

ASTEROIDAE NATURAE: WHAT IT TAKES TO CAPTURE AN ASTEROID

In the summer of 2013, Planetary Resources, Inc.¹ successfully completed a Kickstarter² campaign in just thirty-three days to crowdfund the launch of world's first public telescope.³ Over 17,600 supporters pledged a combined \$1.5 million to back the project.⁴ Google's Larry Page, Microsoft's Charles Simonyi, and, most recently, Sir Richard Branson, are among Planetary Resources' key investors.⁵ In addition to turning space

¹. From the company's website:

Planetary Resources, Inc. was founded in 2009 by Eric Anderson and Dr. Peter H. Diamandis. Our vision is to establish a new paradigm for resource utilization that will bring the Solar System within humanity's economic sphere of influence. The company will conduct low-cost robotic space exploration beginning with the Arkyd Series of space missions that will identify the most commercially viable near-Earth asteroids. These initial missions will assist the company in enabling the retrieval of raw materials from these select asteroids, including water, precious metals and more.

Planetary Resources Names Peter Marquez as Vice President for Global Engagement, PLANETARYRESOURCES.COM (Jun. 10, 2013), <http://www.planetaryresources.com/2013/06/planetary-resources-names-peter-marquez-as-vice-president-for-global-engagement/>. The ARKYD-3R deployed from the International Space Station in July 2015 on a 90-day mission to test technology to be used in future spacecrafts. Mike Wall, *Asteroid Mining May Be A Reality By 2015*, SPACE.COM (Aug. 11, 2015), <http://www.space.com/30213-asteroid-mining-planetary-resources-2025.html>. Future Arkyd rockets, such as the 100 series, will hunt for viable mining targets from a low-Earth orbit. *Id.*

². Kickstarter runs a website that allows inventors, artists, and designers to create public, internet-based fundraising campaigns to raise startup money for their projects. This practice is known as "crowdfunding." For more information, see About Kickstarter, KICKSTARTER.COM, <https://www.kickstarter.com/about> (last visited Jan. 30, 2016).

³. The ARKYD is planned for launch this year. *Planetary Resources Surpasses \$1.5 Million to Launch World's First Crowdfunded Space Telescope*, PLANETARYRESOURCES.COM (Jul. 1, 2013), <http://www.planetaryresources.com/2013/07/planetary-resources-surpasses-us-1-5-million-to-launch-worlds-first-crowdfunded-space-telescope/>.

⁴. ARKYD: A Space Telescope for Everyone, KICKSTARTER.COM, <https://www.kickstarter.com/projects/arkydforeveryone/arkyd-a-space-telescope-for-everyone> (last visited Jan. 30, 2016).

⁵. Planetary Resources Company Team, PLANETARYRESOURCES.COM, <http://www.planetaryresources.com/company/#team> (last visited Jan. 30, 2016); Ellis E. Conkin, *Planetary Resources Takes One Giant Step in its Mission to Mine Space*, SEATTLE WKLY. NEWS

exploration funding on its head, Planetary Resources also envisions humans as a multi-planetary species in the not-so-distant future.⁶ The Arkyd project is its first step towards that vision, which includes extra-terrestrial mining.

With existing technology, the distances between solar systems are still too great to be reached in a human lifetime.⁷ Voyager One, the most distant manmade object launched into space, has traveled 11.3 billion miles on its journey that began in 1977.⁸ It would have to travel another 70,000 years to reach Alpha Centauri, the nearest solar system outside of our own.⁹ Even a trip to Mars is estimated to take around seven months using current technology.¹⁰ The “bring-everything-with-you” method of propelling rockets into space, used since the days of Apollo in the 1960s, requires that a rocket carry with it all the fuel necessary for its round-trip journey.¹¹ For human interstellar travel, existing propellant technology simply will not do if we want to explore our galaxy on anything but a one-way trip.

Companies like Planetary Resources theorize that asteroids may be utilized as sources for alternative types of fuels. In addition, asteroids and other celestial bodies are rich in mineral resources that are sought on earth. Space mining is moving from theory to practice as the technology to make it feasible is successfully being tested. Surprisingly, no new legal framework has been universally adopted to address this new resource, now realistically within reach.

I. INTRODUCTION

In 2010, President Obama set a goal of sending a manned mission past the moon to an asteroid and, eventually, Mars by the 2030s.¹² This goal will

(Jul. 21, 2015), <http://www.seattleweekly.com/home/959736-129/one-washington-companys-mission-to-advance>.

⁶ See *Asteroid Mining Plans Revealed By Planetary Resources, Inc.*, SPACEREF (Apr. 24, 2012, 1:40 PM), <http://spaceref.biz/company/planetary-resources/asteroid-mining-plans-revealed-by-planetary-resources-inc.html>.

⁷ See Mike Wall, *Asteroid Mining Could Pave the Way for Interstellar Flight*, SPACE.COM (Jan. 23, 2013), <http://www.space.com/19388-asteroid-mining-interstellar-flight.html>.

⁸ *Id.*

⁹ *Id.*

¹⁰ Sarah Cruddas, *Mars One: We're All Going to Die, But It's Important What You Do Before You Die*, CNN (Feb. 18, 2015), <http://www.cnn.com/2015/02/17/tech/mars-one-final-100>. Mars One has selected 100 candidates from which it purportedly intends to narrow down to 24 individuals who will take part in six one-way missions to Mars beginning in 2022. See *id.*

¹¹ Planetary Resources, *The Market Problem and Radical Solution*, YOUTUBE (Nov. 21, 2013), <https://www.youtube.com/watch?v=VLouRKHknOU>.

¹² President Barack Obama, Remarks by the President on Space Exploration in the 21st Century, Delivered at the John F. Kennedy Space Center (Apr. 15, 2010), http://www.nasa.gov/news/media/trans/obama_ksc_trans.html.

ostensibly be achieved by a new collaborative effort between NASA and the private space industry.¹³ As such, the President's 2010 National Space Policy calls for strong growth of the private sector to meet this goal.¹⁴ The 2011 retirement of the space shuttle program and NASA's shrinking resources have necessitated a marriage between the public and private sectors that ends NASA's forty-eight-year tradition (and monopoly) of manned space travel by the United States.¹⁵

Rocket engineers theorize that mining will play an important role in the future of space travel.¹⁶ Mining propellant from celestial bodies would extend the range of human space travel and reduce the overall cost of sending ships into orbit and beyond.¹⁷ Planetary Resources has gone so far as to plot a map of our solar system with potential mining sites.¹⁸ This is an inevitable byproduct of the privatization of space exploration. NASA's mission to explore space was a goal in itself.¹⁹ In contrast, private industry is not shy about discussing the lucrative potential of extra-terrestrial mining.²⁰ Allowing privatized mining in space presents an extraordinary boon to an industry that is limited by the finite resources on Earth and racing to discover and extract what little resources are left to exploit.²¹

The private sector's influence is evident in legislation running through the pipelines of Congress. Last year, the aptly named ASTEROIDS Act²² was introduced to the House of Representatives and referred to committee in

¹³. *See id.*

¹⁴. *See* PRESIDENT OF THE UNITED STATES, NATIONAL SPACE POLICY OF THE UNITED STATES (June 28, 2010), https://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf.

¹⁵. *See NASA Invests in Private Sector Space Flight with SpaceX, Rocketplane-Kistler*, NASA (Aug. 18, 2006), http://www.nasa.gov/exploration/news/COTS_selection.html.

¹⁶. *See* Wall, *supra* note 7.

¹⁷. *See id.*

¹⁸. *How We Choose Our Asteroid Targets*, PLANETARYRESOURCES.COM (Aug. 28, 2015), <http://www.planetaryresources.com/2015/08/how-we-choose-our-asteroid-targets/>.

¹⁹. *See Why We Explore*, NASA, http://www.nasa.gov/exploration/whyweexplore/why_we_explore_main.html (last updated Sep. 30, 2013).

²⁰. On its website, Planetary Resources opines, "[A] single 500-meter platinum-rich asteroid can contain more platinum group metals than have ever been mined in human history. And despite their high costs, platinum group metals are so useful that 1 of 4 industrial goods on Earth require them in production." *Mining and Delivery*, PLANETARYRESOURCES.COM, <http://www.planetaryresources.com/asteroids/#market-for-metals> (last visited Jan. 30, 2016).

²¹. MICHAEL T. KLARE, *THE RACE FOR WHAT'S LEFT: THE GLOBAL SCRAMBLE FOR THE WORLD'S LAST RESOURCES* 16-17 (2012).

²². American Space Technology for Exploring Resource Opportunities in Deep Space Act, H.R. 5063, 113th Congress (2014) (hereinafter "H.R. 5063" or "Asteroids Act").

July 2014.²³ Planetary Resources' home state of Washington is also home to three of the Act's eighteen co-sponsors, including its original sponsor, Congressman Derek Kilmer.²⁴ The Act's goal is to "facilitate the commercial exploration and utilization of asteroid resources to meet national needs."²⁵ Remarkably, it purports to grant ownership of the resources obtained from asteroids to whomever extracts them.²⁶ However, the House has yet to vote on the Act and send it to the Senate.

Since this planet began its flirtation with space exploration, the international community has relied on the fundamental principle that space is not to be conquered or owned by any one country or entity.²⁷ The first humans to land on the moon left a plaque stating, "We came in peace for all mankind."²⁸ Moreover, numerous multilateral agreements and treaties exist on this subject, and they universally prohibit ownership rights in space. At best, the Asteroid Act is inconsistent with the prevailing view of ownership in space. At worst, its provision purporting to grant ownership rights directly violates the Outer Space Treaty of 1967,²⁹ which is in fact binding on the United States.³⁰ If corporations intend on chasing asteroids around the galaxy to carve up newly attainable resources for profit, the day will inevitably come when a private company lays claim to an asteroid. So how should the United States handle such a claim?

Section II of this comment will chronicle the history of space travel, from its competitive roots to the current era of collaboration. Section III describes

²³. Upon its introduction to the House, H.R. 5063 was referred to the House Committee on Science, Space, and Technology and the Subcommittee on Space. *See Committees Referred To*, CONGRESS.GOV, <https://www.congress.gov/bill/113thcongress/housebill/5063/allinfo> (last visited Jan. 30, 2016).

²⁴. *See List of Co-Sponsors*, CONGRESS.GOV, <https://www.congress.gov/bill/113thcongress/house-bill/5063/cosponsors> (last visited Jan. 30, 2016).

²⁵. H.R. 5063.

²⁶. *Id.*

²⁷. *See* G.A. Res. 1721 (XVI), International Cooperation in the Peaceful Uses of Space (Dec. 20, 1961).

²⁸. StarChild Team, *The Apollo 11 Memorial on the Moon*, HIGH ENERGY ASTROPHYSICS SCI. ARCHIVE RES. CTR., http://starchild.gsfc.nasa.gov/docs/StarChild/space_level2/apollo11_plaque.html (last visited Jan. 30, 2016).

²⁹. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, art. 2, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter "OST"]. The OST proscribes celestial bodies from being subject to "national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." *Id.*

³⁰. Comm. on the Peaceful Uses of Outer Space, Legal Subcomm., Status of International Agreements Relating to Activities in Outer Space as of 1 January 2015, U.N. Doc. A/AC.105/C.2/2015/CRP.8, http://www.unoosa.org/pdf/limited/c2/AC105_C2_2015_CRP08E.pdf.

the current state of international law relevant to the exploration of space while section IV analyzes the holes in international law that asteroid mining exposes. Section V addresses whether such gaps warrant abandoning international law in favor of returning to Nineteenth Century property doctrines.

II. FROM THE MOON TO MARS: A LITE [SPEED] HISTORY OF SPACE TRAVEL

Space travel began as the byproduct of the Cold War arms race between the United States and former Soviet Union.³¹ During the peak of the Cold War in the late 1950s, the Soviet Union and United States formally declared their intent to beat the other into space, a race the Soviets initially won with the successful launch of Sputnik-1 in 1957.³² In 1962, President Kennedy promised that the United States would land a man on the lunar surface by the end of the decade, extending the finish line to the Moon.³³ Interestingly, JFK proposed a joint American-Russian mission to the moon in 1963, but the Soviets scoffed at the idea.³⁴ Fortunately for the United States, NASA made good on President Kennedy's promise. On July 20, 1969, Neil Armstrong and Buzz Aldrin took a giant leap for mankind by walking on the moon.³⁵ America had definitively won the space race.³⁶

Despite chilly relations between the United States and USSR during the Cold War, the Americans and Soviets managed to collaborate on a mission in 1975 that involved docking each other's Apollo and Soyuz capsules in orbit.³⁷ After the fall of the Soviet Union, the two nations completed many joint missions to the Russian space station, Mir, and the International Space Station (ISS).³⁸ Since 2011 retiring of the space shuttle, NASA has bought seats on Russian Soyuz missions to get their astronauts to the ISS, with the

³¹. See JAMES SCHEFTER, *THE UNCENSORED STORY OF HOW AMERICA BEAT RUSSIA TO THE MOON* 3-5 (1999). The United States and Soviet Union converted military technology for intercontinental ballistic missiles to send satellites into orbit. See *id.*

³². *Id.* In 1957, Sputnik-1 was the first satellite to reach Earth's orbit. ASIF A. SIDDIQI, *SPUTNIK AND THE SOVIET SPACE CHALLENGE* 171 (2003). NASA was created in the following year. National Aeronautics and Space Act of 1958, Pub. Law No. 85-568, 72 Stat. 426 (1958).

³³. John F. Kennedy, Speech at Rice University (September 12, 1962).

³⁴. Melissa Hogenboom, *America and Russia: Uneasy Partners in Space*, BBC NEWS (Feb. 12, 2013), <http://www.bbc.co.uk/news/science-environment-17074388>.

³⁵. *Missions to the Moon*, PLANETARY SOC'Y, <http://www.planetary.org/explore/space-topics/space-missions/missions-to-the-moon.html> (last visited Jan. 30, 2016).

³⁶. Hogenboom, *supra* note 34 (internal quotation marks omitted).

³⁷. *Id.*

³⁸. *Id.*

round trip ticket costing an estimated \$70.7 million per seat.³⁹ However, the recent conflict in Crimea illustrates the vulnerability this type of arrangement presents for United States space travel.⁴⁰ In fact, NASA directed its officials to cease all communications with their Russian counterparts in April 2014 in response to what it viewed as Russia's violation of the Ukraine's sovereignty.⁴¹

Fortunately for the United States, Russia is not the only country going to space. The ISS now involves a complex partnership of fifteen nations and five different space agencies.⁴² The European Space Agency (ESA), initially founded by ten European member states, now includes twenty countries in Europe.⁴³ In 2003, China became the third country to send a human to space.⁴⁴ China is actively working towards a manned mission to the moon.⁴⁵ Japan's national aerospace agency is over ten years old.⁴⁶ Most recently, India joined the space travel club by sending its first ever satellite into Mars'

³⁹ Mike Wall, *NASA to Pay \$70 Million a Seat to Fly Astronauts on Russian Spacecraft*, SPACE.COM (Apr. 30, 2013, 2:40 P.M.), <http://www.space.com/20897-nasa-russia-astronaut-launches-2017.html>.

⁴⁰ Ken Kremer, *ISS, NASA and US National Security Dependent on Russian & Ukrainian Rocketry Amidst Crimean Crisis*, UNIVERSETODAY.COM (Mar. 5, 2014), <http://www.universetoday.com/110006/iss-nasa-and-us-national-security-dependent-on-russian-ukrainian-rocketry-amidst-crimean-crisis/>.

⁴¹ Brian Fung, *NASA Orders Its Staff to Stop Talking to Russia, Because Crimea*, WASH. POST (Apr. 2, 2014), <http://www.washingtonpost.com/blogs/the-switch/wp/2014/04/02/nasa-orders-its-staff-to-stop-talking-to-russia-because-crimea/>. A copy of NASA's leaked internal memorandum is available at <http://www.spaceref.com/news/viewsr.html?pid=45536>.

⁴² Kremer, *supra* note 40.

⁴³ Press Release, ESA, *No. 27-2005: ESA Turns 30! A Successful Track Record for Europe in Space* (May 31, 2005), http://www.esa.int/For_Media/Press_Releases/ESA_turns_30!_A_successful_track_record_for_Europe_in_space. Members of ESA include Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the United Kingdom. *New Member States*, ESA, http://www.esa.int/About_Us/Welcome_to_ESA/New_Member_States. Canada is also an associate member. *See id.*

⁴⁴ *Making History: China's First Human Spaceflight*, SPACE.COM (Sept. 28, 2005, 4:21 P.M.) <http://www.space.com/1616-making-history-china-human-spaceflight.html>.

⁴⁵ Paul D. Spudis, *China is Now Positioned to Dominate the Moon*, AIR & SPACE MAG. (Nov. 6, 2014), <http://www.airspacemag.com/daily-planet/china-now-positioned-dominate-moon-180953267/?no-ist>. Last year, China completed another step towards this goal by successfully sending the Chang'E 5 to the Moon and back. *Id.*

⁴⁶ The Japanese Aerospace Exploration Agency (JAXA) was formed on October 1, 2003. *Jaxa History*, JAXA, <http://global.jaxa.jp/about/history/index.html> (last visited Jan. 27, 2016). However, Japan launched her first satellite into orbit in 1970. *Ohsumi*, JAXA, <http://www.isas.jaxa.jp/e/enterp/missions/ohsumi.shtml> (last visited Jan. 27, 2016).

orbit.⁴⁷ India completed the mission for a mere \$74 million,⁴⁸ likely less than it would have cost a Hollywood studio to make a movie about it.⁴⁹ Space travel is getting more affordable, now within reach of private industry.⁵⁰ Logically, NASA is looking to the private sector for its next generation of space vehicles.⁵¹ And Planetary Resources' successful crowdfunding campaign demonstrates how tenable this approach is.

Even President Eisenhower's vision for space exploration contemplated commercial benefits.⁵² During the Kennedy Administration, the Communications Satellite Act of 1962 privatized communications satellites by creating the Communications Satellite Corporation ("Comsat"), a government-created, yet privately managed, corporation tasked with establishing and running a satellite communications apparatus.⁵³ Comsat was envisioned to be the world's first commercial satellite operator.⁵⁴ However, it frequently ran into obstacles at government agencies in its early years.⁵⁵ President Reagan expanded the private sector's involvement in space

⁴⁷. Gardiner Harris, *On a Shoestring, India Send Orbiter to Mars on Its First Try*, N.Y. TIMES (Sept. 24, 2014), http://www.nytimes.com/2014/09/25/world/asia/on-a-shoestring-india-sends-orbiter-to-mars.html?_r=0.

⁴⁸. *Id.*

⁴⁹. According to Box Office Mojo, two recent films about space travel, *Gravity* and *Interstellar* had production budgets of \$100 million and \$165 million, respectively. See *Gravity*, BOX OFFICE MOJO, <http://www.boxofficemojo.com/movies/?id=gravity.htm> (last updated Jan. 21, 2016, 5:19 PM); *Interstellar*, BOX OFFICE MOJO, <http://www.boxofficemojo.com/movies/?id=interstellar.htm> (last updated Jan. 21, 2016, 5:19 PM).

⁵⁰. David Kestenbaum, *Spaceflight is Getting Cheaper. But It's Still Not Cheap Enough*, NPR.ORG (July 21, 2011 4:54PM), <http://www.npr.org/blogs/money/2011/07/21/138166072/spaceflight-is-getting-cheaper-but-its-still-not-cheap-enough>.

⁵¹. *Dream Chaser Crew Transport VTHL Spacecraft, United States of America*, AEROSPACE-TECH.COM, <http://www.aerospace-technology.com/projects/dream-chaser-crew-spacecraft-us-nasa/> (last visited Jan. 27, 2016). Space Dev won a contract under the 2009 American Recovery and Reinvestment Act that awarded it a \$50 million grant to develop a private space craft, one of five such contracts awarded. Tariq Malik, *NASA Awards \$50 Million to Commercial Spaceship Builders*, SPACE.COM (Feb. 2, 2010, 2:21 PM), <http://www.space.com/7856-nasa-awards-50-million-commercial-spaceship-builders.html>.

⁵². Mike Wall, *50 Years of Presidential Visions for Space Exploration*, SPACE.COM (Feb. 18, 2013, 7:00 A.M.), <http://www.space.com/11751-nasa-american-presidential-visions-space-exploration.html> (follow "11" hyperlink).

⁵³. See The Communications Satellite Act of 1962, Pub. L. No. 87-624, 419 Stat. 76 (1962).

⁵⁴. See JONATHAN F. GALLOWAY, NASA, SP-4217, BEYOND THE IONOSPHERE 171-72 (Andrew J. Butrica ed. 1997).

⁵⁵. *Id.* at 172-73. Comsat's first chairman, Philip Graham, accused the State Department of interfering with the international components of the company's plans. Likewise, Comsat's second chairman also believed the FCC was invading his managerial functions by dictating company expenditures. *Id.*

exploration by calling for the United States government to create a “climate conducive to expanded private sector investment.”⁵⁶

The last two administrations have taken somewhat inconsistent views of space exploration. President George W. Bush’s 2004 policy identified the private sector’s growing role in missions to outer space.⁵⁷ But the goal in exploring moons of other planets was, according to Bush, still to discover, not conquer.⁵⁸ Just two years later, President Bush’s policy abruptly departed from international collaboration.⁵⁹ The new policy unequivocally claimed a national interest in space, citing multiple prior national security acts, and it considered any attempt to impede such rights as hostile.⁶⁰ This policy resembled a Cold War era mindset and could easily be described as a step towards the U.S. militarization of space.⁶¹ Only secondarily did the policy intend to encourage and facilitate the commercial sector.⁶² The Obama Administration’s new policy in 2010 significantly tempered this rhetoric, reducing self-defense to just one paragraph at the end of the stated principles.⁶³ The central focus of the policy is one of economic development and international cooperation.⁶⁴

Despite the seemingly bipolar policies on the part of the executive, private industry has maintained steady growth. In 2002, Elon Musk took his billions earned from tech startups and started his own rocket company,

⁵⁶. RONALD REAGAN, NATIONAL SECURITY DECISION DIRECTIVE NUMBER 42, NATIONAL SPACE POLICY, at 5 (July 4, 1982), <http://www.hq.nasa.gov/office/pao/History/nsdd-42.html>. “The United States encourages domestic commercial exploration of space capabilities, technology, and systems for national economic benefit. These activities must be consistent with national security concerns, treaties, and international agreements.” *Id.* at § I[2]D.

⁵⁷. NASA, THE VISION FOR SPACE EXPLORATION 17, 21 (2004), http://www.nasa.gov/pdf/55583main_vision_space_exploration2.pdf.

⁵⁸. *Id. passim*.

⁵⁹. See *U.S. National Space Policy*, NASA, http://history.nasa.gov/ostp_space_policy06.pdf (last visited Jan. 28, 2016). President Bush signed a National Space Policy that rejected future arms-control agreements and asserted a right to deny access into space for anyone who might be “hostile to U.S. interests.” Marc Kaufman, *Bush Sets Defense As Space Priority*, WASH. POST (Oct. 18, 2006) <http://www.washingtonpost.com/wp-dyn/content/article/2006/10/17/AR2006101701484.html>. “In 2004, the Air Force published a Counterspace Operations Doctrine that called for a more active military posture in space and said that protecting U.S. satellites and spacecraft may require ‘deception, disruption, denial, degradation and destruction.’” *Id.*

⁶⁰. *U.S. National Space Policy*, *supra* note 59, at 1-3.

⁶¹. See *id.* at 2 (“The United States will oppose the development of new legal regimes or other restrictions that seek to prohibit or limit U.S. access to space. Proposed arms control agreement or restrictions must not impair the rights of the United States . . .”).

⁶². *Id.* at 6-7.

⁶³. See PRESIDENT OF THE U. S., NATIONAL SPACE POLICY OF THE UNITED STATES 3 (June 28, 2010), http://www.au.af.mil/au/awc/awcgate/whitehouse/national_space_policy_28june2010.pdf.

⁶⁴. *Id.* at 4.

SpaceX.⁶⁵ Last year, SpaceX signed a 20-year lease to take over NASA's famous 39A launch site at Kennedy Space Center, home of the Apollo moon missions and first and final space shuttle launches.⁶⁶ Elsewhere, twenty-two launch sites around the globe now exist.⁶⁷ These developments represent a new chapter in the age of space exploration—one of broad participation. As a result, a variety of new goals now exist for space exploration.

Congress is legislating new policy with respect to space. Representative Bill Boday [R-Fl.-8] introduced H.R. 5063, also known as the American Space Technology for Exploring Resource Opportunities In Deep Space Act (ASTEROIDS Act), “[t]o promote the development of a commercial asteroid resources industry for outer space in the United States and to increase the exploration and utilization of asteroid resources in outer space.”⁶⁸ On July 10, 2014, the bill made it out of the Committee on Science, Space, and Technology and was introduced into the House.⁶⁹ The bill has eighteen cosponsors from both sides of the aisle.⁷⁰

The Asteroids Act attempts to “facilitate commercial exploration and utilization of asteroid resources to meet national needs.”⁷¹ However, the bill recognizes existing international obligations that may limit this right.⁷² Notwithstanding, it calls for a “first in time” right to resources, while attempting to comply with existing international obligations.⁷³ The Act also provides ownership rights for any resources obtained from asteroids.⁷⁴

Space mining is still just a theory, but at least two companies have announced plans for prospecting Near Earth Asteroids (NEAs) for

⁶⁵. See Kestenbaum, *supra* note 50.

⁶⁶. Alan Boyle, *SpaceX Sign 20-Year Lease for Historic Launch Pad 39A*, NBC NEWS (Apr. 15, 2014), <http://www.nbcnews.com/science/space/spacex-signs-20-year-lease-historic-launch-pad-39a-n81226>.

⁶⁷. *Space Launch Sites Around the World*, SPACETODAY.ORG, <http://spacetoday.org/Rockets/Spaceports/LaunchSites.html> (last visited Jan. 29, 2016).

⁶⁸. American Space Technology for Exploring Resource Opportunities In Deep Space Act, H.R. 5063, 113th Cong. § 1 (2014).

⁶⁹. *H.R.5063 – Asteroids Act*, CONGRESS.GOV, <http://www.congress.gov/bill/113th-congress/house-bill/5063/actions> (last visited Jan. 29, 2016).

⁷⁰. *H.R.5063 – Asteroids Act*, CONGRESS.GOV, <https://www.congress.gov/bill/113th-congress/house-bill/5063/cosponsors> (last visited Jan. 29, 2016). Eleven Democrats and seven Republicans are listed as cosponsors. *Id.*

⁷¹. H.R. 5063 § 51301(1).

⁷². H.R. 5063 § 51301(3).

⁷³. H.R. 5063 § 51302(b).

⁷⁴. H.R. 5063 § 51302 states, “Any resources obtained in outer space from an asteroid are the property of the entity that obtained such resources, which shall be entitled to all property rights thereto, consistent with applicable provisions of Federal law.”

resources.⁷⁵ State-sponsored space agencies are developing technology that could be used for mining objects in space. Japan successfully sent a satellite to an asteroid that collected a sample and returned it to Earth.⁷⁶ And last year, the ESA successfully landed a satellite on a comet.⁷⁷ The stage appears to be set for an all out free for all into the galaxy. So what's stopping everyone?

III. INTERNATIONAL LAW PROSCRIBES OWNERSHIP OF CELESTIAL BODIES

Agreements Relating to Space

Following the Soviet Union's successful Sputnik missions, the United Nations established the Committee on the Peaceful Uses of Outer Space (COPUOS) in 1958.⁷⁸ In 1961, the United Nations passed the first resolution regarding space that purported to make outer space free for all to explore and free from national appropriation.⁷⁹ These principles were clarified and

⁷⁵. Deep Space Industries advertises that they “will launch small scouts to inspect NEAs for valuable resources that can be sold to in-space markets to refuel satellites, build space structures, and provision crewed habitats with water and air. As in-space operations grow, platinum group metals will be produced as byproducts and exported to Earth.” *Space Resources, Mining the Sky*, DSI, <http://deepspaceindustries.com/space-resources/> (last visited Jan. 30, 2016); see *Why Asteroids Now?*, PLANETARY RESOURCES, <http://www.planetaryresources.com/asteroids/why-asteroids-now/> (last visited Jan. 29, 2016). Deep Space Industries advertises that they “will launch small scouts to inspect NEAs for valuable resources that can be sold to in-space markets to refuel satellites, build space structures, and provision crewed habitats with water and air. As in-space operations grow, platinum group metals will be produced as byproducts and exported to Earth.” *Prospecting for Space Resources*, DSI (Dec. 9, 2014), <http://deepspaceindustries.com/prospecting> [<https://web.archive.org/web/20141209202618/http://deepspaceindustries.com/prospecting>]. Planetary Resources claims that “Asteroids are the most valuable real estate in the solar system.” *Asteroids Are the Best Real Estate in the Solar System*, PLANETARY RESOURCES (Nov. 6, 2013), <http://www.planetaryresources.com/asteroids/> [<https://web.archive.org/web/20131106073811/http://www.planetaryresources.com/asteroids/>].

⁷⁶. Japan's Hayabusa is only the fourth time that samples of an extraterrestrial object have been returned to Earth. Jonathan Amos, *Hayabusa Asteroid-Sample Capsule Recovered in Outback*, BBC NEWS (June 14, 2010), <http://www.bbc.co.uk/news/10307048>. Japan's Hayabusa is only the fourth time that samples of an extraterrestrial object have been returned to Earth. *Id.*

⁷⁷. European Space Agency, *Touchdown! Rosetta's Philae Probe Lands on Comet*, ROSETTA (Nov. 12, 2014), http://www.esa.int/Our_Activities/Space_Science/Rosetta/Touchdown!_Rosetta_s_Philae_probe_lands_on_comet.

⁷⁸. G.A. Res. 1348 (XIII), ¶ 1 (Dec. 13, 1958). COPUOS was initially an ad hoc committee, but a year later, the committee was made permanent. G.A. Res. 1472 (XIV) A, ¶ 1 (Dec. 12, 1959). COPUOS's stated purpose was “to study practical and feasible means for giving effect to programmes in the peaceful uses of outer space. . . .” *Id.* ¶ 1(a).

⁷⁹. See G.A. Res. 1721 (XVI) A, International Co-operation in the Peaceful Uses of Outer Space (Dec. 20, 1961).

The General Assembly, Recognizing the *common interest of mankind* in furthering the peaceful uses of outer space and the urgent need to strengthen international co-operation in this important field, Believing that the exploration and use of outer space should be *only for the*

unanimously adopted by the United Nations two years later.⁸⁰ The resolution specifically states, “Outer space and celestial bodies are not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”⁸¹ Members of the United Nations recognize communal nature of space exploration.⁸²

Existing United Nations resolutions were not sufficient to establish international law regulating space, nor were they binding law.⁸³ Despite space travel’s infancy at the time, the world would sooner need a real legal framework to regulate space because even customary international law⁸⁴ would have taken too long produce an adequate legal scheme.⁸⁵ In 1966, the General Assembly of United Nations adopted 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” or “OST”).⁸⁶ Reflecting the 1963 Declaration of Space Principles, the Outer Space Treaty proscribes national appropriation of the moon and other celestial bodies.⁸⁷ An overwhelming majority of the 193-member General Assembly signed on to the Outer Space Treaty.⁸⁸ It was the first multilateral

betterment of mankind and to the benefit of States irrespective of the stage of their economic or scientific development, 1. Commends to States for their guidance in the exploration and use of outer space the following principles: (a) International law, including the Chapter of the United Nations, applies to outer space and celestial bodies; (b) Outer space and celestial bodies are free for exploration and use by all States in conformity with international law and are *not subject to national appropriation*. . . .

Id. (final emphasis added).

⁸⁰. See G.A. Res. 1962 (XVIII), Declaration of Legal Principles Governing the Activities of States in the Exploration of States in the Exploration and Use of Outer Space (Dec. 13, 1963) [hereinafter “Declaration of Space Principles”].

⁸¹. *Id.* ¶ 3.

⁸². *Id.* ¶¶ 1-3. Scholars characterize ownership rights over celestial bodies as *res communis omnium*, meaning they are not capable of appropriation. See FABIO TRONCHETTI, THE EXPLORATION OF NATURAL RESOURCES OF THE MOON AND OTHER CELESTIAL BODIES 12-13 (2009).

⁸³. FRANCIS LYALL & PAUL B. LARSEN, SPACE LAW 54 (2009).

⁸⁴. 48 C.J.S. Int’l. Law § 2 (2015). Customary international law is created when the international community accepts legal doctrine by custom or international agreement, or it is derived from common principles within the world’s major legal systems. *Id.*

⁸⁵. LYALL & LARSON, *supra* note 83, at 54.

⁸⁶. *Id.* at 53. As of 1967, only sixteen countries actually ratified the treaty and ninety-three signed it, of the then-existing 123 member states. *Id.*

⁸⁷. OST, *supra* note 29. “Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.” *Id.* The phrase “Moon and other celestial bodies” is found twenty-six times in the preamble and articles of the treaty. See generally *id.*

⁸⁸. UN Member States on the Record, UN.ORG, <http://www.un.org/depts/dhl/unms/whatisms.shtml>. 102 UN members have now ratified the Outer Space Treaty, and another eighty-nine are signatories. *Treaties On Principles Governing the Activities of States in the Exploration*

treaty of its kind, and it still serves as the “Magna Carta” for law in outer space.⁸⁹ As required by the Constitution,⁹⁰ the Senate consented to the OST, which was by a unanimous vote.⁹¹

The only other major treaty to address ownership rights in space is the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (“Moon Agreement”).⁹² The Moon Agreement was introduced into the General Assembly in 1979.⁹³ However, only sixteen states are parties to the agreement, with another eleven signatories.⁹⁴ The Moon Agreement reiterates the Outer Space Treaty’s principle of *res communis*.⁹⁵ But it very specifically prevents the natural resources of the moon from being claimed by any one state, organization, or person.⁹⁶ The Moon Agreement also states that party countries are responsible for the acts of their non-governmental entities.⁹⁷ Importantly, the Moon Agreement was not ratified by the United States.

and *Use of Outer Space, Including the Moon and Other Celestial Bodies*, UN.ORG, http://disarmament.un.org/treaties/t/outer_space.

⁸⁹. LYALL & LARSEN, *supra* note 83, at 53; TRONCHETTI, *supra* note 82, at 19.

⁹⁰. See U.S. CONST., art. II, § 2 cl.2.

⁹¹. *Narrative, Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, U.S. DEP’T OF STATE, <http://www.state.gov/t/isn/5181.htm>.

⁹². See generally *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, arts. 2 & 11, Dec. 5, 1979, 1363 U.N.T.S. 3 [hereinafter “Moon Treaty”].

⁹³. See generally G.A. Res. 2625 (XXV), Oct. 24, 1970.

⁹⁴. *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, UN.ORG, <http://disarmament.un.org/treaties/t/moon> (last visited Jan. 30, 2016).

⁹⁵. Moon Treaty, *supra* note 92, at art. 2, 11.

All activities on the Moon, including its exploration and use, shall be carried out in accordance with international law, in particular the Charter of the United Nations, and taking into account the Declaration on Principles of International Law concerning Friendly Relations and Cooperation among States in accordance with the Charter of the United Nations. . . .

. . . .

The exploration and use of the Moon shall be the province of all mankind and shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development.

Id. at arts. 2, 4.

⁹⁶. *Id.* Article 11 states,

Neither the surface nor the subsurface of the Moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person. The placement of personnel, space vehicles, equipment, facilities, stations and installations on or below the surface of the Moon, including structures connected with its surface or subsurface, shall not create a right of ownership over the surface or the subsurface of the Moon or any areas thereof.

Id. at art. 11.

⁹⁷. *Id.* at art. 14.

Other Sources of International Law

The “golden age” of space treaties has long since passed.⁹⁸ However, basic principles of common ownership transcend space law and are common elements in international law for the past 60 years. Even before space, international law generally rejected ownership claims. Treaties governing space were derived from common principles found in existing international law.⁹⁹ The “Common Heritage of Mankind” was first coined in a treaty to preserve cultural works during armed conflict.¹⁰⁰ The common heritage doctrine also exists in the Declaration of Principles Governing the Seabed and Ocean Floor, which sought to preserve the deep seabed for peaceful purposes.¹⁰¹

Similarly, the treaty governing Antarctica does not recognize a government or national property rights.¹⁰² The Antarctica Treaty’s preamble recognizes that it is in the interest of all mankind that Antarctica not be a source of conflict between nations.¹⁰³ This idea of common heritage for uninhabitable territories such as Antarctica is based on notion that these places are impossible to establish permanent settlement.¹⁰⁴ Instead, ownership of Antarctica is *res nullius* or *res communes*.¹⁰⁵ Despite this view,

⁹⁸. LYALL & LARSEN, *supra* note 83, at 37.

⁹⁹. *Id.* at 53.

¹⁰⁰. *Convention for the Protection of Cultural Property in the Event of Armed Conflict with Regulations for the Execution of the Convention 1954*, UNESCO.ORG, http://portal.unesco.org/en/ev.php-URL_ID=13637&URL_DO=DO_TOPIC&URL_SECTION=201.html. The treaty has 126 parties and 4 signatories. The Convention for the Protection of Cultural Property in the Event of Armed Conflict recognizes “cultural property belonging to any people whatsoever means damage to the cultural heritage of all mankind. . . .” *Id.*

¹⁰¹. G.A. Res. 2749 (XXV), ¶ 1, Dec. 12, 1970. European airlines brought suit to challenge the FAA ban on DC-10 airplanes in contravention of numerous multilateral treaties, including the Chicago Convention. *Id.* at 1163-68 (adopted by 108 nation states). Thirty years prior, President Truman issued a proclamation that unilaterally claimed the continental shelf off both coasts of the United States. Truman Pres. Proc. No. 2667, 10 Fed. Reg. 12303, Sept. 28, 1945.

¹⁰². 7-58 THOMPSON ON REAL PROPERTY, THOMAS EDITIONS § 58.06 (2015). Antarctica Treaty was drafted in 1959 to resolve claims by seven different countries, including Argentina, Australia, Chile, France, New Zealand, Norway, and the United Kingdom. *Id.* Only twelve countries made up the original signatories. *Id.* Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, Soviet Union, United Kingdom, and United States were all original signatories to the treaty. *Id.* Since then, countries representing 80% of the world’s population have joined as parties to the treaty. *Id.*

¹⁰³. The Antarctic Treaty, *opened for signatures* Dec. 1, 1949. 12 U.S.T. 794, 402 U.N.T.S. 71 [hereinafter “Antarctic Treaty”].

¹⁰⁴. LYALL & LARSEN, *supra* note 83, at 60 n.35.

¹⁰⁵. 7-58 THOMPSON ON REAL PROPERTY, THOMAS EDITIONS §§ 58.10-58.11 (2015). *Res nullis* directly translated means “a thing of no one” and cannot be owned. *Black’s Law Dictionary*

the treaty¹⁰⁶ to preserve Antarctica's environment and share in its resources failed due to vetoes by France and Austria.¹⁰⁷

Treaties governing air travel are ideal sources from which to extrapolate principles of international law and apply them to space. In 1911, France became the first country to consider free flight over its territory as non-trespassory.¹⁰⁸ The first international agreement¹⁰⁹ on airspace recognized that every contracting state had "complete and exclusive sovereignty over the air space above its territory."¹¹⁰ But this treaty provided that commercial aircraft could freely use this airspace.¹¹¹ The Chicago Convention regulates civil aviation to this day,¹¹² and all but four United Nations members have ratified it.¹¹³ It provides framework for sovereignty and sharing the skies for civil aviation.¹¹⁴ Importantly, federal courts have upheld the Chicago Convention's supremacy over federal law.¹¹⁵

IV. IS THE LOOPHOLE IN SPACE TREATIES LARGE ENOUGH TO FIT AN ASTEROID?

The type of ownership grant the Asteroids Act purports to grant would likely violate international law in its current form. Notwithstanding, proponents of the Asteroids Act believe that sufficient ambiguities exist in international law to allow the United States to grant ownership rights for asteroids to private industry.¹¹⁶ Additionally, Planetary Resources' President

(10th ed. 2014). Similarly, *res communis* means a "common thing" that cannot be owned or appropriated. *Id.*

^{106.} See generally Convention on the Regulation of Antarctic Mineral Resource Activities, Wellington, New Zealand, June 2, 1988, Document A.M.R./S.C.M./88/78 (June 2, 1988), reprinted in 27 Int'l Legal Materials 868 (1988) [hereinafter "CRAMRA"].

^{107.} 7-58 THOMPSON ON REAL PROPERTY, THOMAS EDITIONS § 58.07 (2015). Original claimants to Antarctica are entitled to veto modification pursuant to Article XII of the Treaty. Antarctic Treaty, *supra* note 103, at art. 12.

^{108.} STUART BANNER, WHO OWNS THE SKY? THE STRUGGLE TO CONTROL AIRSPACE FROM THE WRIGHT BROTHERS ON 113 (2008) [hereinafter "BANNER"].

^{109.} Convention Relating to the Regulation of Aerial Navigation, October 13, 1919, 11 L.N.T.S. 173 [hereinafter "Aerial Navigation Treaty"].

^{110.} Aerial Navigation Treaty, *supra* note 109, at art. 1.

^{111.} BANNER, *supra* note 108, at 261-62. The Aerial Navigation Treaty defined state aircraft and considered the remainder private. *Id.* However, the United States never ratified the treaty based on its heavy influence from the League of Nations. *Id.* at 66.

^{112.} Convention on Int'l Civil Aviation, signed at Chicago on December 7, 1944.

^{113.} *Id.* at art. 3.

^{114.} BANNER, *supra* note 108, at 261-62.

^{115.} British Caledonia Airways Ltd. v. Bond, 665 F.2d 1153, 1163 (D.C. Cir. 1981).

^{116.} Joseph Stromberg, *Is Asteroid Mining Legal? Congress Wants to Make it So.*, VOX (Sept. 11, 2014), <http://www.vox.com/2014/9/11/6135973/asteroid-mining-law-polic>.

and Chief Engineer believes that extracting mineral resources from asteroids and bringing them to market does not conflict with the Outer Space Treaty.¹¹⁷

The key provision of the OST states, “Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”¹¹⁸ Several questions may be raised against the application of this provision to mining asteroids. First, does the Outer Space Treaty even apply to asteroids, i.e., are they “celestial bodies” contemplated by the treaty? Second, is private industry bound by prohibition on national appropriation? Third, if these questions cannot be resolved in favor of allowing mining, could the United States simply withdraw from the OST?

To answer the first question, Congress cannot simply construe the language of existing treaties to suit its needs. The Moon is the only object actually identified by name in the OST.¹¹⁹ Neither the Declaration of Principles nor the OST distinguish planets from asteroids.¹²⁰ Those interested in exploiting such an omission would argue it warrants a clever statutory construction that disregards the plain meaning of “celestial” and “body.”¹²¹ So are we left to guess as to what objects fall within the umbrella of “celestial bodies?” Of course not!

The International Astronomical Union is internationally recognized as the authoritative body for taxonomy and nomenclature of celestial objects, dating back to 1919.¹²² In 2006, the IAU famously re-classified Pluto as a new type of celestial body, downgrading it from planet to a trans-Neptunian dwarf planet.¹²³ The IAU distinguishes two types of planets.¹²⁴ All other

¹¹⁷. Mike Wall, *Asteroid Mining May Be a Reality by 2025*, SPACE.COM (Aug. 11, 2015), <http://www.space.com/30213-asteroid-mining-planetary-resources-2025.html>.

¹¹⁸. OST, *supra* note 29, at art. 2.

¹¹⁹. *See id.*

¹²⁰. *Compare* OST, *supra* note 29, with Declaration of Space Principles, *supra* note 80.

¹²¹. *Barnhart v. Sigmon Coal Co., Inc.*, 534 U.S. 438, 450 (2002). Statutory construction beyond plain meaning may be used to interpret ambiguous language. But language is only ambiguous if it is susceptible of two *reasonable* interpretations. *People v. Dieck*, 209 P.3d 623, 625 (Cal. 2009).

¹²². About the IAU, IAU.ORG, <http://iau.org/about/>; *see also Naming Astronomical Objects*, IAU.ORG, <https://www.iau.org/public/themes/naming/> (last visited Jan. 30, 2016).

¹²³. *IAU 2006 General Assembly: Result of the IAU Resolution Votes*, IAU.ORG, <http://www.iau.org/news/pressreleases/detail/iau0603/>; *see Resolution B6 Pluto*, IAU.ORG, https://www.iau.org/static/resolutions/Resolution_GA26-5-6.pdf. With Pluto’s reclassification as a dwarf planet, it was the first recognized Transneptunian Object, an object with an orbit beyond Neptune. Small Bodies: Profile, NASA.GOV, (last visited Mar. 4, 2016).

¹²⁴. A planet is a celestial body that orbits around the Sun, has sufficient mass to reach “hydrostatic equilibrium” (making it round), and has “cleared the neighbourhood around its orbit.” *Resolution B5 Definition of Planet in the Solar System*, IAU.ORG., https://www.iau.org/static/resolutions/Resolution_GA26-5-6.pdf. Similarly, a dwarf planet is a

objects in space (besides man-made satellites) are considered part of a third category of “Small Solar System Bodies.”¹²⁵ Asteroids are explicitly included within in this third category.¹²⁶ Unfortunately, the IAU’s classifications alone are not binding international law.¹²⁷ But any argument that asteroids are not contemplated by the Outer Space Treaty as celestial bodies would contradict the taxonomy of celestial objects set forth by the IAU, binding or not. Consequently, such a construction is unreasonable.

Next, is it possible that private companies may escape obligations under international treaties simply by virtue they are not a party state? One space rights libertarian posits that the Outer Space Treaty does not expressly prevent a private company from making a property claim in space.¹²⁸ Of course, treaties are only binding on the United States if they are self-executing or have been implemented by domestic law.¹²⁹ A self-executing treaty “manifests an intention that it shall become effective as domestic law of the United States at the time it becomes binding”¹³⁰ This is dubbed the “intent thesis.”¹³¹ But even if the OST is not self-executing, nations are generally responsible to implement it within their respective national legal systems.¹³² Thus, the domestic enforceability of the OST against private

celestial body with the first two characteristics, but that has not cleared its neighborhood and is not a satellite. *Id.*

¹²⁵. *See id.*

¹²⁶. *Id.* at n.3. However, the IAU’s language including asteroids qualifies them: “[Small Solar System Bodies] include *most* of the Solar System asteroids.” *Id.* (emphasis added).

¹²⁷. The IAU admits,

[F]rom time to time the IAU takes decisions and makes recommendations on issues concerning astronomical matters affecting other sciences or the public. Such decisions and recommendations are not enforceable by any national or international law; rather they establish conventions that are meant to help our understanding of astronomical objects and processes. Hence, IAU recommendations should rest on well-established scientific facts and have a broad consensus in the community concerned.

Naming Astronomical Objects, IAU.ORG, <https://www.iau.org/public/themes/naming/>.

¹²⁸. Adam Mann, *Loophole Could Allow Private Land Claims on Other Worlds*, WIRED (Apr. 5, 2012), <http://www.wired.com/2012/04/moon-mars-property/>.

¹²⁹. *See generally* RESTATEMENT (SECOND) OF FOREIGN RELATIONS LAW § 141 (1965).

¹³⁰. *Id.* at § 141(1).

Not all treaties made by the United States have immediate effect as domestic law in the United States upon becoming binding between the United States and the other parties under the rule of international law. . . . Such a treaty has immediate domestic effect as the supreme law of the land under Article VI, Clause 2 of the Constitution only if it is self-executing.

Id. at cmt. a.

¹³¹. David Sloss, *Non-Self-Executing Treaties: Exposing a Constitutional Fallacy*, 36 U.C. DAVIS L. REV. 1, 4 (2002).

¹³². *See* Statement by the Board of Directors of the International Institute of Space Law (IISL) On Claims to Property Rights Regarding the Moon and Other Celestial Bodies. *See also* Vienna Convention on the Law Treaties, art. 27, http://www.iislweb.org/docs/IISL_Outter_Space_Treaty_Statement.pdf (“A party may not invoke the provisions of its internal law as justification for its failure to perform a treaty.”).

parties turns on whether it is self-executing or whether the treaty has been properly implemented.

Many factors determine whether a treaty is self-executing.¹³³ However, the “ordinary meaning in context” factor is a required factor.¹³⁴ It is also the primary factor—at a minimum—but could also be conclusive.¹³⁵ Treaties have been found to non-self-executing in three situations: 1) the treaty fails to meet the intent to be self-executing;¹³⁶ 2) the Senate has made its consent contingent on implementing new legislation;¹³⁷ or 3) the Constitution requires that the treaty be implemented by domestic legislation.¹³⁸ Non-self-executing treaties usually contain language that states the party states will enact necessary measures for carrying out the terms of the treaty.¹³⁹

The language relating to private entities is clearly self-executing. The OST requires that party states ensure their national policies and non-

¹³³. Those factors include:

- (a) the ordinary meaning of the words of the agreement in the context in which they are used;
- (b) the title given the agreement and statements of purpose and scope included in its text;
- (c) the circumstances attending the negotiation of the agreement;
- (d) drafts and other documents submitted for consideration, action taken on them, and the official record of the deliberations during the course of the negotiation;
- (e) unilateral statements of understanding made by a signatory before the agreement came into effect, to the extent that they were communicated to, or otherwise known to, the other signatory or signatories;
- (f) the subsequent practice of the parties in the performance of the agreement, or the subsequent practice of one party, if the other party or parties knew or had reason to know of it;
- (g) change of circumstances, to the extent indicated in § 153;
- (h) the compat[ability] of alternative interpretations of the agreement with (i) the obligations of the parties to other states under general international law and other international agreements of the parties, and (ii) the principles of law common to the legal systems of the parties or of all states having reasonably developed legal systems;
- (i) comparison of the texts, in the different languages in which the agreement was concluded, taking into account any provision in the agreement as to the authoritativeness of the different texts.

RESTATEMENT (SECOND) FOREIGN RELATIONS LAW. § 147(1) (1965).

¹³⁴. *Id.* at § 147(2).

¹³⁵. *Id.* at cmt. d (“The ordinary meaning of the words of an agreement, as indicated in Subsection (1)(a), must always be considered as a factor in the interpretation of the agreement. There is no established priority as between the factors indicated in Subsection (1)(b)-(i) or as between them and additional factors not listed therein.”).

¹³⁶. *Id.* at § 141(1).

¹³⁷. *See, e.g.*, United Nations Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment, G.A. Res. 39/46, Annex, 39 U.N. GAOR Supp. No. 51, U.N. Doc. A/39/51 (1984). They only consented contingent on an express declaration that the treat was not self-executing. U.S. Reservations, Declarations, and Understandings to the Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment, 136 Cong. Rec. H.R. 1 (daily ed., Oct. 27, 1990).

¹³⁸. RESTATEMENT (SECOND) FOREIGN RELATIONS § 141(3) (1965).

¹³⁹. *Id.* § 141 cmt. a.

governmental entities conform to the treaty.¹⁴⁰ Specifically, article VI states, “Parties to the Treaty shall bear international responsibility for national activities in space . . . whether such activity are carried on by governmental agencies or by non-governmental entities” and must “assure” that such activities conform to the treaty.¹⁴¹ Non-governmental entities “shall require authorization and continuing supervision.”¹⁴² Further, when the United States ratified the OST, the President did not request any implementing legislation.¹⁴³ And the Department of State dealt with the initial authorization procedures in a fashion that implied the treaty was self-executing.¹⁴⁴ As an aside, liability for launching objects into space is attached by virtue of the vehicles’ origin, meaning that the United States would be liable for any object emanating from its territory, regardless of whether it was privately owned.¹⁴⁵

Finally, what if the United States simply withdrew from the Outer Space Treaty? This would be an extreme act, and it would pose an interesting constitutional question. The Constitution is silent with respect to which branch(es) of government can terminate a treaty.¹⁴⁶ In the past 50 years, only twice has the United States withdrawn from a treaty.¹⁴⁷ In 1978, President Jimmy Carter nullified the Sino-American Mutual Defense Treaty¹⁴⁸ between Taiwan and United States in exchange for normalizing relations with the People’s Republic of China.¹⁴⁹ Barry Goldwater filed suit against the President, but the Supreme Court dismissed the case.¹⁵⁰ Similarly, the lawsuit brought by members of Congress against President Bush for withdrawing the United States from the Anti-Ballistic Missile Treaty with Russia was

¹⁴⁰. 18 U.S.T. 2410 art. VI.

¹⁴¹. *Id.* (emphasis added).

¹⁴². *Id.*

¹⁴³. V. KAYSER, LAUNCHING SPACE OBJECTS: ISSUES OF LIABILITY AND FUTURE PROSPECTS 78 (2001).

¹⁴⁴. *Id.*

¹⁴⁵. OST, *supra* note 29, at art. VII.

¹⁴⁶. See *Goldwater v. Carter* 444 U.S. 996, 1003 (1979) (plurality opinion); see also U.S. CONST., art. II, § 2, cl. 2.

¹⁴⁷. In 1979, President Carter unilaterally decided to abrogate the mutual defense treaty with Taiwan. In 2002, President Bush unilaterally withdrew the United States from the Anti-Ballistic Missile Treaty with Russia and four other former Soviet block countries. Wade Boese, *U.S. Withdraws from ABM Treaty*, GLOBAL RESPONSE MUTED (July 1, 2002), https://www.armscontrol.org/act/2002_07-08/abmjul_aug02.

¹⁴⁸. Mutual Defense Treaty Between the United States of America and the Republic of China, U.S.-China, Dec. 10, 1954, 6 U.S.T. 433.

¹⁴⁹. ALAN M. WACHMAN, CARTER’S CONSTITUTIONAL CONUNDRUM: AN EXAMINATION OF THE PRESIDENT’S UNILATERAL TERMINATION OF A TREATY 427-28 (1984).

¹⁵⁰. See generally *Goldwater*, 444 U.S. 996.

dismissed by the District Court.¹⁵¹ Assuming the next unilateral withdraw from such a treaty ends in similar fashion, the United States could unshackle itself from the treaty obligations to share space with the stroke of the Executive pen.

In the event that the United States withdraws from the OST, it may nevertheless violate customary international law by enacting the Asteroids Act. Customary international law results from a combination of consistent state practice and *opinio juris*, the underlying legal doctrine that obligates such state practice.¹⁵² 179 states are party to some treaty relating to space law.¹⁵³ The United States has not ratified many international agreements, but still considers itself “bound” by their principles.¹⁵⁴ But in the event that the United States wants to abandon the traditional view of space, this would sure initiate a new era of colonization not seen since the Europeans came to America.

¹⁵¹. Kucinich v. Bush, 236 F. Supp. 2d 1, 18 (D.D.C. 2002).

¹⁵². Customary international law is comprised of two components:

First, there must be a general and consistent practice of states. This does not mean that the practice must be universally followed; rather it should reflect wide acceptance among the states particularly involved in the relevant activity. Second, there must be a sense of legal obligation, or *opinio juris sive necessitatis*. In other words, a practice that is generally followed but which states feel legally free to disregard does not contribute to customary law; rather, there must be a sense of legal obligation. States must follow the practice because they believe it is required by international law, not merely because that they think it is a good idea, or politically useful, or otherwise desirable.

United States v. Bellaizac-Hurtado, 700 F.3d 1245, 1252 (11th Cir. 2012).

David Bederman, International Law Frameworks [see excerpt in Public International Law Casebook]. General principles of state practice are those found in the principle legal systems of civilized nations. They are a priori legal concepts in that they derive from the human reason and the specific nature/social structure of the international community, rather than actual practices. See, e.g., U.N. Charter Preamble. The UN Charter describes its goal to save “succeeding generations from the scourge of war, which twice . . . brought untold sorrow to mankind, and . . . [¶] . . . to promote social progress and better standards of life in larger freedom. *Id.*

¹⁵³. LYALL & LARSEN, *supra* note 83, at 41. However, the Moon Agreement is not binding on the United States because it is not a party. See United States Department of State Treaties in Force A List of Treaties and Other International Agreements of the United States in Force on Jan. 1, 2013, U.S. DEP’T OF STATE, <http://www.state.gov/documents/organization/218912.pdf>. Further, only sixteen states have ratified, so it likely does not qualify as customary international law either for want of widespread practice. LYALL & LARSEN, *supra* note 83, at 42.

¹⁵⁴. For example, the United States signed the Vienna convention on April 24, 1970, but the Senate has not given their advice and consent pursuant to constitutional requirements. See Frequently Asked Questions about the Vienna Convention on the Law of Treaties, <http://www.state.gov/s/l/treaty/faqs/70139.htm>. However, the United States still considers many provisions of the treaty to be customary international law. *Id.*

V. THE MODERN GOLD RUSH TO SPACE

What are the options for mining space? They fall on a spectrum: on one end, where the OST and the like are binding, asteroid mining for profit is simply banned. But this is unrealistic given their potential resources and the progress technology has already made towards making mining feasible. On the other end of the spectrum are the classic discovery by conquest and first possession doctrines that controlled exploration of our own planet.¹⁵⁵ The Asteroids Act falls on this side of the spectrum and would usher in a new era of exploration by private American companies.

The possession by conquest doctrine is unwise and unfeasible. European colonization of America was violent, bloody, and deprived whole swaths of country from its original inhabitants.¹⁵⁶ Colonists acquired property rights of already inhabited land by discovery and conquest.¹⁵⁷ *M'Intosh* held that Native Americans held no title because they were merely occupying land without using it or cultivating it.¹⁵⁸ But under this theory of possession, an asteroid miner would have to "occupy" and "cultivate" an asteroid. Does a remote mining operation really constitute the sort of cultivation contemplated by the *M'Intosh* Court? Obviously, the Supreme Court did not envision unmanned mining in 1823. Therefore, its application in space is not helpful because an asteroid is not realistically inhabitable.

Asteroids probably share more characteristics with *feræ naturæ*¹⁵⁹ than real property. They must be corporeally possessed to assert ownership.¹⁶⁰ Pursuit of a wild animal is not sufficient to make a property claim; a hunter must critically wound or actually possess it before having a viable property right.¹⁶¹ This type of doctrine has also been applied to chattels in modern times, but with some modification that allows multiple rightful owners to

¹⁵⁵. Brandon C. Gruner, *A New Hope for International Space Law: Incorporating Nineteenth Century First Possession Principles into the 1967 Space Treaty for the Colonization of Outer Space in the Twentieth Century*, 35 SETON HALL L. REV. 299, 344-57 (2004).

¹⁵⁶. See FRED ANGERSON & ANDREW CAYTON, *THE DOMINION OF WAS: EMPIRE AND LIBERTY IN NORTH AMERICA, 1500-2000* 51, 87-88 (2005).

¹⁵⁷. *Johnson v. M'Intosh*, 21 U.S. (8 Wheat.) 543, 605 (1823) ("If the discovery be made, and possession of the country be taken, under the authority of an existing government, which is acknowledged by the emigrants, it is supposed to be equally well settled, that the discovery is made for the whole nation, that the country becomes a part of the nation, and that the vacant soil is to be disposed of by that organ of the government which has the constitutional power to dispose of the national domains, by that organ in which all vacant territory is vested by law.").

¹⁵⁸. *Id.* at 569-790.

¹⁵⁹. *Feræ naturæ* refers to wild animals that do not reside on owned real property and are therefore not predisposed to ownership claims by any one person.

¹⁶⁰. See *Pierson v. Post*, 3 Cai. R. 175, 177-78 (N.Y. S. Ct. 1805).

¹⁶¹. *Id.*

assert an ownership claim.¹⁶² Applying first possession to space raises the same question of whether unmanned vehicles could meet the requirements contemplated by Nineteenth Century courts. Logically, corporal possession simply cannot be accomplished remotely. If it could, nations and companies would begin shooting flags onto celestial objects faster than they could ever mine them. Back on Earth, Russia attempted to assert a claim by planting a flag on the seabed of the North Pole, which was met with obvious hostility from the international community.¹⁶³ Russia is not alone; Denmark, Canada, Norway, and the United States also assert sovereignty over the mineral-rich Arctic territory.¹⁶⁴

The Arctic could make for a good test case for resolving property claims in space. The International Seabed Authority (ISA) decides mineral rights for seabed areas beyond national borders.¹⁶⁵ It was created in 1982 by the United Nations Convention on the Law of the Sea (UNCLOS), which has 167 party states.¹⁶⁶ The ISA is tasked with resolving the claims on the Arctic territory.¹⁶⁷ If the ISA can successfully adjudicate this property dispute, a strong case can be made for preserving the existing constructs in the Outer Space Treaty.

VI. CONCLUSION

The pragmatic and most likely approach to property rights space is to build upon the existing framework of the Outer Space Treaty and the Common Heritage Doctrine. While principles like *res nullius* will likely have to cede to commercial interests, Space should still be free for all to explore. Additionally, the United States should adopt an egalitarian view of

¹⁶². Popov v. Hayashi, 2002 WL 31833731 (Cal. Super. Ct. 2002). Barry Bonds hit a record-setting home run into the stands where the plaintiff had his glove up, making contact with the baseball, but a mob of people prevented him from catching the ball. The defendant saw the ball on the ground and picked it up. Both claimed ownership of the ball, but the court ruled former has pre-possessive right and latter has possessory right of the abandoned baseball. The ball was sold and its proceeds split. *Id.*

¹⁶³. Tom Parfitt, *Russia Plants Flag on North Pole Seabed*, GUARDIAN (Aug. 2, 2007), <http://www.theguardian.com/world/2007/aug/02/russia.arctic>.

¹⁶⁴. *Denmark Challenges Russia and Canada Over North Pole*, BBC NEWS (Dec. 15, 2014).

¹⁶⁵. *About the International Seabed Authority*, INT'L. SEABED AUTH, <http://www.isa.org.jm/authority> (last visited Jan. 30, 2016).

¹⁶⁶. Chronological Lists of Ratifications of Accessions and Successions to the Convention and the Related Agreements, United Nations Division for Ocean Affairs and the Law of the Sea as of October 3, 2014, https://www.un.org/depts/los/reference_files/chronological_lists_of_ratifications.htm (last visited Mar. 20, 2015).

¹⁶⁷. Luke Harding, *Kremlin Lays Claim to Huge Chunk of Oil-Rich North Pole*, GUARDIAN (Jun. 28, 2007, 5:41 EDT), <http://www.theguardian.com/world/2007/jun/28/russia.oil>.

extraterrestrial property rights because the 1970s era of American hegemony in space no longer exists. The United States no longer dominates space travel, so allowing the type of first in right claims that the Asteroid Act grants may turn out to be contrary to its own interests.

As we move to mining asteroids, commercial mining is logical as means of motivating and rewarding those who develop the technology to do so. But as we begin colonizing other planets and moons, commercial interests must be tempered. Colonization should not be conducted to the exclusion of others. Nor is there reason to exclude them. When Mark Twain said, "Buy land, they're not making it anymore," he was right. Land and resources have value by virtue of their scarcity. When space mining and colonization become a reality, the conventional supply and demand calculus of property valuation will be turned on its head. How does one value something for which there is theoretically an infinite supply?

Michael Jensen