tunisia, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, and Zambia. Twenty-five others have signed without ratifying. United Nations Office for Outer Space Affairs, *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2006*, [http://www.unoosa.org/pdf/publications/ST\\_SPACE\\_11\\_Rev1\\_Add1E.pdf](http://www.unoosa.org/pdf/publications/ST_SPACE_11_Rev1_Add1E.pdf) (accessed Apr. 13, 2007).

<sup>97</sup> Goldman, *Transition of Confusion*, *supra* n. 6, at 162-63; *Liability Convention*, *supra* n. 96, at art. II. See also *Convention on Registration of Objects Launched Into Outer Space* (Sept. 15, 1976), 28 U.S.T. 695 [hereinafter *Registration Convention*].

<sup>98</sup> Goldman, *Transition of Confusion in the Law of Outer Space*, *supra* n. 6, at 162-63; *Liability Convention*, *supra* n. 96, at art. III.

<sup>99</sup> *Registration Convention*, *supra* n. 97. The countries which had ratified as of January 1, 2006, are: Antigua and Barbuda, Argentina, Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Chile, China, Cuba, Cyprus, Czech Republic, Denmark, France, Germany, Greece, Hungary, India, Indonesia, Italy, Japan, Kazakhstan, Liechtenstein, Mexico, Mongolia, Netherlands, Niger, Norway, Pakistan, Peru, Poland, Republic of Korea, Russian Federation, Saint Vincent and the Grenadines, Serbia and Montenegro, Seychelles, Slovakia, Spain, Sweden, Switzerland, Ukraine, United Arab Emirates, United Kingdom, United States, and Uruguay. Four others have signed without ratifying. United Nations Office for Outer Space Affairs, *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2006*, [http://www.unoosa.org/pdf/publications/ST\\_SPACE\\_11\\_Rev1\\_Add1E.pdf](http://www.unoosa.org/pdf/publications/ST_SPACE_11_Rev1_Add1E.pdf) (accessed Apr. 13, 2007).

<sup>100</sup> *Registration Convention*, *supra* n. 97, at arts. I-II.

<sup>101</sup> *Moon Treaty*, *supra* n. 79; Goldman, *Transition of Confusion in the Law of Outer Space*, *supra* n. 6, at 164.

resources” are called the “common heritage of mankind.”<sup>102</sup> It excludes any part of the Moon, and any resources extracted from the Moon, from appropriation by any actor, government or private.<sup>103</sup> It requires “equitable sharing . . . in the benefits derived from [lunar] resources . . .” among all nations.<sup>104</sup> Additionally, it prohibits the placement of “nuclear weapons or other . . . weapons of mass destruction” on or in orbit around the Moon, and it prohibits “the testing of any type of weapons” and “the conduct of military manoeuvres” on the Moon’s surface.<sup>105</sup> As of January 1, 2006, only 12 nations had ratified the *Moon Treaty* (none of which has a piloted space program).<sup>106</sup>

The common heritage principle incorporated into the *Moon Treaty* was first introduced by Argentina’s representative to the United Nations Committee on the Peaceful Uses of Outer Space during consideration of the *Outer Space Treaty*.<sup>107</sup> Most developed nations, especially those active in the space industry, apparently prefer not to ratify the *Moon Treaty* because the “equitable sharing” of profits (the treaty uses the word “benefits”) derived from space exploration, and the prohibition against any form of appropriation of resources, that accompany the common heritage principle would seriously erode, if not negate, the economic incentives for space exploration.<sup>108</sup> On the other hand, less developed nations apparently support the treaty because they would share in the economic benefit derived from such exploration despite their inability to engage independently in such exploration.<sup>109</sup> In any event, the *Moon Treaty* would likely have little effect on the law of property acquisition in space because none of the major space powers has agreed to ratify it.<sup>110</sup>

Two other treaties offer useful interpretive insights regarding the provisions of the *Outer Space Treaty* and the *Moon Treaty*, particularly those provisions relating to the acquisition of property rights on the Moon, Mars, and other celestial bodies. The *Antarctic Treaty*, in force since 1961, established a system of unlimited duration for the cooperative management

<sup>102</sup> *Moon Treaty*, *supra* n. 79, at art. 11, ¶ 1.

<sup>103</sup> *Id.* at art. 11, ¶¶ 2-3.

<sup>104</sup> *Id.* at art. 11, ¶ 7(d).

<sup>105</sup> *Id.* at art. 3, ¶¶ 3-4.

<sup>106</sup> The 12 nations, as of January 1, 2006, are: Australia, Austria, Belgium, Chile, Kazakhstan, Mexico, Mongolia, Netherlands, Pakistan, Peru, Philippines, and Uruguay. Four others have signed without ratifying. United Nations Office for Outer Space Affairs, *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2006*, [http://www.unoosa.org/pdf/publications/ST\\_SPACE\\_11\\_Rev1\\_Add1E.pdf](http://www.unoosa.org/pdf/publications/ST_SPACE_11_Rev1_Add1E.pdf) (accessed Apr. 13, 2007).

<sup>107</sup> Jasentuliyana, *supra* n. 5, at 19; *Moon Treaty*, *supra* n. 79, at art. 11, ¶ 7(d).

<sup>108</sup> *See id.* at 231-32. *Moon Treaty*, *supra* n. 79, at art. 11, ¶¶ 2-3, 7(d).

<sup>109</sup> Reynolds, *supra* n. 22, at 230.

<sup>110</sup> *See* Jasentuliyana, *supra* n. 5, at 39, 231. The treaty technically entered into force July 11, 1984 after the requisite number of governments ratified it. *Id.* at 40; *Moon Treaty*, *supra* n. 79, at art. 19, ¶ 3. Pakistan, a signatory of the *Moon Treaty*, has its own (unpiloted) space launch capability, but it is not among the traditionally dominant space powers. *See* Turner, *supra* n. 22 at 6-8.

of the Continent (using the word “forever”).<sup>111</sup> It also incorporates a number of agreements established after 1961.<sup>112</sup> The *Law of the Sea* contains a number of agreements on the governance and regulation of the world’s oceans, specifically setting limits on territorial waters, protecting certain species and the maritime environment, and creating “exclusive economic zones” in which states have certain sovereign rights beyond the limits of their territorial waters.<sup>113</sup>

Antarctica, in terms of its wealth of mineral resources and relative inaccessibility, provides a useful analogue to the exploration of space.<sup>114</sup> The *Antarctic Treaty*, in language similar to the words “the province of all mankind” in the *Outer Space Treaty*, provides, “in the interest of all mankind,” that “Antarctica shall be used for peaceful purposes only.”<sup>115</sup> In fact, the principles of the *Antarctic Treaty* influenced the development of the *Outer Space Treaty*.<sup>116</sup> It accordingly prohibits the establishment of military bases and the placement of military assets in Antarctica, much like the *Outer Space Treaty* and the *Moon Treaty* prohibit certain military activities in space and on extra-terrestrial bodies.<sup>117</sup> It also denies any claims to sovereignty in Antarctica made subsequent to the signing of the treaty, much like the *Outer Space Treaty* and the *Moon Treaty* forbid national appropriation of celestial bodies.<sup>118</sup> Disputes among the parties to the treaty are to be resolved through consultation by “negotiation, inquiry, mediation, conciliation, arbitration, judicial settlement or other peaceful means of [the parties’] choice.”<sup>119</sup> Failing that, disputes are to be referred to the International Court of Justice.<sup>120</sup> The result to date of the *Antarctic Treaty* has been to leave Antarctica open to scientific research but to inhibit or prevent commercial development.<sup>121</sup> Its terms, like that of the *Outer Space Treaty* and the *Moon Treaty*, emphasize international cooperation, peaceful

<sup>111</sup> *Antarctic Treaty*, *supra* n. 80, at Preamble; Frank G. Klotz, *America on the Ice: Antarctic Policy Issues* 35 (Natl. Def. U. Press 1990).

<sup>112</sup> Klotz, *supra* n. 111, at 53-54; *Antarctic Treaty*, *supra* n. 80, at art. IX.

<sup>113</sup> *Law of the Sea*, *supra* n. 80, at pt. II, § 2, art. 3; *id.* at pt. V, arts. 55-60; *id.* at pts. VII, XII.

<sup>114</sup> Klotz, *supra* n. 111, at 84-90.

<sup>115</sup> *Outer Space Treaty*, *supra* n. 79, at art. I; *Antarctic Treaty*, *supra* n. 111, at preamble, art. I, ¶ 1; *Outer Space Treaty*, *supra* n. 79, at art. IV.

<sup>116</sup> See Christol, *Law of Outer Space*, *supra* n. 84, at 39.

<sup>117</sup> *Outer Space Treaty*, *supra* n. 79, at art. IV; *Moon Treaty*, *supra* n. 79, at art. 3, ¶¶ 3-4.

<sup>118</sup> *Antarctic Treaty*, *supra* n. 80, at art. IV; *Outer Space Treaty*, *supra* n. 79, at art. II; *Moon Treaty*, *supra* n. 79, at art. 11, ¶ 2. Because certain nations had outstanding claims to sovereignty in Antarctica at the time of the signing of the treaty, Article IV states that the treaty has no effect on such claims. *Antarctic Treaty*, *supra* n. 80 at art. IV, ¶ 1(a)-(c).

<sup>119</sup> *Antarctic Treaty*, *supra* n. 80, at art. XI, ¶ 1.

<sup>120</sup> *Id.* at art. XI, ¶ 2.

<sup>121</sup> See Christopher C. Joyner, *Governing the Frozen Commons: The Antarctic Regime and Environmental Protection* 149-51 (U. of S.C. Press 1998); Klotz, *supra* n. 111, at 81-84.



purposes, scientific (as opposed to commercial) exploration, and collective management.<sup>122</sup>

The *Law of the Sea* states that “the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction” are “the common heritage of mankind,” the same words with which the *Moon Treaty* describes “the Moon and its natural resources.”<sup>123</sup> Further, it prohibits any state from claiming sovereignty over any of these common heritage areas.<sup>124</sup> Within 200 miles adjacent to their territorial waters, however, nations may create “exclusive economic zones” in which they have sovereign rights to exploit resources.<sup>125</sup> A state’s laws and regulations apply within its exclusive economic zone, and it has the right to enforce them.<sup>126</sup> Borders of different nations’ adjacent exclusive economic zones are to be settled “on the basis of international law, as referred to in Article 38 of the Statute of the International Court of Justice . . . .”<sup>127</sup> The *Law of the Sea* places limits on the sovereignty of nations within their exclusive economic zones, incorporates principles of equitable sharing, and under certain circumstances, allows for the participation of “geographically disadvantaged” (e.g., landlocked) countries in the exclusive economic zones of other countries.<sup>128</sup> Parties to the *Law of the Sea* are to resolve disputes by “peaceful means [of their own choice] in accordance with Article 2, paragraph 3 of the Charter of the United Nations,” or failing that, they are to submit their disputes to their choice of the International Tribunal for the

<sup>122</sup> See *Antarctic Treaty*, *supra* n. 80, at arts. II-III, X-XI; *Outer Space Treaty*, *supra* n. 79; *Moon Treaty*, *supra* n. 79. See Joyner, *supra* n. 121, at 21-22.

<sup>123</sup> *Law of the Sea*, *supra* n. 80, at pt. I, art. 1; *id.* at pt. XI, § 2 art. 136; *Moon Treaty*, *supra* n. 79, at art. 11, ¶ 1.

<sup>124</sup> *Id.* at part XI, § 2 art. 137.

<sup>125</sup> *Law of the Sea*, *supra* n. 80, at pt. V, arts. 55-57. The following countries, as of Dec. 29, 2006, claimed exclusive economic zones to the full extent of the allowed 200 miles from their coastlines: Angola, Antigua and Barbuda, Argentina, Australia, Bahamas, Bangladesh, Barbados, Belize, Brazil, Brunei Darussalam, Bulgaria, Cambodia, Canada, Cape Verde, Chile, China, Colombia, Comoros, Cook Islands, Costa Rica, Côte d’Ivoire, Cuba, Cyprus, Democratic People’s Republic of Korea, Denmark, Djibouti, Dominica, Dominican Republic, Equatorial Guinea, Fiji, France, Gabon, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Iceland, India, Indonesia, Ireland, Jamaica, Japan, Kenya, Kiribati, Madagascar, Malaysia, Maldives, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Morocco, Mozambique, Myanmar, Namibia, Nauru, New Zealand, Nicaragua, Nigeria, Niue, Norway, Oman, Pakistan, Panama, Philippines, Portugal, Republic of Korea, Romania, Russian Federation, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Solomon Islands, South Africa, Spain, Sri Lanka, Suriname, Syrian Arab Republic, Thailand, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Turkey, Tuvalu, Ukraine, United Arab Emirates, United Kingdom, United Republic of Tanzania, United States, Uruguay, Vanuatu, Venezuela, Viet Nam, Yemen. United Nations, *Table of Claims to Maritime Jurisdiction* (as at 29 December 2006), [http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/claims\\_2005.pdf](http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/claims_2005.pdf) (accessed Apr. 13, 2007).

<sup>126</sup> *Id.* at pt. V, art. 73. Enforcement may not include corporal punishment or imprisonment unless part of a bilateral agreement between states. *Id.* at ¶ 3.

<sup>127</sup> *Law of the Sea*, *supra* n. 80, at part V art. 74, ¶ 1.

<sup>128</sup> *Id.* at pt. V, arts. 56, 69-70.

Law of the Sea, the International Court of Justice, or other special tribunals described in the treaty.<sup>129</sup>

## V. ARGUMENT

### A. *In Support of Exploration*

Many motives have spurred the exploration of space. The desire for pure adventure has motivated some, and others have been motivated by the desire to explore and understand the unknown—the quest for pure knowledge.<sup>130</sup> Others cite the effect that the exploration of Earth has had on human civilization throughout history and discern a so-called exploration imperative, that is, a “sense that humans” must explore and settle space “if the human race is to survive indefinitely.”<sup>131</sup>

Other, more practical motivations also apply. Exploration of space, particularly in the context of the Space Race between the United States and the U.S.S.R., has inspired a number of remarkable technological innovations.<sup>132</sup> Population pressure stretches resources, and some suggest that the human population of Earth is rapidly nearing the point at which the planet will no longer be able to support it.<sup>133</sup> Extra-terrestrial bodies would afford humanity room to expand, as well as access to new reservoirs of resources.<sup>134</sup> Furthermore, some highly polluting activities, such as energy production and mining, could be relocated off of Earth’s surface, sparing Earth the environmental damage such activity causes.<sup>135</sup> Extra-terrestrial real estate could prove to be a lucrative business, as well, if the surprisingly large number of (purported) sales of land on the Moon and Mars is any indication.<sup>136</sup>

<sup>129</sup> *Id.* at pt. V, art. 59; *Id.* at pt. XV, arts. 279, 281(1), 287(1)(a)-(d).

<sup>130</sup> Launius, *supra* n. 18, at 6.

<sup>131</sup> *Id.*

<sup>132</sup> E.g., Doppler radar, ergonomic chairs, implantable cardiac defibrillators, memory foam, and satellite radio. Marjolijn Bijlefeld & Robert Burke, *It Came from Outer Space: Everyday Products and Ideas from the Space Program* 24, 26, 49, 63, 84 (Greenwood Press 2003).

<sup>133</sup> See K. Bruce Newbold, *Six Billion Plus: Population Issues in the Twenty-first Century* (Rowman & Littlefield Publishers, Inc. 2002).

<sup>134</sup> E.g., the asteroids orbiting the Sun in the region of Earth’s orbit contain varying quantities of water, iron, and nickel. See Paul S. Hardersen, *The Case for Space: Who Benefits from Explorations of the Last Frontier?* 118-20 (ATL Press, Inc. 1997). Also, helium-3, an isotope of helium, is abundant on the Moon and rare on Earth; it could be useful in fusion reactors to produce energy. Larry Haskin & Paul Warren, *Lunar Chemistry*, in *Lunar Sourcebook: A User’s Guide to the Moon* 637 (Grant H. Heiken, David T. Vaniman & Bevan M. French eds., Cambridge U. Press 1991).

<sup>135</sup> See Hardersen, *supra* n. 134, at 118-20. Solar energy could be collected by satellites orbiting Earth, or by facilities on the surface of the Moon, and transmitted to Earth. Hardersen, *supra* n. 134, at 106-18. This would reduce pollution on Earth by eliminating the need for such polluting sources of energy as coal and nuclear power.

<sup>136</sup> E.g., an organization calling itself “The Lunar Embassy” has sold some 2,524,728 plots of land on the Moon and 945,344 on Mars. The Lunar Embassy, *So Who on Earth Buys Extra-terrestrial Property?*, [http://www.lunarembassy.com/lunar/shops.lasso?-database=aa654s5677556pr&-layout=US\\$\\_pr9981\\_en&-response=index\\_e.lasso&-NoResultsError=index\\_e.lasso&-token.affindex=&-token.trackindex=1303301&-token.rm=18734638&-token.cs=US\\$&-token.rs29=33&-token.rscd=LE&-](http://www.lunarembassy.com/lunar/shops.lasso?-database=aa654s5677556pr&-layout=US$_pr9981_en&-response=index_e.lasso&-NoResultsError=index_e.lasso&-token.affindex=&-token.trackindex=1303301&-token.rm=18734638&-token.cs=US$&-token.rs29=33&-token.rscd=LE&-)

*B. Legal Analysis*

The disparate interpretations of the provisions on national appropriation in the space treaties, divided here into two analyses, would lead to different practical results. One interpretation emphasizes strict adherence to the common heritage principle and would tend to promote scientific exploration to the detriment of commercial development. The other interpretation focuses on an extremely literal reading of the *Outer Space Treaty*, and disregards most of the *Moon Treaty*. This approach would favor private enterprise while risking international discord. After a discussion of these two competing interpretive models of the treaties, and of their comparative merits and shortcomings, a number of proposals follow.

During the debates on the *Outer Space Treaty*, Argentina's ambassador introduced the "common heritage of mankind" principle with reference to space and extra-terrestrial bodies, such as the Moon and Mars.<sup>137</sup> In the final version of the treaty, the words "the province of all mankind" echo the influence of this principle.<sup>138</sup> One interpretation of the meaning of the provision in the *Outer Space Treaty* prohibiting "national appropriation" rests on the common heritage principle and holds that neither governments nor private enterprise may make any claim to ownership of extra-terrestrial real estate or resources based upon the so-called common heritage principle.<sup>139</sup> Christol, among others, has argued that the phrase "by any other means" in Article II of the *Outer Space Treaty*, based in part on its negotiating history, would have no meaning unless it had been intended to apply the restrictions imposed on state actors to private parties as well.<sup>140</sup> Article VI of the *Outer Space Treaty*, which states that the parties to the treaty "shall bear international responsibility for national activities in outer space, . . . , whether such activities are carried on by governmental agencies or by non-governmental entities," supports this interpretation.<sup>141</sup>

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token.firstlogin=&-token.skip=&-show (accessed Apr. 13, 2007). Such sales, although based on extremely dubious claims of right asserted by the purveyor, suggest a strong interest in investing in other worlds.

<sup>137</sup> Jasentuliyana, *supra* n. 5, at 19. Malta's ambassador later introduced it into the debates on the *Law of the Sea*. Jasentuliyana, *supra* n. 5, at 19.

<sup>138</sup> *Outer Space Treaty*, *supra* n. 79, at art. I; Christol, *Law of Outer Space*, *supra* n. 84, at 44 (stating that "it has substantially influenced the law of the sea through the term 'common heritage of mankind.'"). See Sethu Nandakumar, "Common Heritage of Mankind" – Property Rights, in the Wake of Commercial Use of the Moon and Other Celestial Bodies in *Proceedings of the Forty-eighth Colloquium on The Law of Outer Space* 308, 315 (Am. Inst. of Aeronautics & Astronautics 2006).

<sup>139</sup> *Outer Space Treaty*, *supra* n. 79, at art. II; see Zhukov & Kolosov, *supra* n. 84, at 46, 178-179; Christol, *1967 Treaty Revisited*, *supra* n. 84, at 244; Heidi Keefe, *Making the Final Frontier Feasible: A Critical Look at the Current Body of Outer Space Law*, 11 Santa Clara Computer & High Tech. L.J. 345, 360 (1995).

<sup>140</sup> Christol, *1967 Treaty Revisited*, *supra* n. 84, at 263. Article II states that "[o]uter space, including the moon [sic] 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." *Outer Space Treaty*, *supra* n. 79, at art. II.

<sup>141</sup> *Outer Space Treaty*, *supra* n. 74, at art. VI. Note that the Declaration of Legal Principles establishes the same principle in nearly identical words. *Declaration of Legal Principles*, *supra* n. 76, at ¶ 5.

Governments, by this reasoning, always have “jurisdiction and control” over natural and legal persons (e.g., corporations), so allowing private actors to exercise property rights would be an impermissible back door, so to speak, to national sovereignty.<sup>142</sup>

The common heritage principle, and with it the related language “the province of all mankind” in the *Outer Space Treaty*, descends from the Roman civil law concept of *res communis*.<sup>143</sup> Loosely translated, *res communis* means “community property.” *Res communis* refers to “things legally not property because they [are] incapable of dominion and control.”<sup>144</sup> Under Roman law, *res communis* applied to, for example, the air, running water, and the oceans.<sup>145</sup> Such communal property “is not susceptible of any form of appropriation” and “must remain free to be used for the benefit of mankind as a whole.”<sup>146</sup> Five individual principles together constitute the encompassing idea of the common heritage: (1) the common heritage area is not subject to national appropriation; (2) the common heritage area is exclusively for peaceful purposes; (3) scientific research may be conducted freely, but the results must be shared; (4) any exploitation of resources must be done in the public interest, with particular regard to the needs of developing countries; and (5) any exploration or exploitation should not harm the environment and should be in accord with the principles of the United Nations Charter.<sup>147</sup> Therefore, if applied to celestial bodies, the principle would preclude not only the exercise of sovereignty by governments but also private ownership of property.<sup>148</sup>

<sup>142</sup> Keefe, *supra* n. 139, at 359 (quoting and referencing Christol, *supra* n. 84, at 263)

<sup>143</sup> E.R.C. van Bogaert, *Aspects of Space Law* 32 (Kluwer L. & Taxn. Publishers 1986). A member of the United States Senate noted, during hearings before the Committee on Foreign Relations regarding the *Outer Space Treaty*, that the phrase “province of all mankind” was a concept essentially the same as the concept of freedom of the seas, referring to the *res communis* principle. Christol, *Law of Outer Space*, *supra*, n. 84, at 45; Sen. Comm. on For. Rel., *Treaty on Outer Space*, 90th Cong. 55 (Mar. 7 & 13, Apr. 12 1967); *Outer Space Treaty*, *supra* n. 79, at art. I. Christol noted that “[t]he discussions during the 1960s, which led to the acceptance of the *res communis* principle in Article 2 of the 1967 Principles Treaty, accepted the premise that the Moon and other celestial bodies should be treated as a *res communis*.” Christol, *Law of Outer Space*, *supra* n. 84, at 249. See also Nandakumar, *supra* n. 138, at 315. The concept of the freedom of the seas is frequently associated with Hugo Grotius, who published a treatise called *Mare Librum* in 1618. See generally Richard Tuck, *The Rights of War and Peace: Political Thought and the International Order from Grotius to Kant* (Oxford U. Press 1999).

<sup>144</sup> Lynda L. Butler, *The Commons Concept: An Historical Concept with Modern Relevance*, 23 Wm. & Mary L. Rev. 835, 847 (1982).

<sup>145</sup> *Id.* at 849 (discussing commentary of Justinian on *res communis*).

<sup>146</sup> van Bogaert, *supra* n. 143, at 32.

<sup>147</sup> Joyner, *supra* n. 121, at 221 (quoting a 1967 speech by Arvid Pardo, then Malta’s ambassador to the United Nations, before the First Committee of the General Assembly).

<sup>148</sup> The community could itself, presumably, appropriate resources from the *res communis*, or authorize another to engage in appropriation, for its collective benefit. See Christol, *Law of Outer Space*, *supra* n. 84, at 322; Lynn M. Fountain, Student Author, *Creating Momentum in Space: Ending the Paralysis Produced by the “Common Heritage of Mankind Doctrine”*, 35 Conn. L. Rev. 1753, 1759 (2003).

Later, the principle was incorporated explicitly into the *Moon Treaty* in 1979.<sup>149</sup> The *Moon Treaty* in express terms bars national and private appropriation.<sup>150</sup> In addition to prohibiting the exercise of state sovereignty and prohibiting state and private assertion of property rights, application of the common heritage principle would require collective, international management and equitable sharing of the benefits derived from extra-terrestrial exploration.<sup>151</sup>

This understanding of the common heritage principle can lead to serious inhibition of economic development and can stand in the way of meaningful international consensus.<sup>152</sup> For example, with the principle strongly incorporated into the *Law of the Sea*, the United States, along with many other industrialized countries, refused to sign because of the limits imposed upon exploitation of seabed mineral resources in Part XI of the treaty (which calls such resources “the common heritage of mankind”).<sup>153</sup> The impasse cleared with the formation of the Part XI Agreement.<sup>154</sup> The Part XI Agreement suspended certain obligations and restrictions imposed on parties to the treaty by the original version of Part XI in the 1982 draft of the *Law of the Sea*, thereby obviating the objections of some developed nations, like the United States, to the restrictions on deep seabed mining.<sup>155</sup>

<sup>149</sup> *Moon Treaty*, *supra* n. 79, at art. 11, ¶ 1. The principle “finds its expression in the provisions of this Agreement [the *Moon Treaty*] and in particular in paragraph 5 of this article [Article 11 of the *Moon Treaty*].” *Id.*

<sup>150</sup> *Moon Treaty*, *supra* n. 79, at art. 11, ¶¶ 2-3; *Outer Space Treaty*, *supra* n. 79, at art. II (using only the word “national,” without additional terms such as “non-governmental organization” as in the *Moon Treaty*); *Moon Treaty*, *supra* n. 79, at art. 11, ¶ 3.

<sup>151</sup> *Moon Treaty*, *supra* n. 79, at art. 11, ¶ 7(d); see Nandakumar, *supra* n. 138, at 313-14; Jasentuliyana, *supra* n. 5, at 140. Goldman points out that “[e]quitable sharing does not mean equal [shares].” Nathan C. Goldman, *American Space Law: International and Domestic* 90 (Iowa St. U. Press 1988) [hereinafter Goldman, *American Space Law*]. Regardless, the operative word is “sharing.”

<sup>152</sup> See Joyner, *supra* n. 121, at 149-51; Klotz, *supra* n. 111, at 81-84 (discussing the difficulty of mineral exploration and economic development in Antarctica under the *Antarctic Treaty*).

<sup>153</sup> *Law of the Sea*, *supra* n. 80, at part XI § 2 art. 136. See also Jasentuliyana, *supra* n. 5, at 39 n. 57; John E. Noyes, *International Legal Developments in Review: 1996*, 31 *Intl. Law* 703 (1997). Part XI of the *Law of the Sea* as originally proposed would have required not only collective management of deep sea mineral resources and equitable sharing of economic benefits derived, but also some measure of technology transfer. *Law of the Sea*, *supra* n. 80, at pt. XI, art. 144 ¶¶ 1-2. Malta’s ambassador to the United Nations, Arvid Pardo, introduced the concept in 1967 into the discussions and debates that led to the *Law of the Sea*. *United Nations Convention on the Law of the Sea 1982: A Commentary* vol. VI, 5 (Satya N. Nandan, Michael W. Lodge & Shabtai Tosenne eds., Martinus Nijhoff Publishers 2002).

<sup>154</sup> *Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982* (July 28, 1994), 33 *I.L.M.* 1309.

<sup>155</sup> See Jasentuliyana, *supra* n. 5, at 39 n. 57; Noyes, *supra* n. 153. Part XI originally called for the creation of “The Enterprise,” an agency pursuant to the *Law of the Sea* that would “carry out activities in the Area directly, . . . , [including] the transporting processing and marketing of minerals recovered from the Area.” *Law of the Sea*, *supra* n. 80, at pt. XI, art 170, ¶ 1. The term “activities” means “all activities of the exploration for, and exploitation of, the resources of the Area.” *Id.* at pt. I, art. 1, ¶ 3. The term “Area” refers to “the seabed and the ocean floor and subsoil thereof, beyond the limits of national jurisdiction,” meaning that Part XI would have applied even to exclusive economic zones. *Id.* at pt. I, art. 1, ¶ 1(1). The original Part XI would also have required member states to finance the Enterprise and to engage in mandatory transfers of technology to further the operations of the Enterprise. See Nandan, Lodge & Shabtai, *supra* n. 153, at 507. The Part XI Agreement relieved the parties of the obligation to

The *Antarctic Treaty*, although it does not make explicit use of the common heritage principle, makes use of the related phrase “the interest of all mankind.”<sup>156</sup> Another example of the implementation of collective, international management, the *Antarctic Treaty* is “virtually silent on the question of resource development.”<sup>157</sup> It refers to the interest of all mankind, but the parties to the treaty have reserved to themselves the right to govern Antarctic affairs, “in effect excluding nations that may have an interest in the region, but lack the wherewithal to mount major expeditions.”<sup>158</sup> Moreover, disputed claims to sovereignty, dating from before its adoption in 1959, remain unresolved.<sup>159</sup>

The *Outer Space Treaty* rests on broad principles formulated in the context of the Cold War and related international tensions that are no longer relevant to the exploration of space.<sup>160</sup> The *Moon Treaty* largely reflects the concern of developing nations that the major space powers, specifically the United States and Russia, would capitalize on their lead in space technology to exclude broad, international participation in the exploration and settlement of space.<sup>161</sup> Nearly 30 years later, however, three nations have active, piloted space programs, and five others (counting the European Space Agency as one) have independent launch capabilities.<sup>162</sup> Additionally, with the dawn of routine, private human spaceflight looming, the fear that a few privileged nations would come to dominate space has become an anachronism. Other international agreements, moreover, such as the *Law of the Sea* with its provision in Part V for exclusive economic zones, offer models for accommodating the desire for private development of celestial bodies with the goals of protecting the interests of terrestrial nations that lack the independent ability to engage in human exploration of space, as well as promoting scientific research.<sup>163</sup>

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finance the Enterprise and required the Enterprise to obtain any needed technology on the open market. *Id.* at 507-08.

<sup>156</sup> *Antarctic Treaty*, *supra* n. 80, at preamble. The influence of the *Antarctic Treaty* on the *Outer Space Treaty* affirms the interrelationship of the phrases “interest of mankind” and “province of all mankind,” and this interrelationship supports the inference that the phrase “interest of mankind” suggests the influence of collectivist principles, similar to what has become known as the common heritage principle, on the *Antarctic Treaty*. *Outer Space Treaty*, *supra* n. 79, at art. I; *Antarctic Treaty*, *supra* n. 80, at preamble.

<sup>157</sup> Klotz, *supra* n. 111, at 81. See Joyner, *supra* n. 121, at 149-51.

<sup>158</sup> *Id.* Management and decision making for Antarctica are reserved to the “Contracting Parties” under the treaty. *Antarctic Treaty*, *supra* n. 80, at arts. IX, XII ¶ 1(a). Contracting Parties must accept certain obligations and engage in research, as would any nation seeking to become a contracting party. *Id.* at art. IX; Klotz, *supra* n. 111, at 81. See also Joyner, *supra* n. 121, at 48-51.

<sup>159</sup> *Antarctic Treaty*, *supra* n. 80, at art. IV; Klotz, *supra* n. 111, at 83.

<sup>160</sup> See Reynolds, *supra* n. 22, at 230.

<sup>161</sup> See *id.* at 230.

<sup>162</sup> Turner, *supra* n. 22, at 6-8; Reynolds, *supra* n. 22, at 231. Of these, Brazil, China, India, and Pakistan may fairly be called representatives of the developing world. China has a human spaceflight program. Turner, *supra* n. 22, at 6-7, 10.

<sup>163</sup> *Law of the Sea*, *supra* n. 80, at pt. V, arts. 55-57.

The appeal of discarding a dogmatic adherence to the common heritage principle lies in the principle's inhibition of economic development. Terrestrial examples of the likely outcomes of strict adherence to the principle in outer space and on extra-terrestrial bodies are the dearth of productive economic activity in Antarctica under the present *Antarctic Treaty* regime; the exclusion of most nations from participating in exploration and research in Antarctica; and the only recently resolved refusal of many major powers to ratify the *Law of the Sea* because Part XI, as originally constituted, would have damaged their economic interests.<sup>164</sup> Nations are unlikely to reach an accord on an international legal regime governing resource-rich environments when doing so would mean surrendering their economic interests. Additionally, the *Antarctic Treaty* has left disputes over claims to sovereignty unresolved for nearly 50 years.<sup>165</sup> The common heritage principle, although based upon laudable idealism, has serious weaknesses when practically applied.

The alternate interpretation of the *Outer Space Treaty* and of the *Moon Treaty*, that private actors may claim property rights on extra-terrestrial bodies, or at least profit from the extraction of resources, relies upon an exactingly literal interpretation of the treaty's prohibition of "national appropriation" and essentially ignores the *Moon Treaty* to arrive at the conclusion that non-governmental organizations, like private businesses, may claim property rights on other worlds.<sup>166</sup> By this understanding of Article II of the *Outer Space Treaty*

[T]he meaning accorded to the words of the agreement at the time of its negotiation, . . . , [and] the practices of the space-resource States [e.g., countries with extensive, active space programs, such as the United States and Russia] both prior to and following entry into force of the Treaty, . . . it may reasonably be concluded that the free and equal use . . . provisions of Article 1, par. 2 encompass non exclusive rights on the part of all States to engage in exploitative activities.<sup>167</sup>

The *Moon Treaty* provides that "[n]either the surface nor the subsurface of the moon [sic], nor any part thereof or natural resources *in place*, shall become property of any State, international intergovernmental or non-

<sup>164</sup> *Id.* at pt. XI. See Jasentuliyana, *supra* n. 5, at 39 n. 57; Noyes, *supra* n. 153; Klotz, *supra* n. 111, at 83. See Joyner, *supra* n. 121, at 21-22, 149-51.

<sup>165</sup> *Antarctic Treaty*, *supra* n. 80, at art. IV; Klotz, *supra* n. 111, at 81. See Joyner, *supra* n. 121, at 21-22.

<sup>166</sup> *Outer Space Treaty*, *supra* n. 79, at art. II; see e.g. Reynolds, *supra* n. 22, at 230, 232.

<sup>167</sup> Christol, *Law of Outer Space*, *supra* n. 84, at 42. *Outer Space Treaty*, *supra* n. 79, at arts. I, II. Article I states that "[o]uter space, including the moon [sic] 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." *Id.* at art. I, ¶ 2.

governmental organization, national organization or non-governmental entity or of any natural person.”<sup>168</sup> Although neither governments nor private entities could exercise property rights on celestial bodies, resources in place on the Moon, or on other extra-terrestrial bodies, would not be susceptible to private ownership but, once extracted, would become the property of whoever extracted them.<sup>169</sup> Based upon the words “in place,” this interpretation of the *Moon Treaty* rests upon an understanding of res communis disconnected from the common heritage principle.<sup>170</sup> Some proponents of commercial exploitation of resources available on celestial bodies have even suggested unilateral abrogation of the *Outer Space Treaty*.<sup>171</sup>

This interpretation, favorable as it is to the economic exploitation of celestial bodies, fails to take into account the philosophical pedigree of the *Outer Space Treaty*, and, as noted, discounts the effect of most of the language of the *Moon Treaty*. Compared to an interpretation based upon the common heritage principle, the literal interpretation, favoring the permissibility of private appropriation, presents problems of its own. First, history suggests that governments will use force, if necessary, to protect their economic interests and the economic interests of their citizens.<sup>172</sup> For example, the United Kingdom and the United States engaged in a series of interventions in Central American countries in pursuance of “economic, political, and security interests in the region” throughout the nineteenth and twentieth centuries.<sup>173</sup> Second, even if initial settlement of space were entirely private, the nations from which those settlements originated could very likely be drawn into some conflict arising independently between private parties.<sup>174</sup> United Nations regulation of such private settlements, as some have suggested, might not be an adequate solution to this problem.<sup>175</sup> Many United Nations interventions into regions plagued by conflict, for instance, civil war, have produced little or only short-lived results.<sup>176</sup>

<sup>168</sup> *Moon Treaty*, *supra* n. 79, at art. 11, ¶ 3 (emphasis added).

<sup>169</sup> See Nandakumar, *supra* n. 138, at 311 (discussing the similar cumulative import of Articles II, VIII, and IX of the *Outer Space Treaty*); Christol, *Law of Outer Space*, *supra* n. 84, at 322. See also Fountain, *supra* n. 148, at 1759.

<sup>170</sup> *Moon Treaty*, *supra* n. 79, at art. 11, ¶ 3. Goldman, *American Space Law*, *supra* n. 151, at 90. See Christol, *Law of Outer Space*, *supra* n. 84, at 322; Fountain, *supra* n. 148, at 1759.

<sup>171</sup> See e.g. Reynolds, *supra* n. 22, at 233 n. 25; see also Brandon C. Gruner, Student Author, *A New Hope for International Space Law*, 35 Seton Hall L. Rev. 299, 351-52, 355 (2004). The United States is not among the twelve countries which have ratified the *Moon Treaty*. *Supra* n. 106.

<sup>172</sup> See e.g. John A. Booth & Thomas W. Walker, *Understanding Central America* 21 (Westview Press, Inc. 1989).

<sup>173</sup> *Id.*

<sup>174</sup> Apart from such interventions as mentioned above, the wars in which the European powers engaged in North America in the sixteenth, seventeenth, and eighteenth centuries are also a case in point for the contention that privately founded settlements can produce economic interests over which governments would be willing to go to war. See e.g. Anderson & Cayton, *supra* n. 62, at 118.

<sup>175</sup> See e.g. Reynolds, *supra* n. 22, at 233.

<sup>176</sup> For example, United Nations intervention in the Republic of the Congo, after its independence from Belgium in 1960, left behind a “corrupt and bloody . . . dictatorship.” James Dobbins et al., *The UN's*



Finally, if extra-terrestrial bodies are treated as *res communis* available to anyone with the means to exploit the resources of such worlds, then the probable result would be ruinous “over-exploitation of resources.”<sup>177</sup> In a *res communis* regime of this kind, the “individual enjoys the benefit of exploiting . . . resources . . . , [but] the cost of this . . . use is spread . . . over all users.”<sup>178</sup> Therefore, those engaged in commercial exploitation of resources available on celestial bodies would have an incentive to maximize their own profit, heedless of the cost to others and to the long-term consequences.

### C. Proposals

The provision in the *Law of the Sea* allowing for the creation of exclusive economic zones and the exercise of limited national sovereignty within them offers an excellent model for the settlement and economic development of extra-terrestrial bodies.<sup>179</sup> Under such a model, governments and private enterprise alike could make investments in space and be confident in their ability to reap the rewards of their investments in the context of a familiar and established legal regime. Granting the first possessor the limited sovereignty of an exclusive economic zone would thereby encourage settlement and investment in space without allowing the dominant space powers to take the “common heritage of mankind” only for themselves.<sup>180</sup>

Exclusive economic zones would accommodate the philosophical underpinnings of the common heritage principle while allowing for economic development. Part V of the *Law of the Sea* grants to states “sovereign rights for exploring and exploiting” natural resources, as well as “with regard to other activities for the economic exploitation and exploration of the zone, . . . .”<sup>181</sup> The sovereignty of the nation with dominion over the exclusive economic zone is tempered by the rights of all others to “navigation and overflight and of the laying of submarine cables and pipelines . . . .”<sup>182</sup> In an exclusive economic zone, a state may “in the exercise of its sovereign rights to explore, [and] exploit, . . . take such measures, including boarding, inspection, arrest, and judicial proceedings, as may be necessary to ensure compliance with the laws and regulations

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*Role in Nation-Building: From the Congo to Iraq 27* (Rand Corp. 2005). The intervention in Sierra Leone in October 1999 almost collapsed because of “reliance on poorly trained, ill-equipped, and unprepared units.” *Id.* at 146-47.

<sup>177</sup> Fountain, *supra* n. 148, at 1759.

<sup>178</sup> *Id.*

<sup>180</sup> *Law of the Sea, supra* n. 80, at pt. V. For a similar suggestion, see Rosanna Sattler, *Transporting a Legal System for Property Rights: From the Earth to the Stars*, 6 *Chi. J. Intl. L.* 23, 41-43 (2005).

<sup>181</sup> *Moon Treaty, supra* n. 79, at art. 11, ¶ 1.

<sup>182</sup> See *Law of the Sea, supra* n. 80, at pt. V, art. 56 ¶ 1(a) (listing “production of energy from the water” as an example of “other activities”).

<sup>183</sup> *Id.* at pt. V, art. 58, ¶ 1.

adopted by it in conformity with this Convention.”<sup>183</sup> This system, applied to extra-terrestrial settlements, would allow for economic development without making other worlds the sole province of the few nations, at present, with the ability to reach them. Yet, by allowing for restrained national sovereignty, orderly and systematic development could proceed without the uncertainty produced by an awkward system of exclusive, collective, consensus-based management as that in the *Antarctic Treaty*.<sup>184</sup>

Management within the zone would be left to one nation and its laws, constrained by an international agreement resembling Part V of the *Law of the Sea*; relations among nations, that is, the inter-zone relations, would be governed by the agreement itself.<sup>185</sup> Such a system would preserve space as the shared, common dominion of humanity generally, but it would also provide economic opportunities, law and order, and stability. Furthermore, inasmuch as the *Outer Space Treaty* states that the “exploration and use of outer space, including the moon [sic] and other celestial bodies, shall be carried out for the benefit . . . of all countries,” and the *Moon Treaty* states that the “exploration and use of the moon . . . shall be carried out for the benefit and in the interests of all countries,” a system of exclusive economic zones would still allow for the same international, market-based investment and cooperation that happens on Earth.<sup>186</sup> A monumental undertaking, like the settlement of other worlds, suggests the very practical need for a broad spectrum of participation.

The question remains as to whom and how to grant exclusive economic zones on extra-terrestrial bodies. In the *Law of the Sea*, states have the right, based simply upon geographic proximity, to claim exclusive economic zones in their coastal waters.<sup>187</sup> Clearly, this approach has little or no applicability to celestial bodies. First possession recommends itself as a logical and easily administered system for establishing rights to claim exclusive economic zones. The common law posits that possession is the foundation of property.<sup>188</sup> At common law, “first possession is the root of title.”<sup>189</sup> In this case, possession would be the foundation of limited, sovereign property rights similar to those provided by exclusive economic zones under the *Law of the Sea*.<sup>190</sup> First possession is established by giving “notice to the world through a clear act” and “mix[ing] labor” with the

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<sup>184</sup> *Law of the Sea*, *supra* n. 80, at pt. V, art. 73, ¶ 1.

<sup>185</sup> *Antarctic Treaty*, *supra* n. 80, at arts. IX, XII; see Klotz, *supra* n. 111, at 81-83.

<sup>186</sup> *Law of the Sea*, *supra* n. 80, at pt. V.

<sup>187</sup> *Outer Space Treaty*, *supra* n. 79, at art. I; *Moon Treaty*, *supra* n. 79, at art. 4, ¶ 1.

<sup>188</sup> *Law of the Sea*, *supra* n. 80, at pt V, arts. 57, 69-70 (allowing for land-locked and “geographically disadvantaged states” to have access to exclusive economic zones of nearby coastal states).

<sup>189</sup> Carol M. Rose, *Possession as the Origin of Property*, 52 U. Chi. L. Rev. 73, 74 (1985).

<sup>190</sup> *Id.* at 75.

<sup>191</sup> *Law of the Sea*, *supra* n. 80, at pt. V.

act.<sup>191</sup> The *Outer Space Treaty*, the *Registration Convention*, and the *Moon Treaty* all have provisions requiring states to give notification regarding their activities in space.<sup>192</sup> The notice component of a first possession regime, therefore, comports well with existing treaty principles. Moreover, first possession “reward[s] useful labor.”<sup>193</sup> This labor (i.e., research, development, and specifically the deployment of expeditions to extra-terrestrial bodies) would be the *act* component of establishing first possession. Historically, the doctrine of first possession was subject to some abuse when “one group [does] not play the . . . game [acknowledging the principles of first possession],” but the Author presumes that human explorers will not encounter other civilizations on celestial bodies.<sup>194</sup>

The system proposed here would allow a state to claim limited sovereignty on extra-terrestrial bodies only once it had satisfied three conditions. First, the state, or a private party on behalf of the state, would have to be the first to arrive on the site for which it made a claim, or it would have to arrive on an unoccupied and unclaimed site. Second, the state or private party would have to send human explorers to the site it intended to claim. Allowing claims to be asserted upon landing of unpiloted probes could leave the system open to much abuse. Third, the state or private party would have to make continuous, subsequent use of the site. Were the state, or private party acting on its behalf, to discontinue its use of the site for more than a specified period (e.g., one year), any recognition of sovereignty and property rights would be voided.

Such claims, once allowed, would also be of limited physical area. A convenient limitation could be, for instance, a maximum of twice the area covered by any permanent installation, measured from the center of the installation. No state would be allowed to claim an area reserved by international agreement because of its particular scientific importance or because of its utility as a landing site for future expeditions. Finally, no state would be allowed to claim more than an internationally predetermined percentage of the surface area of any body.

## VI. CONCLUSION

A comparison of the colonial histories of North and South America reinforces the argument that the extension of national sovereignty need not be a divisive force but, to the contrary, can be a stabilizing influence. History also suggests that armed conflict often follows the economic interests of nations, meaning that any system or international agreement for

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<sup>192</sup> Rose, *supra* n. 189, at 77 (discussing *Pierson v. Post*, 3 Cai. R. 175 (N.Y. 1805) and John Locke’s labor theory of property).

<sup>193</sup> *Outer Space Treaty*, *supra* n. 79, at art. XI; *Registration Convention*, *supra* n. 97, at arts. II-IV; *Moon Treaty*, *supra* n. 79, at art. 5.

<sup>194</sup> Rose, *supra* n. 189, at 82.

<sup>195</sup> *Id.* at 85 (discussing the example of *Johnson v. McIntosh*, 21 U.S. 543 (1823)).

the colonization of celestial bodies must account for competition and disagreement. Attempts at purely collective management have often proved problematic, either failing to resolve conflict or stifling development.

The common heritage principle shared by the *Outer Space Treaty*, the *Moon Treaty*, and the *Antarctic Treaty*, would, if controlling, tend to suppress productive investment in the exploration of space. In the *Law of the Sea*, however, the collectivist implications of this principle have been tempered somewhat by way of its provisions on exclusive economic zones. Applying the *Law of the Sea* provisions on exclusive economic zones to state-sponsored and private settlement exploration of other worlds would afford the stability of national sovereignty and provide protection for the interests of those nations presently lacking the independent means to engage in such activity. Establishing a means in advance by which to fix claims and to define their international legal limits would channel the potential for destructive conflict into beneficial expansion, promote equal access to opportunities in space, provide order and stability, and facilitate the realization of humanity's long-standing aspirations to explore the heavens. As humanity prepares to embark on its shared voyage of boundless new discoveries, the importance of creating a workable, accommodating policy framework can hardly be overstated.

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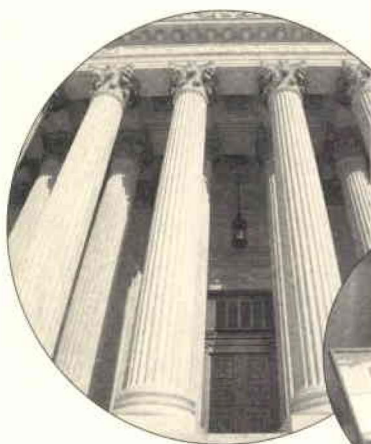
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