

DEPLOYING THE COMMON LAW TO QUASI-MARXIST PROPERTY ON MARS

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“This is a court of space law . . .”

Star Trek: The Menagerie, Part I
(CBS television broadcast Nov. 17, 1966)

ABSTRACT

If and when the first human settlement arrives on Mars, it may be with the intention of staying on permanently. Progress and the spirit of adventure being what they are, the first group of settlers may be joined some time thereafter by a second. In anticipation of two groups of settlers on Mars who may compete over scarce suitable landscapes for sustaining the basic human needs of oxygen, energy, water, shelter and food, a framework of private property rights is necessary. In crafting possible frameworks, the 1967 Outer Space Treaty's (OST) governing provisions regarding property law must be considered. Existing scholarship has largely failed to properly account for the application of common law precepts to realistic property disputes governed by OST provisions, to fully acknowledge the non-appropriation and common use commands of the OST, which sound, arguably, in quasi-Marxist tones, and to explicate the types of unique property demands of permanent extraterrestrial human settlements. This article maps out two basic common law frameworks for two anticipated varieties of property disputes which adhere to the general and more specific principles contained within the OST while encouraging economically efficient decision-making and sustainable uses of the planet surface.

TABLE OF CONTENTS

I. INTRODUCTION	27
II. DISCUSSION	28
A. <i>Private Martian Settlements</i>	28
B. <i>The OST Problems</i>	34
1. An Overview of the OST	35
2. The Article II Non-Appropriation Problem	41
3. The Article I Common Use Problem	49
a. Moon Rocks	51
b. The Moon Agreement	52
c. Soviet Property Principles.....	54
C. <i>Potential Solutions and Proposals</i>	60
1. Traditional Adverse Possession Doctrine	61
2. An Application of Adverse Possession to an Initial Martian Property Dispute.....	65
3. A Secondary Martian Property Dispute	70
4. Inverse Partition.....	71
III. CONCLUSION.....	78

I. INTRODUCTION

By 2027, it is possible, even projected, that the first human settlements will have dug in on the surface of Mars.¹ The financial and personal costs accompanying a privately financed settlement will be high.² The first settlers may be overcome by the challenges of their environment, just as the New World settlers at Roanoke were.³ Alternatively, they may overcome those challenges and thrive on Mars, as did the settlers at Jamestown.⁴

Assuming the latter, the Earth-originating Martians' success will no doubt inspire other adventurers. When the second wave of immigrants encounters the first, optimists would predict selfless cooperation; pessimists would predict conflict; realists would predict a bit of both, in varying degrees. With scarce resources and challenging conditions, competition for those resources will be inevitable. What legal mechanisms will provide a framework for dispute resolution based upon rule rather than might? This article mines the utility of

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1. See MARS ONE, <http://www.mars-one.com/> (last visited July 15, 2015) (“Mars One, a Dutch nonprofit organization, currently plans to establish a permanent private settlement on Mars with astronauts departing Earth in 2026.”); see also ANDREW ALAN RADER, *LEAVING EARTH: WHY ONE-WAY TO MARS MAKES SENSE* 129 (2014) (noting that Mars One “is not an engineering company” but “a fundraising and organizational umbrella” but that perhaps “this is a good thing, because it can remain global, impartial, and free to purchase hardware from any vendor.”).

2. Compare ROBERT ZUBRIN, *THE CASE FOR MARS: THE PLAN TO SETTLE THE RED PLANET AND WHY WE MUST* 47 (1996) [hereinafter *THE CASE FOR MARS*] (quoting a leaked NASA estimate for a manned Mars program including two weeks on the surface at \$450 billion); with *id.* at 3 (estimating a low cost “Mars Direct” expedition at \$20 billion); and *How Much Does the Mars Mission Cost?*, MARS ONE, <http://www.mars-one.com/faq/finance-and-feasibility/how-much-does-the-mission-cost> (estimating the cost at putting four astronauts on Mars (without a return trip back to Earth) at \$6 billion).

3. See JAMES HORN, *A KINGDOM STRANGE: THE BRIEF AND TRAGIC HISTORY OF THE LOST COLONY OF ROANOKE* 61 (2010) (noting financial support for the Roanoke settlement, which set ashore in 1585, “from [Queen] Elizabeth, the court, and London’s mercantile community.”); see also JAMES HORN, *A LAND AS GOD MADE IT: JAMESTOWN AND THE BIRTH OF AMERICA* 71, 151 (2005) [hereinafter *JAMESTOWN*] (noting by 1609, the settlers were all presumed dead).

4. “Thrive” might be an overstatement as recent archeological evidence at Jamestown provides “clear evidence that the settlers cannibalized their dead to survive during the famine,” a starving time in which hundreds of settlers died. Marilyn Johnson, *Four Funerals and a Wedding*, *SMITHSONIAN*, Sept. 2015, at 69. See also *JAMESTOWN*, *supra* note 3, at 136 (explaining that the joint-stock venture encapsulating the Jamestown expedition was funded by individuals and other corporations who, upon purchasing shares “would be the major source of capital for the Company and in return would share the land, minerals, and other profits according to the size of their investment.”).

the common law doctrine of adverse possession in an application to the land rights claims of initial rival Martian settlements, introducing a paradigm called “inverse partition” as a proposed mechanism to resolve secondary property disputes without doing violence to the operative provisions of the Outer Space Treaty of 1967.⁵ The common law has long exhibited its vitality and ability to expand or contract to fit new environments and social relationships.⁶ The application of common law solutions to the problems of property on Mars must take account of the unique Martian environment while staying within the confines of the United States’ international treaty provisions that govern extraterrestrial real estate. This article aims to craft longstanding common law doctrines with a level of innovation appropriate to the surface of Mars. This must be done while abiding by the applicable treaty provisions to which the United States has bound itself, creating a kind of nascent Martian law that conjures predictable outcomes while adhering to some undertones of sustainability.

II. DISCUSSION

A. *Private Martian Settlements*

The Mars One project, which projects private and permanent human settlers on Mars in just eleven years, has been met with considerable skepticism.⁷ At the same time, Mars One has generated wonderment and

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

6. See Henry Upson Sims, *Remarks, in THE FUTURE OF THE COMMON LAW* 239 (Peter Smith, ed., 1965) (Noting, in the context of drafting the Restatement of Property, that “the common law was a Christmas tree, so to speak, on which we should hang various improvements or inventions until the whole tree should be covered, and its appearance changed.”).

7. Loren Grush, *How You’ll Die on Mars*, POPULAR SCIENCE (May 26, 2015), <http://www.popsci.com/how-youll-die-mars>. Among the technical challenges: deadly cosmic ray exposure during the trip to Mars, the difficulty of landing safely on Mars on account of its thin atmosphere; and assuming those challenges are overcome, it’s generally very cold, very difficult to produce foodstuffs, and oxygen and water are in short supply once the planet surface is reached. See Sidney Do, et al., *An Independent Assessment of the Technical Feasibility of the Mars One Mission Plan*, 65TH INTERNATIONAL ASTRONAUTICAL CONGRESS 25 (concluding, *inter alia*, “that crop growth, if large enough to provide 100% of the settlement’s food, will produce unsafe oxygen levels in the habitat.”). There will also be significant psychological challenges and of isolation and confinement and the physical effects of zero and reduced gravity. MARY ROACH, *PACKING FOR MARS: THE CURIOUS SCIENCE OF LIFE IN THE VOID* 43-62, 81-94 (2010). Mars One projects that the initial group of

serious thought about private extraterrestrial settlements occurring in the next generation or so.⁸ In the settlement of the Americas, initial government-sponsored, quasi-governmental expeditions by Columbus were soon followed by privately financed explorations and settlements.⁹ In outer space, the American and U.S.S.R. astronauts first made imprints of their boots on the moon with government-owned and operated rocket transports.¹⁰ In the coming decades, it now seems as likely as not that it will be private settlers, not government-sponsored expeditions, which will lead the way. If the excitement surrounding Mars One and other ventures like SpaceX translates into private spaceflights to another planet, the public-to-private progression of exploration and settlement will have followed that of North America some 500 years ago.¹¹

settlers will depart Earth in 2026 and land on Mars the next year. *Roadmap, MARS ONE*, <http://www.mars-one.com/mission/roadmap> (last visited July 1, 2015). Back in the 1970s, NASA had planned for manned missions to Mars by 1983. DEBORAH CADBURY, *SPACE RACE: THE EPIC BATTLE BETWEEN AMERICA AND THE SOVIET UNION FOR DOMINION OF SPACE* 335 (2006).

8. Ben Brumfield & Elizabeth Landau, *A One-Way Ticket to Mars, Apply Now*, CNN (Aug. 9, 2013), <http://www.cnn.com/2013/04/22/world/mars-one-way-ticket/>.

9. See SAMUEL ELIOT MORISON, *CHRISTOPHER COLUMBUS, MARINER 30* (1955) (narrating Ferdinand's and Isabella's financing of Columbus' 1492 voyage); see also FELIPE FERNÁNDEZ-ARMESTO, *COLUMBUS 45* (1991) ("Fifteenth century explorers, as far as we know, did not set off into the blue without the license and support of some mighty prince."); CHARLES HUDSON, *KNIGHTS OF SPAIN, WARRIORS OF THE SUN: HERNANDO DE SOTO AND THE SOUTH'S ANCIENT CHIEFDOMS 45* (1997) (indicating by the early sixteenth century, exploration and settlement of the Americas was underwritten privately, though still for the most part under royal charter). Sovereign approval, if not capital, was a prerequisite to obtaining legally protected rights. See FERNÁNDEZ-ARMESTO, *supra* note 9, at 45-46 (Noting that "a private individual might make a discovery, but could not advance a claim to sovereignty; nor would he be able to keep his gains without princely protection against interloping by fellow-subjects or attack from some foreign prince.").

10. See Cadbury, *supra* note 7, at 185-86 (describing the creation of NASA in 1958 and the parallel initial attempts to create a coordinated Soviet space program); Michael J. Listner, *The Ownership and Exploitation of Outer Space: A Look at Foundational Law and Future Legal Challenges to Current Claims*, 1 REGENT J. INT'L L. 75, 75 (2003) (Noting how the launch of Sputnik "ushered in the era of the great 'space race' between the United States (U.S.) and the U.S.S.R.; a competition to see who could first achieve in the conquest of space, with the ultimate objective being to put the first man on the moon and reap the political and scientific rewards of that achievement.").

11. See generally SPACEX, <http://www.spacex.com/about> (last visited July 1, 2015) (Space Exploration Technologies Corporation (also known as SpaceX) is an American aerospace corporation which manufactures space launch vehicles that have supplied the International Space Station and could supply Mars One with "Falcon Heavy" transports to Mars).

Mars One initially plans for four astronauts to arrive on Mars, followed by more groups of four, which are spaced every two years.¹² Water present in the soil can be tapped for hygiene, agriculture, and as a source of oxygen through electrolysis.¹³ Photovoltaic panels will power the Mars One settlement, with the initial settlement planning to install 3000 square meters of surface area to generate power.¹⁴ Food will be grown in portable greenhouses, with plants supplying food, oxygen, and wood for the construction of additional infrastructure as capacity expands.¹⁵

Mars is about only half as large as Earth, but given that it has no oceans, it is about equal in land area.¹⁶ Property disputes and competition for resources might appear to be unlikely given the ample elbow room. It might seem likely that a second wave of settlers would select positions far enough away from the first wave of settlers to avoid, or at least defer, property disputes. Three important factors suggest otherwise.

First, the band of habitable land on Mars may be relatively narrow. An ideal landscape may balance proximity to the northern polar cap and its high ice water soil concentrations against proximity to warmer temperatures and solar-collecting opportunities as one moves south.¹⁷ Temperatures near the equator reach sixty-eight degrees Fahrenheit in the summer months, with

12. *Roadmap*, MARS ONE, <http://www.mars-one.com/mission/roadmap> (last visited July 1, 2015).

13. See generally MICHAEL J. CARR, *WATER ON MARS* (1996) (analyzing data on the issue of water availability in various forms on Mars).

14. *Mission Feasibility*, MARS ONE, <http://www.mars-one.com/mission/technical-feasibility> (last visited July 1, 2015).

15. *Will the Astronauts Have Enough Water, Food and Oxygen?*, MARS ONE, <http://www.mars-one.com/faq/health-and-ethics/will-the-astronauts-have-enough-water-food-and-oxygen> (last visited July 1, 2015) [hereinafter *Food and Oxygen*]; Rader, *supra* note 1, at 61-62 (Inflatable greenhouses could utilize hydroponics and aeroponics to grow easy-to-grow plants like lettuce, tomatoes, peas and mushrooms. To supplement settlers' diets with meat, insects would be the most efficient options).

16. THE CASE FOR MARS, *supra* note 2, at xiv ("The Martian day is very similar to that of Earth—24 hours and 37 minutes—and the planet rotates on an axis with a 24° tilt virtually equal to that of Earth, and thus has four seasons of similar relative severity to our own.").

17. See *Food and Oxygen*, *supra* note 15 (Noting that "water can be extracted from the soil" on Mars and that the location for the initial Mars One settlement will be "primarily based on the water content in the soil" which is expected to be "to be at a latitude of between 40 and 45 degrees North."); see also THE CASE FOR MARS, *supra* note 2, at 186 (noting the availability of an estimated two million cubic kilometers of frozen water in Mars' northern polar cap).

summers lasting six months.¹⁸ The availability of geothermal access might be key to survival as well as natural sheltering protections from radiation and winds.¹⁹ Second, that narrow Goldilocks band, once identified with specificity, might contain large swaths of topographically challenging land masses. Martian canyons are deeper than any on Earth, and Martian mountains are taller.²⁰ Finding level ground within the Goldilocks band might reduce the places for possible settlement to only a handful of viable options. Third, basic human needs encompass more than food, oxygen, and habitation; they also include contact and socialization with other humans. Given the choice between a second settlement several thousand kilometers from the initial Mars One settlement and one in relatively close proximity to an established settlement, human nature strongly suggests that a nearby second settlement will be preferable to one buffered by distance or barriers. As Robert Zubrin wrote: “On Earth, they say that the top three criteria for determining the value of real estate are location, location, and, you guessed it, location. The same prioritization is true on Mars, only it’s the top five criteria.”²¹

For these reasons, it is not unreasonable to project that a “Mars Two” settlement might crop up a few dozen, rather than a few thousand, kilometers from the first; the scarcity of resources may quickly bring the two groups into competition over those resources, especially soil suitable for water extraction and topography best situated for solar collectors. Conflicting claims to agriculturally-situated plots and living space may also arise. Inter-settlement friction should be anticipated.

Any disputes between Mars One employees themselves will no doubt be tightly governed by Mars One policies, mandatory arbitration clauses, and

18. Joseph Castro, *What Would It Be Like to Live on Mars?*, SPACE.COM (Feb. 17, 2015, 4:00 PM), <http://www.space.com/28557-how-to-live-on-mars.html> (“[Y]ou’d probably want a permanent base somewhere in the low northern latitudes,” Ashwin Vasavada, a deputy project scientist for NASA’s Mars Science Laboratory, told Space.com.”).

19. See ROBERT ZUBRIN, *HOW TO LIVE ON MARS: A TRUSTY GUIDEBOOK TO SURVIVING AND THRIVING ON THE RED PLANET* 39-41 (2008) [hereinafter *HOW TO LIVE ON MARS*] (explaining that geothermal power for Mars settlers may be preferable to solar power); see also *THE CASE FOR MARS*, *supra* note 2, at 207-08 (noting the possibility of harnessing wind power on Mars); Carr, *supra* note 13, at 187 (“Sites with thick regoliths will be favored because regolith can provide materials that can be used to provide protection against radiation. Lava tubes have also been suggested as potential shelters.”).

20. See *THE CASE FOR MARS*, *supra* note 2, at 139-40 (noting that “the Martian terrain is incredibly varied” including “canyons, chasms, volcanoes, ice fields, dry-ice fields, and ‘chaotic terrain’” as well as “the 3,000-kilometer-long Valles Marineris.”).

21. *HOW TO LIVE ON MARS*, *supra* note 18, at 32-33.

Earth-bound arbitrators.²² There are limitations to conducting a resolution, proceeding, or trial of a dispute arising from Mars on Earth: all, or most, of the witnesses and relevant evidence are on a planet some hundreds of millions of kilometers away.²³ Nevertheless, a far away, neutral, and qualified decision making body will likely control the outcome of any disputes between Mars One employees.²⁴

If the second Martian settlement consists of employees or associates of an entity other than Mars One (say, for purposes of convenience, “Mars Two”), preconceived and prearranged constraints, dispute resolution formats, and choice of law and venue selection clauses will likely be absent, although the United States would retain sovereign control and jurisdiction over both Martian settlements, assuming both were launched from U.S. soil.²⁵ When the second settlement encounters the first, pre-arranged mechanisms for alternative dispute resolution may be nonexistent.²⁶ Still, an Earth-bound decision making body will likely provide the kind of qualified and objective deliberation that will be unavailable on Mars. Moreover, the firms employing the settlers will themselves have input over questions like venue, and they will certainly prefer

22. See James Ottavio Castagnera & Michael Ostrowski, *Alternative Dispute Resolution: Employment Law*, 57 AM. JUR. TRIALS 255 § 1 (1995) (observing that “both binding and nonbinding ADR techniques have extensively infiltrated both private employment contracts” and courts’ dockets).

23. THE CASE FOR MARS, *supra* note 2, at 75 (explaining that Mars is 38 million kilometers from Earth during planetary opposition and 400 million kilometers distant during planetary conjunction. “[N]o propulsion system is even on the drawing boards that can push directly away from the Sun and perform the transit between Earth and Mars in a straight line when the two are in opposition.” Thus, as a practical matter the travelling distance between Earth and Mars is several hundred million kilometers).

24. See E-Mail from Suzanne Flinkenflögel, Dir. of Comm’n, Mars One, to author (Apr. 15, 2015, 03:34 CST) (on file with author) (indicating Mars One settlers will become employees of the Mars One company when they begin training for their mission and they will remain employees of Mars One once they are on Mars).

25. OST, *supra* note 5, art. VIII.

26. See generally P.J. Blount, *Jurisdiction in Outer Space: Challenges of Private Individuals in Space*, 33 J. SPACE L. 299, 300 (2007) (stating that “there are nebulous jurisdictional issues in space”); see also Stacy J. Ratner, Note, *Establishing the Extra-terrestrial: Criminal Jurisdiction and the International Space Station*, 22 B.C. INT’L & COMP. L. REV. 323, 338-41 (1999) (identifying gaps in the 1998 Intergovernmental Agreement on Space Station Cooperation and 1988 Intergovernmental Agreement with regards to jurisdiction and extradition principles governing crimes committed on the International Space Station); OST, *supra* note 5, art. VIII (It should be noted that Article VIII of the OST does provide that a country “on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body.”).

to rely on established dispute resolution mechanisms on Earth, rather than on anything the settlers might attempt in the way of Martian forums.

When the Mars Two settlers claim use of a hillside for their photovoltaic panels or water-extraction mechanics and the Mars One settlers claim prior appropriation of the same hillside for their own use, to what frameworks will an Earth-bound jurist turn? The availability of appropriate legal frameworks is essential to avoid a might-makes-right resolution of the Martian settlers' irreconcilable interests and assertions. How can the rule of law be fashioned to mediate the confrontation? Will Earth-originating doctrines provide a solution that will be respected by the opposing settlements? Will the evolution of a Martian-esque rule of law be required to take account of the unique situations of the first settlers? Or will Earth common law doctrines make room for the needs and reasonable expectations of the Martian settlers?

The following text attempts to assess the workability of adverse possession doctrine to an initial land-use confrontation between competing Martian settlements. To avoid the scholastic quicksand of a fifty state analysis and conflict of laws assessment, a generalized common law premise is adopted. The first type of property dispute envisioned is one between an initial Martian settlement and a newly arrived settlement which disputes the first settlement's rights to a particular parcel or parcels of productive resources which has been occupied—or perhaps imperfectly or only partially occupied—by the first settlement. The fit and utility of adverse possession doctrine to such a dispute will be examined.

Next, I will briefly explore a different type of property dispute. As the first settlement group and the second settlement group put down roots on Mars and move beyond their initial conflicting claims, another doctrine will likely become necessary to resolve the kinds of secondary, pre-occupancy property disputes that are likely to arise between those with rival interests. As will also be explored below, the international treaty rubric may limit, and probably prohibits, any Earth-based court or other government body from parceling out tracts between the rivals. I will propose a presumption of common ownership, which I call “inverse partition,” to disputed parcels as a solution that respects the economic realities of competing Martian settlements, while also staying within the general confines of international treaty provisions and background principles of extraterrestrial property law.²⁷ Before unpacking the operation of

27. See, e.g., Alan Wasser & Douglas Jobes, *Space Settlements, Property Rights, and International Law: Could a Lunar Settlement Claim the Lunar Real Estate it Needs to Survive?*, 73 J. AIR L. & COMM. 37, 64-65 (2008) (Some scholars are too ready to dismiss the importance of treaty law on the parceling out of private property interests on extraterrestrial bodies. The authors point out the flexibility retained by the United States government in abiding by and interpreting its obligations pursuant to treaty by reference to the

adverse possession and this idea of inverse partition on Mars, however, it is important to consider the implications of international treaties. International law will directly shape the contours of workable common law property dispute frameworks.

B. *The OST Problems*

The first Martian settlers' property dispute may derive from settlers of the same national origin and governed by the same country's jurisprudence, seemingly obviating any requirement for an international law overlay. For example, the first settlers may be United States' citizens, acting under the auspices of a United States corporation, which launched a rocket from the United States, and the second settlers comprised of other U.S. citizens who are employed by another U.S. company, which also launched a rocket from a U.S. site.²⁸ Any state choice of law quandaries might be moot where the outcome to a given dispute would be the same, regardless of which state's law applies.²⁹ For purposes of a more manageable analysis, this article ignores state choice of law concerns and assumes the first Martian property law disputes would arise between employees of two different private entities, both based in the United States. The resolution of property law disputes on Mars between two such

government's deviance from the guarantee of favorable trade status to Iran under the Treaty of Amity, Economic Relations, and Consular Rights Between the United States of America and Iran (1957) by prohibiting trade with Iran for twenty years); *see also* Renkel v. United States, 456 F.3d 640, 643 (6th Cir. 2006) (internal citations omitted) ("Self-executing treaties;" those "which do not require domestic legislation to give them the full force of law . . . can create private rights enforceable in court.") The concern with the application of treaty law to a private dispute involving Martian land as framed in this article is not principally whether the United States government could conceivably implement a Martian land transfer registry but rather that in a dispute between Martian settlements over land rights, one party's arguments could be undermined (or strengthened) to the extent that they strain (or complement) applicable treaty provisions governing property on other planets.

28. No *in rem* jurisdiction assertions would be colorable when all property in dispute is extra-terrestrially situated. *See* Thomas Muskus, et al., 21 C.J.S. *Courts* § 71 (2006) (In *rem* jurisdiction "is the power of a court over the thing before it," that "in *rem* jurisdiction of a court is founded on physical power, and has its basis in the presence of the subject property within the territorial jurisdiction of the forum court."). Nor would choice of law principles invoked by the location of the real property prove workable. *See* RESTATEMENT (SECOND) OF CONFLICT OF LAW § 227 (1971) ("Whether there has been a transfer of an interest in land by adverse possession or by prescription and the nature of the interest transferred are determined by the local law of the situs.").

29. *See, e.g.,* Mecanique C.N.C., Inc. v. Durr Environmental, Inc., 304 F. Supp. 2d 971, 975 (S.D. Ohio 2004) (reasoning that since no conflict existed between relevant provisions of Michigan and Ohio law, conducting a choice-of-law analysis was unnecessary and the law of the forum state (Ohio) should be applied).

groups will be shaped to a significant degree by international treaty; the import of the Outer Space Treaty (OST) is squarely implicated.³⁰

1. An Overview of the OST

The OST was produced by delegates to the United Nations' Committee on the Peaceful Uses of Outer Space (or "COPUOS").³¹ The OST is foundational, forming the "basic framework for international space law."³² One hundred twenty-seven countries, including the United States and all other spacefaring nations, have signed or ratified it.³³

The OST was a product of the Cold War; it was an attempt by the United States and the U.S.S.R. to "avoid the extension of present national rivalries into this new field," that is, outer space and celestial bodies.³⁴ The atmosphere in which the agreement was negotiated was contentious and "politically tense."³⁵ Many of the provisions of the OST do not deal directly with the ownership of extraterrestrial real property.³⁶ Indeed, the focus was oriented more toward

30. See OST, *supra* note 5.

31. MATTHEW J. KLEIMAN, *THE LITTLE BOOK OF SPACE LAW* xii-xiii (2013).

32. *Id.*; Hughes Aircraft Co. v. United States, 29 Fed. Cl. 197, 229 (Fed. Cl. 1993).

33. Kleiman, *supra* note 31, at xiii.

34. Eric Husby, *Sovereignty and Property Rights in Outer Space*, 3 J. INT'L L. & PRAC. 359, 362-363 (1994), *citing* G.A. Res. 1963, U.N. GAOR, 18th Sess., at 13 (U.N. General Assembly Resolution 1347 (XIII) of October 17, 1963, on which parts of the OST were based).

35. Ezra J. Reinstein, *Owning Outer Space*, 20 NW. J. INT'L L. & BUS. 59, 62 (1999) ("The Outer Space Treaty was hashed out in a politically tense environment. Negotiations began on the heels of the Soviet Union's earthshaking Sputnik launch in 1957. Each side of the Cold War was concerned that the other might gain irreversible advantage by militarizing outer space. The OST grew up as much a document of prevention as one of hope. The U.N. General Assembly Resolution 1348 (XIII) of October 17, 1963, on which parts of the OST were based, explicitly intended to 'avoid the extension of present national rivalries into this new field.'"); Lynn M. Fountain, *Creating Momentum in Space: Ending the Paralysis Produced by the 'Common Heritage of Mankind' Doctrine*, 35 CONN. L. REV. 1753, 1775 n. 152 (2003) ("The Outer Space Treaty [was an attempt] to control the conflicts that would have inevitably ensued from a 'first come-first served' approach to the exploration, exploitation, and colonization of outer space.").

36. H.G. Darwin, *Outer Space Treaty*, 42 BRIT. Y.B. INT'L L. 278, 282 (1967) ("The three strands [of the OST are] . . . the free and common use of outer space including the celestial bodies, the disarmament measures to be applied there, and the means of co-operation in its use."); He Qizhi, *The Outer Space Treaty in Perspective*, 25 J. SPACE L. 93, 93-94 (1997) (Qizhi outlines the OST's structure as follows:

1) The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interest of all countries;

suppressing an outer space arms race than toward outlining private property rights:

Creating a space property law supportive of private development was not a priority. Each side of the Cold War was hoping to prevent the other from advancing as a sovereign into outer space and achieving an insurmountable military and geographic superiority. As a result, the OST is at best ambiguous, and at worst hostile, to the privatization and commercialization of space resources.³⁷

This is not to suggest that the parties simply did not contemplate the possibility of private expeditions to other planets in 1967 or that the United States and the U.S.S.R. were operating on an unspoken presumption that only official government exploration and property claims merited consideration. Private exploration of celestial bodies was on the agenda. The U.S.S.R., in fact, desired a treaty that would expressly ban all private enterprise activity in space and the United States resisted the idea.³⁸ No such ban is found within the OST in its final form.

2) Outer space shall be free for exploration and use by all states on a basis of equality;

3) Outer space shall not be subject to appropriation by claim of sovereignty, by means of use or occupation, or by any other means;

4) Activities in the exploration and use of outer space must be carried out in accordance with international law, including the Charter of the United Nations in the interest of maintaining peace and security;

5) No nuclear weapons or any other kind of weapons of mass destruction shall be placed in orbits of the earth;

6) The Moon and other celestial bodies shall be used by all state parties to the treaty exclusively for peaceful purposes;

7) Astronauts shall be given every possible assistance;

8) State parties bear international responsibility for national activities in outer space;

9) State parties keep jurisdiction and control over launched objects and personnel recorded in their register;

10) State parties shall avoid harmful contamination of outer space, celestial bodies and the environment of the earth, and shall consult with other state parties regarding potential harmful experiments;

11) The UN Secretary-General must be informed about space activities and shall disseminate such information to the public and the international scientific community;

12) International cooperation and understanding are to be promoted).

37. Reinstein, *supra* note 35, at 63.

38. U.S. Delegation on Negotiations with the Soviets on the Legal Problems of Outer Space, Position Paper (Sept. 24, 1963) [hereinafter Position Paper] (copy on file with author)

Article II of the OST presents serious concerns for the initial recognition of private property rights on Mars.³⁹ It provides: “Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”⁴⁰ Alongside this total ban on national appropriation of celestial bodies’ real estate, Article I provides in part that “there shall be free access to all areas of celestial bodies” and that the use of “celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.”⁴¹ Similarly, the preamble establishes that the “use of outer space should be carried on for the benefit of all peoples” in recognition of the “common interest of all mankind.”⁴² That the tone of the OST here resonates with socialist principles should be surprising, given that the Outer Space Treaty was the product of compromise with the U.S.S.R.⁴³ One could even read the OST as invoking quasi-Marxist principles, neither entirely socialist nor purely

(This paper was declassified in 1990, is part of the archives of the LBJ Presidential Library, and is located in the Legislative Background collection, Outer Space Treaty History, box 1, folder. It states that progress is made toward an agreed set of legal principles and the issue of private enterprises in outer space was identified in the Position Paper as being more of a contentious issue. It noted that the Russians are virtually prepared to accept some form of US principles. Soviet principle 7 would have provided, “[a]ll activities of any kind pertaining to the exploration and use of outer space shall be carried out solely by States.” U.S. principle g relates to State responsibility for activities in space. Principle g is now found in Article VI of the Outer Space Treaty); OST, *supra* note 5, art. VI.

39. See, e.g., Fabio Tronchetti, *Private property rights on asteroid resources: Assessing the legality of the ASTEROIDS Act*, 30 SPACE POL’Y 193, 194 (2014) (“[T]he . . . historical, textual and factual elements [of the OST] leave little doubt about the existence of a ban on the private appropriation of outer space.”).

40. OST, *supra* note 5, art. II.

41. OST, *supra* note 5, art. I; Reinstein, *supra* note 35, at 66 (Reinstein asks rhetorically, “[w]hat does the OST mean by permitting use of space only for the ‘benefit . . . of all countries?’ Will the United Nations step in and seize the profits derived from private use of space, if it determines that the usage has not benefited all nations?”).

42. OST, *supra* note 5, preamble; compare OST art. VIII (“[o]wnership of objects launched into outer, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space.”).

43. See generally, John N. Hazard, Comment, *Socialist Law and the International Encyclopedia*, 79 HARV. L. REV. 278, 284-85 (1965) (That is, one way characterizing the type of property law that is envisioned by the OST is as a hybrid of socialist theories regarding property and capitalist ones); Larisa Krasavchikova, *Comments on the Law on Property in the Russian Soviet Federated Socialist Republic*, ST. MARY’S L.J. 481, 485 (1993) (In the 1960’s, “the state had the exclusive right to own land” in the U.S.S.R.); *infra* Part II Section (b)(3)(c) (but use rights approximating outright ownership were recognized in the Soviet Union as explicated).

free market.⁴⁴ It may reflect, for better or worse, a compromise in capitalist and socialist ideologies, which will have serious implications for all extraterrestrial property.⁴⁵

In free market economies, one typically thinks of property as something capable of being owned; one usually views property as a thing over which private ownership can be assumed. One of the primary hallmarks of private property ownership in free market economies is the owner's right to exclude others, which is enforceable by means of trespass theory.⁴⁶ The right to exclude is thought of as one of the most important "sticks" in a basic bundle of free market real property rights;⁴⁷ the other primary "sticks" include the right to

44. See Position Paper, *supra* note 38, at 7 (The United States treaty negotiators would not have characterized their efforts at conceding to any form of Soviet-style rubric in outer space. Strategizing that "if the Soviet principle restricting participation to states was an attempt to extend Communist principles to outer space, then the US should not waste negotiating capital appealing a stand taken, perhaps, purely for the purpose of appearing to make a concession at a later time."); see *id.* attachment B at 1 (The OST Article I "common use" provision appears to not have been the product of compromise between the U.S. and the U.S.S.R., but an uncontroversial provision approved by both sides. Observing that "many provisions concerning legal principles for the activity of states in outer space were formulated by the USSR and the USA almost verbatim . . ."). Certain common use principles can be found in both socialist and non-socialist jurisdictions. See ROSCOE POUND, *THE SPIRIT OF THE COMMON LAW* 189 (1921) (noting, even in free market legal systems, a contemporary tendency "to regard the social interest in the use and conservation of natural resources; to hold, for example, that running water and wild game are, as it were, assets of society which are not capable of private appropriation or ownership except under regulations that protect the social interest.").

45. See Benjamin Perlman, *Grounding U.S. Commercial Space Regulation in the Constitution*, 100 *GEO. L.J.* 929, 954 (2012) ("At the time of the OST's drafting, the United States and the Soviet Union—being the two major space powers—each had a large stake in the OST's final form. The Soviet Union wanted an "absolute state monopoly on space activities," whereas the United States pushed for an "absence of restrictions [on] private enterprise." Therefore, "Article VI represents a compromise between Western and Soviet ideologies." In exchange for allowing private commercial actors into space, the Soviets required the United States to exercise general authority and supervision over those actors—presumably on any aspect of private/commercial conduct that could implicate OST obligations."); NATHAN C. GOLDMAN, *AMERICAN SPACE LAW: INTERNATIONAL AND DOMESTIC* 72 (2nd ed. 1996) (asserting that Article VI of the OST—which requires governments to bear international responsibility for national activities in outer space, even activities are carried on by non-governmental entities, and to assure that national activities are carried out in conformity with the OST—represents a compromise in socialist and free market ideologies).

46. See *Adams v. Cleveland-Cliffs Iron Co.*, 602 N.W.2d 215, 219 (Mich. Ct. App. 1999) (stating that "trespass is an invasion of the plaintiff's interest in the exclusive possession of his land") (citation omitted).

47. *Adams*, 602 N.W.2d at 218 (explaining that the basic "concept of 'property' comprises various rights – a 'bundle of sticks,' as it is often called") (citation omitted).

alienate or transfer and the right to use and enjoy.⁴⁸ Article XII of the OST limits the right to exclude:

All stations, installations, equipment and space vehicles on the moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity. Such representatives shall give reasonable advance notice of a projected visit, in order that appropriate consultations may be held and that maximum precautions may be taken to assure safety and to avoid interference with normal operations in the facility to be visited.⁴⁹

In spite of this softening of the traditional right to exclude, Article XII is significant in that it also contemplates a higher degree of private property rights that the more general principle of “free access” in Article I and the “common interest of all mankind” theme from the preamble might suggest. Article XII recognizes a balance between free access to extraterrestrial installations and the right of the property owner to exclude in the absence of “reasonable advance notice of a projected visit” and “appropriate consultations” with the residents of the installation.⁵⁰ Stated another way, Article XII’s diplomatic exception to the right to exclude confirms the general application of the right to “stations, installations, equipment and space vehicles” parked on other planets as well as improved or occupied tracts outside the installations.⁵¹

Thus, the OST contains at least three separate potential stumbling blocks to private real property rights on Mars. The first, and perhaps least significant, is Article XII’s limits on the right to exclude representatives of other governments from equipment, stations, installations, and space vehicles with reasonable advance notice.⁵² Article XII essentially relates only to diplomats visiting Mars. The two categories of property disputes between rival settlements explored below would be unaffected by Article XII. More serious are the property rights provisions of Articles I and II.

Article II of the OST presents concerns for the initial acquisition of private property rights on Mars; it provides that “celestial bodies [are] not subject to national appropriation by claim of sovereignty, by means of use or occupation,

48. See RAYMOND R. COLETTA, WORKBOOK ON ESTATES AND FUTURE INTERESTS 11 (2nd ed. 2007) (explaining that an owner of an estate in fee simple “has the right to use the estate without any limitation” and “[t]he estate is completely alienable, devisable, and inheritable.”).

49. OST, *supra* note 5, art. XII.

50. *Id.*

51. *Id.*

52. OST, *supra* note 5, art. XII; see also OST art. I (providing that “there shall be free access to all areas of celestial bodies . . .”).

or by any other means.”⁵³ The third and most significant OST problem is Article I’s guarantee that the use of “celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.”⁵⁴ Article I speaks to property use and seems to contemplate some degree of re-characterization of ownership rights, in that property uses must benefit “all countries” and that extraterrestrial realty “shall be the province of all mankind.”⁵⁵ I believe that Article I can be read as partaking in Soviet principles of common ownership, which transformed private property holdings into “the property of all the people”⁵⁶ after the 1917 Revolution. If read in isolation, Article I could be interpreted as imposing some kind of socialist, worldwide ownership on all celestial bodies to the exclusion of any form of private ownership. Reading Article I in context, however, it is reasonable to conclude that extraterrestrial property could be governed by limited principles of socialism hybridized with familiar concepts of capitalist private ownership.⁵⁷ Yet, even in the Soviet Union in the late 1960s, some forms of private and

53. OST, *supra* note 5, art. II.

54. OST, *supra* note 5, art. I; Reinstein, *supra* note 35, at 67 (“One school interprets the phrase as being no more than a non-binding guide, a moral exhortation, for each state party. Others read ‘for the benefit . . . of all countries’ as packing a powerful legal mandate.”).

55. OST, *supra* note 5, art. I; *see also* Adrian Bueckling, *The Strategy of Semantics and the “Mankind Provisions” of the Space Treaty*, 7 J. SPACE L. 15, 22 (1979) (Asserting that the term “‘mankind’ does not at present represent a workable legal term? As long as there is no supranational constitution . . .”); Ernst Fasan, *The Meaning of the Term “Mankind” in Space Legal Language*, 2 J. SPACE L. 125, 131 (1974) (Concluding that mankind is not yet made “available the property rights of space resources” since “mankind does not yet have an administrative organ to receive and exercise such rights.”).

56. *Decree of the Second All-Russian Congress of Soviets, October 26 (November 8), 1917 “On Land”* [hereinafter Second Decree], in IDEAS AND FORCES IN SOVIET LEGAL HISTORY: A READER ON THE SOVIET STATE AND LAW 117 (Zigurds L. Zile, ed., 1992) [hereinafter IDEAS AND FORCES] (The 1917 Second Decree provides: “Private ownership of land shall be abolished forever; land shall not be sold, purchased, leased, mortgaged, or otherwise alienated. All land, whether state, crown, monastery . . . shall be taken without compensation and become the property of all the people, and pass into the use of those who cultivate it.”).

57. Bueckling, *supra* note 55, at 18 (“The Soviet delegation, in a working paper, denied the concept of ‘common heritage of mankind’ [in an early draft of the Moon Agreement] all legal significance . . .”; *citing* Dausen, *Zur Rechtslage des Mondes und anderer Himmelskörper*, 24 *Zeitschrift f. Luft- und Weltraumrecht* 281 (1975) (If the more socialist-tinged “heritage” from the Moon Agreement lacked significance to the communists, then the less radical “province of all mankind” phrase from OST Article I would carry even less import).

exclusive property uses were recognized.⁵⁸ Moreover, as explicated below, “ownership” of real property in the Soviet Union could be withheld from real property, but an individual might still retain the three basic rights associated with what free market countries think of as ownership (alienation, use, and exclusivity) without owning the thing.⁵⁹

I will turn first to the question of the initial acquisition of private property rights on the Martian surface by the first settlement organization to arrive on Mars. In this context, the difficulties presented by Article II’s ban on appropriation of celestial bodies’ realty “by any means” must be considered in view of the means by which property rights might be acquired and recognized absent a prior appropriation by the United States.⁶⁰ Then, assuming that acquisition of some form of property rights can be obtained through private use and occupation without violating OST’s ban on national appropriation, I will consider the nature of property rights which can be acquired by a second settlement organization on Mars in view of Article I’s “common use” provision.⁶¹ Framing a reasonable interpretation of Articles I and II depends on an examination of conduct and customs of the United States and Soviet Union under the treaty, as well as on a brief explication of the socialist property principles that seem to haunt the OST.

2. The Article II Non-Appropriation Problem

Neither Article II nor the related provisions of the OST quoted above expressly ban private appropriation or ownership of Martian real property; the only express ban prohibits the national appropriation of property.⁶² Read

58. See *infra* Part II Section (B)(3)(c).

59. See, e.g., *infra* notes 159-60 (regarding private homes in the Soviet Union and the exclusive use, alienation and encumbrance rights of the same).

60. OST, *supra* note 5, art. II.

61. *Id.* art. I.

62. See, e.g., *Hughes Aircraft Co. v. United States*, 29 Fed. Cl. 197, 229 (Fed. Cl. 1993) (“Article II generally prohibits any nation from claiming sovereignty over areas of outer space”); Stephen Gorove, *Interpreting Article II of the Outer Space Treaty*, 37 *FORDHAM L. REV.* 349, 352 (1969) [hereinafter *Interpreting Article II*] (Concluding that establishing a permanent settlement on another planet under the supreme authority of a government may constitute national appropriation but “[s]hort of this, if the state wields no exclusive authority or jurisdiction in relation to the area in question” no appropriation in violation of the OST would occur “unless[] the nationals also use their individual appropriations as cover-ups for their state’s activities.”); see also Wasser & Jobes, *supra* note 27, at 43-46 (summarizing and quoting from scholarly conclusions similar to Gorove’s); but see Ruwantissa Abeyratne, *The Application of Intellectual Property Rights to Outer Space Activities*, 29 *J. SPACE L.* 1, 4 (2003) (Concluding that on account of the OST “space law is grounded on the principle that outer space is the common heritage of mankind and that

narrowly, the OST text might seem merely to invoke general principles of private ownership rights, doing so in such a vague manner as to be unenforceable.⁶³ Article II, however, clearly intends to prohibit national appropriation of Martian landscapes “by any means.”⁶⁴ Thus, for example, neither the rover *Opportunity* or science laboratory *Curiosity*, nor any other inert landing craft sent by the United States can form the basis of a claim by our federal government to those landing sites or explored regions.⁶⁵ Similarly, if NASA sent a manned mission to Mars, the prohibition of national appropriation claims would apply.⁶⁶

The problem underlying the text of Article II for private land claims rests on the basic premise of real property in common law countries like the United Kingdom and the United States. After launching and successfully completing the Norman-French conquest of England in 1066 at the Battle of Hastings, William I seized the lands held by the former nobility, originating the feudal tenures system, in which all real property ultimately derived from the crown.⁶⁷

no State or individual can therefore claim *rights in rem* to any portion of outer space.”) (emphasis in original).

63. See Wasser & Jobes, *supra* note 27, at 42 (During the United States Senate ratification hearings for the OST, the head of the negotiating team for the United States was quoted as claiming that Article I was a “broad general declaration of purposes that would have no specific impact until its intent was detailed in subsequent, detailed agreements.” (quoting John W. Finney, *Space Treaty Called ‘Fuzzy’ at Senate Hearings: Rusk and Goldberg Dispute Unexpected Objections by Gore and Fulbright*, N.Y. TIMES, Mar. 8, 1967, at 20)); see also OST, *supra* note 5, art. V. (OST Article V requires “State Parties . . . immediately inform the other States Parties to the Treaty or the Secretary-General of the United Nations of any phenomena they discover in outer space, including the moon and other celestial bodies, which could constitute a danger to the life or health of astronauts.”).

64. OST, *supra* note 5, art. II; see also Harry H. Almond, Jr., *General Principles of Law – Their Role in the Development of the Law of Outer Space*, 57 U. COLO. L. REV. 871, 878 (1986) (opining that Article II of the OST “precludes states from making claims traditionally made among them on earth with respect to unoccupied territories or areas.”).

65. See Apollo Lunar Landing Act, H.R. 2617, 113th Cong. §1 (2013) (explaining that the bill would have created the Apollo Lunar Landing Legacy Act); *Id.* at §§ 5, 7(a)(2) (explaining that the National Park Service (NPS) would manage access to the Apollo 11-17 sites); see also Leonard David, *National Park On The Moon? Proposal To Protect Apollo Lunar Landing Sites Sparks Controversy* (July 29, 2013), http://www.huffingtonpost.com/2013/07/29/national-park-moon-proposal-apollo-lunar-landing-sparks-controversy_n_3672268.html; Michael Listner, founder of Space Law and Policy Solutions, noted that creating a national park “requires sovereign control over the real property” which the OST prohibits); see also 16 U.S.C. § 1 (2015) (creating the NPS under the U.S. Department of Interior).

66. *But see* Wasser & Jobes, *supra* note 27, at 54-55 (arguing that, consistent with the OST, a country could recognize private ownership and transfer of extraterrestrial real estate so long as the country stops short of conferring title).

67. DAVID C. DOUGLAS, *WILLIAM THE CONQUEROR: THE NORMAN IMPACT ON ENGLAND*, 273-75 (1964) (describing the functionality of feudalism introduced by William);

While outright fee simple private ownership of land is obviously permitted today in the U.S. and U.K., the original source of title is still thought of as deriving from the state.⁶⁸ By extension, if a state can never assert any Martian realty ownership, then title can never devolve from a state to a private owner.⁶⁹

EDWARD A. FREEMAN, *WILLIAM THE CONQUEROR 186-90* (1898) (detailing the Domesday survey's purpose in recording the holdings of property uses by various Normans and others throughout England); Douglas, *supra* note 67, at 273 (“[W]as indicative of [William’s] personal authority that he was able to make these men from the start his tenants-in-chief in England, holding their lands, not in absolute ownership as spoils of conquest, but in return for providing a specified number of knights for the royal service.”); *see supra* Part II Section (B)(3)(c); VIRGIU POP, *WHO OWNS THE MOON? EXTRATERRESTRIAL ASPECTS OF LAND AND MINERAL RESOURCES OWNERSHIP* 117 (2009) (“It could even be argued that contemporary property law, heavily regulated and subject to eminent domain, has begun to resemble feudal property:

It is hereby offered that private property, even in its terrestrial form, is an eroded concept. Throughout the last century, the “owner” has involved [sic] into a mere “privileged user” of a certain object. The State taxes that object and the benefits derived thereon, and can confiscate that object by means of eminent domain. Fee simple ownership, as an epitome of property, has been drawn into extinction by the gradual advance of the society into private matters.”)

68. Roy T. Black, *The Historical Background of Some Modern Real Estate Principles*, 34 *REAL EST. L. J.* 327, 335 (2005) (“[T]he military and economic history of England provides us with land law that evolved from feudalism and seems archaic in modern times.”); *see also id.* (quoting THOMAS F. BERGIN AND PAUL G. HASKELL, *PREFACE TO ESTATES IN LAND AND FUTURE INTERESTS* 2 (1966) (“The blunt fact is that the English can celebrate their Hastings; we Americans must live it.”)). Thus, all property derives from the sovereign and depends upon what the sovereign (through its courts) recognize. *See* JOHN AUSTIN, *THE PROVINCE OF JURISPRUDENCE DETERMINED*, reprinted in *THE PROVINCE OF JURISPRUDENCE* 5-6 (Legal Classics Library. ed. 1984) (1832); *but see* H.L.A. HART, *THE CONCEPT OF LAW* 20-25 (1961) (describing the “bottom up” opposing view that property derives from the common customs and practices of a community); Richard A. Epstein, *International News Service v. Associated Press: Custom and Law as Sources of Property Rights in News*, 78 *VA. L. REV.* 85, 127 (1992) (“[D]ecentralized customs may be generated without legal interference and control, but legal force may be necessary to maintain them against systematic defection.”). Reliance on custom and community-endorsed practices for the delineation of property rights in common law systems is both rare and limited. *See, e.g.,* *Ghen v. Rich*, 8 F. 159 (D. Mass. 1881) (recognizing a narrow departure from the rule of occupancy to vest title in *ferae naturae* based on the customs of fin-back whale fishermen in Provincetown, Massachusetts).

69. Jijo George Cherian & Job Abraham, *Concept of Private Property in Space – An Analysis*, 2 *J. INT’L COM. L. & TECH.* 211, 213 (2007) (“There is a view that the restrictions placed on sovereign nations would naturally extend to individuals through their citizenship, and therefore property rights in outer space is [sic] outside the parlance of individuals and individual companies.”); Thomas Gangale & Marilyn Dudley-Rowley, *To Build Bifrost: Developing Space Property Rights and Infrastructure*, *AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS* 1 (2005), <http://astrosociology.com/Library/PDF/Submissions/To%20Build%20Bifrost.pdf> (Arguing that if Congress were “to pass ‘land

If there is an interpretation of OST Article II which would allow private property holdings on Mars, it would distinguish between the clearly prohibited, active national appropriation of extraterrestrial property and judicial recognition, enforcement, or *de facto* endorsement of private property rights on other planets. To be sure, a number of scholars interpret Article II permissively,⁷⁰ note a different outcome if an analysis is conducted under a civil law system,⁷¹ or simply call for the unilateral withdrawal by the United States from the OST.⁷² Ignoring the OST cannot be cast as a realistic option when United States' space policy acknowledges the enforceability of Article II.⁷³ Given the current, binding effects of treaties to which the United States is a

claim recognition' legislation legalizing private claims of land in space would be an exercise of state sovereignty, and therefore a violation of international law under the provisions of the Outer Space Treaty."); *see also* Lawrence A. Cooper, *Encouraging Space Exploration Through a New Application Of Space Property Rights*, 19 SPACE POLICY 111, 112 (2003) ("Some have argued that OST's broad definitions allow individual appropriation of space and celestial bodies because it only specifically prohibits appropriation by States; however, States are responsible for the actions of individuals, and property claims must occur through the State's property laws.").

70. *See, e.g., Interpreting Article II, supra* note 62, at 351 (advancing the argument that the OST "appears to contain no prohibition regarding individual appropriation"); *but see* D. O'Donnell & N. Goldman, *Astro Law as Lex Communis Spatialis*, 40th Colloquium on the Law of Outer Space 322, 322 (1997) (*contra*); *see also* Pop, *supra* note 67, at 66-72 (identifying three additional possible conclusions: that under the OST private appropriation is permitted (but unenforceable) outside the "sphere of sovereignty", that private appropriation is permitted under "individual sovereignty," or under "international sovereignty" (e.g., the United Nations)). Professor Rhett Larson, from ASU's Sandra Day O'Connor College of Law, has posited—with regards to Martian water rights—that the United Nations be "designated as the trustee of extraterrestrial water for purposes of determining beneficial use, with the International Court of Justice adjudicating disputes over those water rights." Rhett Larson, *If There is Water on Mars, Who Get to Use It?*, SLATE.COM (Nov. 2, 2015), http://www.slate.com/articles/technology/future_tense/2015/11/the_tricky_question_of_water_rights_on_mars.html.

71. "Aboriginal title" (in civil law jurisdictions) and "udal land" (in the Orkney and Shetland Islands) is not subject to title held by or originating in the Crown whereas allodial land does.

72. *E.g.,* Wasser & Jobs, *supra* note 27, at 43-77; OST, *supra* note 5, art. XIV (allowing State parties to denounce the treaty with one year's notice); Andrew R. Brehm, Note, *Private Property in Outer Space: Establishing a Foundation for Future Exploration*, 33 WIS. INT'L L.J. 353, 364-65 (2015) (noting the international political consequences and the negative precedential impact of unilateral withdrawal).

73. FEDERAL AVIATION ADMINISTRATION, OFFICE OF COMMERCIAL SPACE TRANSPORTATION, National Space Policy of the United States of America 3 (2010), http://www.faa.gov/about/office_org/headquarters_offices/ast/national_space_policy/media/national_space_policy.pdf. (U.S. policy states: "As established in international law, there shall be no national claims of sovereignty over outer space or any celestial bodies. The United States considers the space systems of all nations to have the rights of passage

party, the text of Article II is unclear as to whether a court would recognize the assertion of private property rights on Mars under a rubric contemplating government appropriation as a precondition to private ownership.⁷⁴

Invoking treaty provisions as a defense or to support a claim in a dispute between private parties is unorthodox, but not unheard of.⁷⁵ In *Nemitz v. United States*, the Ninth Circuit Court of Appeals rejected a *pro se* plaintiff's assertion of property rights in an asteroid on which NASA had landed the spacecraft NEAR in 2001.⁷⁶ The court did not squarely address the Article II problem

through, and conduct of operations in, space without interference. Purposeful interference with space systems, including supporting infrastructure, will be considered an infringement of a nation's rights." This provision is a clear nod to Article II (providing that celestial bodies [are] not subject to national appropriation by claim of sovereignty) but U.S. policy substitutes the OST's ban on national *appropriation* with a ban on "claims of sovereignty." *Id.* (emphasis added). See also OST, *supra* note 5, art. II. Interestingly, Article II tracks the language proposed originally by U.S. negotiators while the 2010 National Space Policy language more closely resembles the Soviet Union's rejected proposal: "[s]overeignty over . . . celestial bodies cannot be acquired"). Position Paper, *supra* note 38, attachment A at 1.

74. U.S. CONST. art. VI, cl. 2 (By constitutional mandate, all treaties entered into by the United States become "the supreme Law of the Land."); see also, e.g., *Medellin v. Texas*, 552 U.S. 491, 505 (2008) (quoting *Foster v. Neilson*, 27 U.S. (2 Pet.) 253, 315 (1829) (Marshall, C.J.), *overruled on other grounds in United States v. Percheman*, 32 U.S. (7 Pet.) 51 (1833) ("[A] treaty is 'equivalent to an act of the legislature,' and hence self-executing, when it 'operates of itself without the aid of any legislative provision.'"); *Air France v. Saks*, 470 U.S. 392, 399 (1985) (holding that courts must give "the specific words of the treaty a meaning consistent with the shared expectations of the contracting parties").

75. See, e.g., Stefan Ohlhoff & Hannes Schloemann, *Transcending the Nation State? Private Parties and the Enforcement of International Trade Law*, 5 MAX PLANCK YEARBOOK OF UNITED NATIONS LAW 675, 679 (J.A. Frowein & R. Wolfrum, eds. 2001) (Tracing "the various angles from which private parties can take part in, or influence, the operations of international trade law."); MICHAEL JOHN GARCIA, CONG. RESEARCH SERV., RL32528, INTERNATIONAL LAW AND AGREEMENTS: THEIR EFFECT UPON U.S. LAW 1, 1 (2015) ("Since its inception, the United States has understood international legal commitments to be binding upon it both internationally and domestically."); see also David Sloss, *The Constitutional Right to a Treaty Preemption Defense*, 40 TOL. L. REV. 971, 995 (2009) ("[T]here are a fairly broad range of circumstances where defendants in state criminal trials could plausibly invoke international human rights treaties to challenge the validity of state criminal laws."); Reporters' Memorandum, RESTATEMENT (FOURTH) OF THE FOREIGN RELATIONS LAW OF THE UNITED STATES JURISDICTION, Tentative Draft No. 1 (March 31, 2014) ("[W]e want to be as clear as possible about the distinction between domestic policy and practice, on the one hand, and international law, on the other."). The Fourth Restatement of the Foreign Relations Law of the United States is currently being undertaken by the American Law Institute primarily to address the distinction between domestic and international law, such as in the area of foreign judgments. *Id.*

76. *Nemitz*, 2004 WL 3167042 (D. Nev. 2004), *aff'd*, 126 Fed.Appx. 343 (9th Cir. 2005); see Defendants' Motion to Dismiss and Memorandum in Support Thereof, *Nemitz v.*

described here. However, the court did note that the OST did not *create* rights in individuals to appropriate private property rights in outer space.⁷⁷

Granted, the language of the OST speaks in terms of hazy principles when it comes to non-appropriation, but a serious problem for private property rights is nevertheless presented in view of the non-appropriation language and common law property theorems that assume appropriation as a prerequisite to private ownership.⁷⁸ Some scholars assert that private property rights in anything other than stations and supplies brought from Earth are simply unachievable under the OST.⁷⁹ After careful consideration of the issue, Virgiliu Pop, in *Who Owns the Moon?* concluded:

Appropriation of land can exist outside the sphere of sovereignty, but its survival is dependent upon endorsement from a sovereign entity. As the Outer Space Treaty prohibits the national appropriation of outer space and celestial bodies, a State endorsement would be interpreted as a means of national appropriation—hence it would be unlawful *de lege lata*.⁸⁰

Yet, the OST stops short of specifically prohibiting state parties to the treaty from recognizing, endorsing, defining, or sanctioning private property rights. Had the drafters of the treaty desired to prohibit the development of any private property rights in celestial body realty, they could have easily done so.⁸¹

United States, 126 Fed.Appx. 343 (9th Cir. 2005) (No. CV-N-03-00599-HDM-(RAM)), 2004 WL 3703798 [hereinafter Defendants' Memorandum] ("Plaintiff's claim of ownership [wa]s founded primarily on a web-based registry which disclaims any ownership of the celestial bodies it purports to register." *Id.* ("In effect, plaintiff's claim ha[d] no more legitimacy than one based on simply pointing to a distant star and declaring exclusive ownership of it.")).

77. See *Nemitz*, 2004 WL 3167042, at *2; see also Defendants' Memorandum, *supra* note 76, at 7 (The government had emphasized that property rights "are created and their dimensions are defined by existing rules or understandings that stem from an independent source such as state law.") (citation omitted). Perhaps significantly, the government did not rest any of its arguments on the OST's non-appropriation language.

78. OST, *supra* note 5, art. II.

79. *E.g.*, Darwin, *supra* note 36, at 282 ("[The] term 'appropriation' . . . can certainly be used of States taking title in international law as well as individuals taking title in municipal law.").

80. Pop, *supra* note 67, at 72; compare Ryan O'Donnell, Comment, *Staking a Claim in the Twenty-First Century: Real Property Rights on Extra-terrestrial Bodies*, 32 U. DAYTON L. REV. 461, 481 (2007) (arguing that private ownership of the moon is not necessarily barred by the OST).

81. See discussion *infra* Section II Part (B)(3)(b) (comparing more expansive language in the unratified "Moon Agreement" which clearly prohibits private ownership of Martian real property).

Were a judge faced with a dispute over Martian real property between two parties over whom the court had personal jurisdiction, it seems unlikely that the court would find Pop's conclusion to be convincing where the result would leave the parties to their own devices in resolving their claims. Instead, the court would consider the plain language of the OST.⁸² The OST does not clearly prohibit the courts of states party to the treaty from resolving property disputes between one another; rather, it prohibits national appropriation of that property.⁸³ Nor does the OST identify lawlessness and anarchy in terms of private property disputes as one of its goals.⁸⁴ Therefore, Earth-based courts will likely attempt to resolve property disputes as they arise on Mars, as long as in doing so they can avoid doing umbrage to the OST.⁸⁵

An analogue can be found in the legal approaches currently undertaken with regard to extraterritorial seabed mineral rights. The United Nations Convention on the Law of the Sea (UNCLOS or the Law of the Sea treaty) was rejected by the United States on account of Article XI, which created an international authority over seabed mineral rights and declared the seabed to be held for the "common heritage of mankind." By comparison, the OST declares that "celestial bodies . . . shall be the province of all mankind."⁸⁶ Maltese diplomat and professor, Avrid Pardo, who is known as the "Father of the Law of the Sea Conference," characterized the common heritage language in UNCLOS "as a socialist concept."⁸⁷ Rather than bind itself to UNCLOS, the

82. See Vienna Convention on the Law of Treaties, art. 31, May 23, 1969, 1155 U.N.T.S. 331 ("A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in light of its object and purpose.").

83. OST, *supra* note 5, art. II.

84. See OST, *supra* note 5, art. VI (requiring state parties to authorize and supervise "non- governmental entities in outer space, including the moon and other celestial bodies"); see also *id.* at art. VIII (Mandating that "[a] State Party to the Treaty on whose registry an object launched into outer space is carried [to] retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body."); *Beattie v. United States*, 756 F.2d 91, 100 (D.C. Cir. 1984) (holding Antarctica not to be a "foreign country" within the meaning of the foreign country exception to the Federal Tort Claims Act), *holding reversed in Smith v. United States*, 507 U.S. 197 (1993) ("[T]he basic principle is that in the sovereignless reaches of outer space, each state party to the treaty will retain jurisdiction over its own objects and persons.").

85. See O'Donnell & Goldman, *supra* note 70, at 325 (applying common law doctrines to an application of the Outer Space Treaty).

86. OST, *supra* note 5, art. I.

87. Jennifer Frakes, *The Common Heritage of Mankind Principle and the Deep Seabed, Outer Space, and Antarctica: Will Developed and Developing Nations Reach a Compromise?*, 21 WIS. INT'L L.J. 409, 419 n. 68 (2003).

United States adopted the Deep Seabed Hard Mineral Resources Act.⁸⁸ The law of the sea holds that no country may “subject the high seas to its sovereignty” or “appropriate any part of the high seas.”⁸⁹ Without exercising or extending its sovereignty to extraterritorial deep sea bed properties, the United States may, and does, in fact, authorize private companies to explore and exploit mineral resources in the sea bed beyond the limits of its national jurisdiction.⁹⁰

As the United States begins to recognize the inadequacy of its existing regulatory regime for private exploration and exploitation of celestial bodies and the moon, the Deep Seabed Hard Mineral Resources Act may serve as a template for government licensing of extraterrestrial property use rights.⁹¹ However, two central precepts of the Act’s construction of user rights far beneath the ocean’s surface do not fit well with the anticipated expectations and needs of settlers on the Martian surface, however.⁹² First, the broad non-exclusivity of deep seabed mineral rights will not transfer well to Martian

88. 30 U.S.C. § 1401 (2015) (The Act itself does recite the “common heritage” language); 30 U.S.C. § 1417 (2015) (The Act authorizes ten year licenses for exploration and twenty year licenses for exploitation of sea bed minerals); *see* 30 U.S.C. § 1402(b)(1) (2015) (encouraging the Secretary of State “to negotiate successfully a comprehensive Law of the Sea Treaty which, among other things, provides assured and nondiscriminatory access to the hard mineral resources of the deep seabed for all nations, gives legal definition to the principle that the resources of the deep seabed are the common heritage of mankind, and provides for the establishment of requirements for the protection of the quality of the environment.”).

89. RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE UNITED STATES § 521 cmt. a (1987); *see also id.* § 523(1)(a) (“Under international law, no state may claim or exercise sovereignty or sovereign or exclusive rights over any part of the sea-bed and subsoil beyond the limits of national jurisdiction, or over its mineral resources, and no state or person may appropriate any part of that area.”); 30 U.S.C. § 1402(a)(2) (2015) (confirming that the U.S., in licensing private mining operations, does not “assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of” any extraterritorial sea bed areas).

90. RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE UNITED STATES § 523(1)(b)(i), (2) (1987). Licensed sea bed “miners are obliged not to interfere with activities of other uses of the sea, and other users are obliged not to interfere with mining so long as a particular area is actually used for mining operations.” *Id.* cmt. b. Any claim by a private company “that it has begun a mining activity and can, therefore, exclude others, must be limited in scope, area and duration to the extent strictly necessary.” *Id.* As early as 1984, the U.S. had granted four licenses for deep sea bed exploration. 49 Fed. Reg. 35973-74, 44938, 48205 (1984).

91. *See infra* notes 100-02 and accompanying text.

92. *See* 30 U.S.C. § 1403(4) (defining the “deep seabed” as “(A) the Continental Shelf of any nation; and (B) any area of national resource jurisdiction of any foreign nation, if such area extends beyond the Continental Shelf of such nation and such jurisdiction is recognized by the United States.”).

settlers' needs.⁹³ Although the OST lowers the bar on the right to exclude with regard to diplomatic visits to stations and installations, it otherwise allows exclusivity, permitting the settlers to put lands to appropriate uses without interference from other settlers.⁹⁴ Thus, surface occupation of Mars demands a different rubric than mining deep below any ship traffic. Second, the inalienability of deep seabed mineral rights, if applied to Mars, would remove the efficiencies of allowing the settlers to barter, license, exchange, or sell their rights to other Martian settlement organizations.⁹⁵ What will be needed on Mars is something more than a mere use license, as is provided by the Deep Seabed Hard Mineral Resources Act; something approximating or achieving fee ownership will be required. Before examining possible solutions, the second major OST problem in Article I should also be considered.

3. The Article I Common Use Problem

Article I of the OST, it will be recalled, guarantees that “the exploration and use” of “celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.”⁹⁶ The proclamation that celestial worlds “shall be the province of all mankind” runs counter to the idea that one or more persons could assert exclusive control and enjoyment of

93. See 15 C.F.R. § 971.403(a) (2015) (Providing that before a recovery permit can be issued to the deep seabed, “the Administrator must find the recovery proposed in the application will not unreasonably interfere with the exercise of the freedoms of the high seas by other nations, as recognized under general principles of international law.”); RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE UNITED STATES § 523(1)(b)(i), (2), cmt. b (1987) (providing that licensed seabed “miners are obligated not to interfere with activities of other uses of the sea”); HUGO GROTIUS, *THE FREEDOM OF THE SEAS* 30 (Oxford University Press ed. 1916) (1608) (“[T]he sea can in no way become the private property of any one, because nature not only allows but enjoins its common use . . . [but] [i]f any part of these things is by nature susceptible of occupation, it may become the property of the one who occupies it only so far as such occupation does not affect its common use.”). While the deep seabed and the air may be by design “destined for all men,” the surface of Mars suggests private property treatment. *Id.* at 28 (explaining common property treatment justifications for air).

94. OST, *supra* note 5, art. XII.

95. See 30 U.S.C § 1416 (2015) (allowing the government to approve transfers of licenses and to suspend or revoke licenses to the deep seabed); 15 C.F.R. § 971.416 (2015) (detailing license transfer procedures).

96. OST, *supra* note 5, art. I. See also Stephen Gorove, *Freedom of Exploration and Use in the Outer Space Treaty: A Textual Analysis and Interpretation*, 1 DENV. J. INT'L L. & POL'Y 93, 97-100 (1971) [hereinafter *Freedom of Exploration*] (exploring the meanings of the terms exploration and use in Articles I and IV of the OST).

certain parcels of a celestial body like Mars.⁹⁷ There is no exception in Article I for private use, even on a small scale, and the phraseology is eerily similar to Marxist ideologies of “communal ownership for the advancement of the common good.”⁹⁸ That the United States may have committed itself to an entire universe outside the Earth’s outer atmosphere imprinted with a Marxist modulation may be stirring to some and repugnant to others.⁹⁹

Recent official action by the U.S. government suggests that it would resist any narrow reading of Articles I or II of the OST. In February of 2015, Reuters reported that the Federal Aviation Administration (FAA) had approved a payload review request from Bigelow Aerospace to establish a habitat on the moon and to occupy related areas for mining or other uses.¹⁰⁰ Nevada-based Bigelow Aerospace’s founder, Robert Bigelow, noted that the FAA approval doesn’t provide property rights on the moon, but instead means “that somebody else isn’t licensed to land on top of you or land on top of where exploration and prospecting activities are going on, which may be quite a distance from the lunar station.”¹⁰¹ In an aside, the letter identified the United States’ “ill-equipped” regulatory framework for discharging U.S. government obligations under the OST.¹⁰² Some question whether the FAA’s licensing itself violates

97. *But see* Pop, *supra* note 67, at 84 (quoting Daniel Goedhuis, *The problems of the frontiers of outer space and air space*, 174 COLLECTED COURSES OF THE HAGUE ACADEMY OF INTERNATIONAL LAW 367-407 (1982) (arguing that OST Article I’s “province of all mankind” phrase is “legally unsubstantial.”)).

98. *See* Randy Bregman & Dorothy C. Lawrence, *New Developments in Soviet Property Law*, 28 COLUM. J. TRANSNAT’L L. 189, 189 (1990) (Explaining that after the 1917 Bolshevik Revolution, all property other than personal property became socialist property pursuant to “the driving Soviet ideology” of “communal ownership for the advancement of the common good.”).

99. *See, e.g.*, Frank Pearce, Review, *The Failure of Marxism*, 23 J.L. & SOC’Y 580, 581 (1996) (Claiming that Marxists are “peddling a *passé* ideology, an eschatology whose God not merely failed but was stillborn.”).

100. Irene Koltz, *Exclusive - The FAA: regulating business on the moon* (Feb. 3, 2015), <http://www.reuters.com/article/2015/02/03/us-usa-moon-business-idUSKBN0L715F20150203>. The FAA has the authority to license private space flights under federal law. 51 U.S.C. § 509 (2012); *see also* 14 C.F.R. § 415.57(b) (2015) (noting that the FAA consults with other agencies such as NASA, the Department of State and the Department of Defense in reviewing payload requests). Bigelow Aerospace is based on a 50-acre facility in North Las Vegas, Nevada and it “seek[s] to assist human exploration and the discovery of beneficial resources, whether in Low Earth Orbit (LEO), on the moon, in deep space or on Mars.” BIGELOW AEROSPACE, <http://bigelowaerospace.com/about/> (last visited July 15, 2015).

101. Koltz, *supra* note 100.

102. Letter from Dr. George C. Nield, Associate Administrator for Commercial Space Transportation, U.S. Department of Transportation, Federal Aviation Administration to

Article I's property use rule.¹⁰³ A comparison between Article I's common use phrase, Article II's appropriation ban, and the unratified Moon Agreement can benefit a review of the OST's two primary signatories' conduct with regard to moon rocks.

a. Moon Rocks

That Article I of the OST did not work a wholesale socialist re-characterization of all extraterrestrial real property rights can be seen in the historical treatment that the United States and U.S.S.R. have accorded to moon rocks.¹⁰⁴ Both states have treated moon rocks taken from the moon's surface back to Earth as chattels owned by the respective governments, with no objection from either government.¹⁰⁵ In *U.S. v. One Lucite Ball*, the United States successfully sought civil forfeiture of a stolen moon rock.¹⁰⁶ In another case, the United States successfully pursued larceny charges against other thefts involving moon rocks.¹⁰⁷ While the customary treatment of a few moon rocks

Michael Gold, Director of D.C. Operations & Business Growth, Bigelow Aerospace (Dec. 22, 2014) (on file with author); Koltz, *supra* note 100.

103. Leonard David, *Moon Space Law: Legal Debate Swirls Around Private Lunar Ventures* (Feb. 24, 2015), <http://www.space.com/28645-moon-space-law-lunar-legal-debate.html>. Mark Sundahl, associate dean for administration and associate professor of law at Cleveland State University's Cleveland-Marshall College of Law, was quoted as saying that "there is a minority point of view that could call into question whether the extraction of natural resources violates the ban on the assertion of sovereignty over celestial bodies" *Id.*

104. Wasser & Jobs, *supra* note 27, at 63.

105. *Id.* ("The U.S. and Soviet governments resolved the first ambiguity by simply taking Moon rocks and declaring ownership of them.").

106. *United States v. One Lucite Ball Containing Lunar Material (One Moon Rock) and One Ten Inch by Fourteen Inch Wooden Plaque*, 252 F. Supp. 2d 1367 (S.D. Fla. 2003). The rock was retrieved from the lunar surface by NASA astronauts and conveyed as a gift by President Nixon to the government and people of Honduras in 1973. *Id.* at 1369. At some point it was stolen from the presidential palace and ended up in the hands of a retired Honduran colonel who conveyed it to an American at a Miami, Florida airport Denny's restaurant in 1996 in exchange for a total of \$35,000. *Id.* at 1369-70. In September of 2003, NASA presented the moon rock (and plaque) to the Honduran ambassador. Kristine Martens, *United States of America v. One Lucite Ball Containing Lunar Material (One Moon Rock) and One Ten Inch by Fourteen Inch Wooden Plaque*, Case Summary, 13 DEPAUL-LCA J. ART & ENT. L. 465, 479 (2003).

107. See BEN MEZRICH, *SEX ON THE MOON: THE AMAZING STORY BEHIND THE MOST AUDACIOUS HEIST IN HISTORY* (2011) 43-97 (describing how in 2002, Thad Roberts and two other co-op students at NASA's Johnson Space Center stole a number of moon rocks from a safe at the center); see also *United States v. Roberts*, 155 Fed. Appx. 501 WL 3150523 at

is too slender a reed on which to hang a bald assertion that the OST's proclamation of common interests and its ban on national appropriation are nullities, it bears emphasis that the principal parties to the OST have conducted themselves consistently with at least some degree of national appropriation, as well as with separate use and enjoyment of rocks from the moon. No attempt has ever been made to hold moon rocks retrieved from the moon as "the province of all mankind" and deposited with the U.N. or some other international body, as the OST seemingly commands.¹⁰⁸ These customs can inform the interpretation of the OST.¹⁰⁹ They suggest that the ban on appropriation and the province of all mankind principle admit some degree of private, exclusive and alienable property rights.

b. The Moon Agreement

That the scope of the OST points towards quasi-socialist real property compartmentalization but stops short of pure socialist precepts can be seen by comparing the OST provisions to those of the Moon Agreement, which flatly prohibits ownership of extraterrestrial realty by any person.¹¹⁰ The 1979 Moon Agreement clearly institutes a non-ownership regime; it bars ownership of much extraterrestrial property by "any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity *or of any natural person.*"¹¹¹ Moreover, it codifies the principle of "common heritage" to the moon and other celestial bodies in our solar

*508-09 (11th Cir. 2005) (affirming a 90-month sentence and an eight-level upward departure under the federal sentencing guidelines for Roberts).

108. *Cf.* Black Hills Inst. of Geological Research v. S.D. Sch. of Mines and Tech., 12 F.3d 737, 742 (8th Cir. 1993) (holding a partially buried tyrannosaurus rex fossil to be realty and not personal property prior to severance); *but see* Or. Iron Co. v. Hughes, 81 P. 572, 574 (Or. 1905) (holding an unburied meteorite to be real property and not personal property in the absence of severance).

109. *See* RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE UNITED STATES § 102(2) (1987) ("Customary international law results from a general and consistent practice of states followed by them from a sense of legal obligation."); V.S. Vereshchetin & G.M. Danilenko, *Custom as a Source of International Law of Outer Space*, 13 J. SPACE L. 22, 33-34 (1985) (rejecting the assertion that "the principle of the common heritage of mankind" as "an emerging rule of customary international law").

110. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies art. 11, para. 3, 18 I.L.M. 1434 (1979) [hereinafter the Moon Agreement].

111. *Id.* (emphasis supplied); *see also* Pop, *supra* note 67, at 64, (quoting Provision U, Association of the Bar of the City of New York (1960)) (recommending—prior to the OST—that celestial bodies "not be subject to exclusive appropriation by *any person*") (emphasis supplied).

system.¹¹² The United States has not signed the Moon Agreement, nor has any major space power.¹¹³ Thus, it is considered dormant by most space lawyers.¹¹⁴

The Moon Agreement's express prohibition of Martian real property ownership by anyone and its "common heritage" command can be contrasted with the OST's requirement that the use of celestial bodies be "carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind."¹¹⁵ Read alongside the Moon Agreement, it is evident that the OST's property use proclamation stops short of prohibiting private property ownership on other planets. While the Moon Agreement would outlaw exclusive ownership of extraterrestrial property by anyone, the OST does not. However, Article I of the OST speaks to use limitations in a broad sense.¹¹⁶ Use

112. Moon Agreement, *supra* note 110, art. 11; *see also* Stephen Gorove, *Exploitation of Space Resources and the Law*, 3 PUB. L. FORUM 29, 33 (1984) [hereinafter Gorove, *Exploitation*] (describing the OST's "province of mankind" phraseology as "more general and elusive" than the Moon Agreement's "common heritage" provision); *see also id.* at 32 (in the context of drafting the Moon Agreement, "the United Nations Committee on the Peaceful Uses of Outer Space implicitly took the position that, under Article II of the Outer Space Treaty, the prohibition of national appropriation did not apply to natural resources.").

113. Kleiman, *supra* note 31, at 139.

114. *Id.* at xiv; *but see* Reinstein, *supra* note 35, at 67 ("The characteristic hermeneutic arising from 'fear by the have-not nations' is to read the phrase ["for the benefit . . . of all countries" in the OST] in light of the Moon Treaty."). That is, some "who hold this interpretive position, hostile to private property rights and national sovereignty in space," read the widely ratified OST and the generally rejected Moon Agreement in concert in reaching a concentrated socialist view of extraterrestrial real property. *Id.*; *see, e.g.*, Carol R. Buxton, *Property in Outer Space: The Common Heritage of Mankind Principle vs. the "First in Time, First in Right" Rule of Property Law*, 69 J. AIR L. & COM. 689, 699 (2004) ("As with the Outer Space Treaty, the common heritage ideal materializes [in the Moon Agreement], coated at times in the 'province of all mankind' language."). *See also, e.g.*, Blake Gilson, Note, *Defending Your Client's Property Rights in Space: A Practical Guide for the Lunar Litigator*, 80 FORDHAM L. REV. 1367, 1385 (2011) (noting that some believe that "the common heritage of mankind doctrine" in the Moon Agreement originated in the "province of all mankind" language in the OST); *but see* David Tan, *Toward a New Regime for the Protection of Outer Space as the "Province of All Mankind,"* 25 YALE J. INT'L L. 145, 162 (2000) (emphasizing "that the concept of the 'province of all mankind' is not to be equated or confused with the notion of the 'common heritage of mankind.'").

115. OST, *supra* note 5, art. I.

116. *See* OST, *supra* note 5, art. I (stating that the "use of outer space . . . shall be carried out for the benefit and in the interests of all countries") (emphasis supplied); *id.* art. II (stating: "Outer space . . . is not subject to national appropriation by claim of sovereignty, by means of use . . .") (emphasis supplied). "It is reasonable to assume that there will be many types of uses" in outer space and "[s]uch uses may cover a wide range of activities, including economic, scientific, military," etc. *Freedom of Exploration, supra* note 96, at 98. "Some of

limitations and ownership are not necessarily antagonistic to each other; for example, governments regulate the use of private property on a widespread basis, especially through environmental and zoning laws.¹¹⁷ The question remains, however, just how the courts would effectuate the OST's requirement that the use of Martian land benefit "the province of all mankind" and its directive against national appropriation by "any means."¹¹⁸ As the source of this language seems more rooted in Marxist thinking than Keynesian thinking, an examination of Marxist—and especially Soviet-Marxist—property principles can illuminate the issue further. This examination will demonstrate that Soviet principles are not necessarily injurious to the kinds of property rights that Martian settlers will require and that Soviet law considered property ownership separately from the most important incidents of ownership—alienability, use, and exclusivity.

c. Soviet Property Principles

Following is an overview of how socialist property principles were applied in historical context in the former Soviet Union.¹¹⁹ This overview, considered against the language of the OST, points in the direction of a treaty permeated neither by outright capitalist property principles, nor by Marxist ones, but at least quasi-socialist or hybridized thinking; this is especially clear with regard to the particular provisions of Articles I and II under analysis here.¹²⁰ Such a

these activities or uses are specifically outlawed [by the OST], while others are specifically "not prohibited." *Id.*

117. See Roy P. Cookston & Burt Bruton, *Zoning Law*, 35 U. MIAMI L. REV. 581, 588 (1981) (noting that "contract zoning, conditional zoning, incentive zoning, floating zones, planned unit developments, and variances [are] flexible methods that local governments use"); Robert L. Glicksman, *From Cooperative to Inoperative Federalism: The Perverse Mutation of Environmental Law and Policy*, 41 WAKE FOREST L. REV. 719, 800 (2006) (observing a "flurry of state and local activity [which] provided an opportunity to achieve a new level of cooperation among federal, state, and local actors in the pursuit of a cleaner, healthier environment and the protection of a stock of natural resources . . .").

118. OST, *supra* note 5, art. I, II.

119. See also Eilene Galloway, *The United States and the 1967 Treaty on Outer Space*, Proceedings of the 40th Colloquium on the Law of Outer Space 18 (1997) ("The [OST] should not be analyzed merely from the date it went into force because the Treaty was actually 10 years in the making . . .").

120. Those provisions which the Soviet Union had wanted included in the OST but which were rejected were the "prohibition of use of outer space for propaganda of war, national or racial hatred and enmity among peoples" and "that only States were allowed to undertake all activity in outer space" so as to "prohibit the use of satellites for military reconnaissance." Yuri Kolosov, *The USSR and the 1967 Treaty on Outer Space*, Proceedings of the 40th Colloquium on the Law of Outer Space 14, 15 (1997).

view is consistent with the historical origins of the OST, which certainly represented the product of a contentious compromise between competing ideologies and worldviews.¹²¹ Regardless of whether the OST is colored by a Marxist or Soviet worldview of extraterrestrial real property, materialist legal principles can readily accommodate an appropriate, sustainable economic model of property rights in the first phase of permanent human settlements on the surface of Mars.¹²²

While Marxist theory in the abstract calls for the wholesale abolition of private property, in practice, the Soviet Union allowed for variable use paradigms, some of which mimicked corporate, cooperative, nonprofit, and even individual ownership rights in a Western context.¹²³ For example, cooperatives or collectives essentially owned a great deal of property. Individuals held other limited tracts, at least with regards to non-productive personal use property. A thumbnail sketch of Soviet property principles

121. See *supra* notes 43-45 and accompanying text; see also Kolosov, *supra* note 120, at 17 (noting that the OST “was ‘the result of direct cooperation between the United States and the Soviet Union.’”) (citation omitted).

122. This is not to suggest that 1960’s Soviet legal frameworks generally provide an attractive model for environmental regulations. See Elena N. Nikitina & Peter H. Pearse, *Conservation of Marine Resources in the Former Soviet Union: An Environmental Perspective*, 23 OCEAN DEV. & INT’L L. 369, 373 (1992) (“The Soviet system depended on extensive use of natural resources, which according to Marxian doctrine had no inherent value.”); but see JOHN BELLAMY FOSTER, MARX’S ECOLOGY 9 (2000) (“[E]ven many of Marx’s most virulent critics have been forced to admit of late that his work contains numerous, remarkable ecological insights.”). Foster explains that Lenin believed that “scientific management of natural resources in accord with the principles of conservation, was essential.” *Id.* at 243; accord, W.E. BUTLER, SOVIET LAW 252 (1983) (Claiming that Marxist-Leninism links environmental protection with “the optimal harmonious relationship between man and nature.”). However, under Stalin, “conservationists were increasingly attacked for being ‘bourgeois.’” Foster, *supra* note 122, at 243. “By the late 1930s the Soviet conservation movement had been completely decimated.” *Id.* at 244.

123. Although pre-Soviet Marxism was greatly concerned with certain types of property ownership, it “eschew[ed] serious consideration of law as a system or as a social institution.” Eugene Kamenka, *Marxism, Economics and Law*, 1981 BULL. AUSTRALIAN SOC’Y LEGAL PHIL. 14, 18 (1981); see also Harold J. Berman, *Soviet Property in Law and in Plan (With Special Reference to Municipal Land and Housing)*, 96 U. PA. L. REV. 324, 324 (1948) (noting that state ownership of property and centralized planning in Soviet Russia “meant ultimately the end of *all* ownership, the end of *all* law”) (emphasis in original). Marx himself “wrote almost nothing extended or systematic about law” Kamenka, *supra* note 123, at 19. He viewed the extermination of property more from a personal development viewpoint than a legal one. See Karl Marx, *Private Property and Communism* 4 (1844), <http://marx.eserver.org/1844-ep.manuscripts/3rd.manuscript/2-property.commu.txt>. (“Private property has made us so stupid and one-sided that an object is only ours when we have it” . . . the [abolition] of private property is therefore the complete emancipation of all human senses”).

follows, detouring neatly around the greater part of the miasma comprised of a surprising variety, dynamism, and evolution of property paradigms in the Union of Soviet Socialist Republics between the 1917 Revolution and the dissolution of the Soviet Union in 1991.¹²⁴ Even granting an enforceable socialist or Soviet tonality to Martian property, common law precepts will be capable of finding principled outcomes to the projected first phrase of property disputes between rival settlement organizations on the planet's surface.

In its broadest strokes, Marxist thought calls for the eradication of all forms of private property.¹²⁵ Karl Marx proclaimed that “the theory of the Communists may be summed up in the single sentence: Abolition of private property.”¹²⁶ Yet just three sentences later, Marx allowed that individuals may retain rights to “self-acquired, self-earned property.”¹²⁷ Household effects or personal use property, for example, were exempt from the communist consolidation of property, since Marxism was concerned primarily with the means of production, not property generally.¹²⁸ Private individuals could retain private property unconnected with a means of production.¹²⁹ But if one

124. See generally, JOHN N. HAZARD, ISAAC SHAPIRO & PETER B. MAGGS, *THE SOVIET LEGAL SYSTEM* 178-80 (rev. ed. 1969) [hereinafter Hazard] (highlighting the variations and complexity of Soviet property law).

125. See, e.g., D.I. Kurskii, *Ob osnovnykh imushchestvennykh pravakh* (About Basic Property Rights), in D.I. Kurskii, *Izbrannye stat'i i rechi* (Selected Articles and Speeches), Moscow 88-89 (1948), in IDEAS AND FORCES, *supra* note 56, at 122 (“We know immovable property only as property belonging to the state This is the first proposition of law.”). Compare JOHN CHRISTMAN, *THE MYTH OF PROPERTY: TOWARD AN EGALITARIAN THEORY OF OWNERSHIP* 40 (1994) (“capitalism can be equated with a private property economy”). “More generally, it is an economic system in which the productive resources available in the society are owned by individuals (or individual-like entities) and used to maximize the profit of those owners” *Id.*

126. KARL MARX, *CAPITAL AND OTHER WRITINGS OF KARL MARX* 335 (The Modern Library 1932) [hereinafter WRITINGS OF KARL MARX].

127. *Id.* at 337 (“You are horrified at our intending to do away with private property. But in your existing society private property is already done away with for nine-tenths of the population; its existence for the few is solely due to its non-existence in the hands of those nine-tenths. You reproach us, therefore, with intending to do away with a form of property In one word, you reproach us with intending to do away with your property. Precisely so: that is what we intend Communism deprives no man of the power to appropriate the products of society: all that it does is to deprive him of the power to subjugate the labor of others by means of such appropriation.”).

128. See Peter B. Maggs, *The Security of Individually-Owned Property under Soviet Law*, 1961 DUKE L.J. 525, 525-26 (1961) (noting that Soviet citizens may own cash, bonds and bank deposits in unlimited amounts, may own consumed goods, private housing, and even income from patents and copyrights).

129. See *id.* at 527 (noting that Soviet law allowed items like livestock to be owned privately although their use “for the production of unearned income is severely restricted”).

employs one's personal property as a means to acquire passive income, the personal property characteristics of the chattel or realty in question would be lost.¹³⁰

Property other than personal use property or the fruits of one's labors (e.g., wages) was principally—though not exclusively—held as State property in the Soviet Union.¹³¹ Other non-personal varieties of socialist property included “cooperative property and the property of social organizations.”¹³² A fourth category—anything other than means-of-production property, or, in Marx's terms, bourgeois private property¹³³—rounds out a thumbnail sketch of the Soviet property law principles which relied less on ownership distinctions than use rights and economic centralized administration.¹³⁴ Each of the four primary varieties of property recognized in the Soviet Union is described briefly below.

State property was property owned and directly controlled by the government, or, in the words of the Soviet constitution, by “all the people.”¹³⁵ State ownership of land formed the basis of U.S.S.R. land law.¹³⁶ Nearly ninety percent of the fixed productive assets in the Soviet Union were held as state property.¹³⁷ State property included forests, waters, minerals, and “the basic means of production in industry”¹³⁸ The national Soviet government had alienation powers in state property; it could transfer the right to use state

130. See D.F. Eremeev, *Pravo lichnoi sobstvennosti* (Law of Personal Property) 68 (1958), in IDEAS AND FORCES, *supra* note 56, at 281 (describing the “Case of Poliakov” who was awarded a car for his efforts as a worker at an automobile plant but was unsuccessful in his attempts to rent it out because in doing so “Poliakov had turned the car into a source of nonlabor income.”).

131. Bregman & Lawrence, *supra* note 98, at 137; see also KONSTITUTSIIA SSSR arts. 11, translated in USSR: SIXTY YEARS OF THE UNION 1922-1982, at 300 (1982) [hereinafter KONST. SSSR].

132. Bregman & Lawrence, *supra* note 98, at 190.

133. WRITINGS OF KARL MARX, *supra* note 126, at 335.

134. Berman, *supra* note 123, at 330 (“The property law thus elaborated is distinguished by the fact that the rights of possession, use and disposition assigned to state business enterprises are derived not from ownership but from economic administration.”); Hazard, *supra* note 124, at 383 (In abolishing private ownership of things capable of being used to produce income, “while it vested title to all land in the state, gave rise to the development of a whole new series of property relationships based on use rather than ownership.”).

135. KONST. SSSR, *supra* note 131, art. 11.

136. Preamble, Fundamental Principles of Land Legislation of the U.S.S.R. and the Union Republics (1968), reprinted in Hazard, *supra* note 124, at 182. “All land in the U.S.S.R. constitutes a single state land fund.” *Id.* part I, art. 4, reprinted in Hazard at 183.

137. Bregman & Lawrence, *supra* note 98, at 191.

138. *Id.*

property to other legal entities.¹³⁹ For example, use rights could be transferred to organizations that produced goods or performed services.¹⁴⁰ Day-to-day control could be exercised by an assignee of state property, even while Moscow maintained nominal ownership and ultimate oversight.¹⁴¹

A second form of real property in the former Soviet Union was cooperative property. Cooperatives were public organizations (such as creative unions or scientific societies) formed by individual workers or farmers.¹⁴² Land—including means-of-production property—could be allocated to cooperatives in perpetuity without a fee, giving the cooperatives something approaching Western ownership rights in the form of rights of operative management.¹⁴³ Two different kinds of cooperatives were recognized.¹⁴⁴ With housing cooperatives, if a member withdrew, his or her share could be redeemed for cash.¹⁴⁵ With collective farms and producer and consumer cooperatives, the cooperative or collective held the property use rights subject to control oversight by central planning agencies.¹⁴⁶

A farm collective as an entity received a certified deed to its acreage in perpetuity (although the government retained ownership).¹⁴⁷ The farming entity lacked the powers to encumber, barter, or even rent the land.¹⁴⁸ Members of a farm collective had no right to withdraw any tracts once they were contributed to the entity.¹⁴⁹ Income would be distributed among members of a collective in proportion to their contributions in labor.¹⁵⁰ Each household in a collective farming entity was typically also assigned up to about two and one-half acres as

139. *Id.*

140. *Id.*

141. *Id.*

142. *Id.*; Hazard, *supra* note 124, at 289 (“The majority of communists in Lenin’s time wanted to abolish cooperatives and go over to state production and state distribution, but Lenin restrained them.”).

143. KONST. SSSR, *supra* note 131, art. 12.

144. Bregman & Lawrence, *supra* note 98, at 192.

145. *Id.* (A housing cooperative was referred to as a *dacha* cooperative).

146. *Id.* at 192 n.23 (Members of consumer cooperatives were required to pay an initial fee and regular dues and upon ceasing to be a member, the individual received their dues and a portion of the profits).

147. VLADIMIR GSOVSKI, SOVIET CIVIL LAW: PRIVATE RIGHTS AND THEIR BACKGROUND UNDER THE SOVIET REGIME 102 (1948).

148. *Id.*

149. *Id.*

150. *Id.* at 103.

a private plot as well as a limited amount of livestock to be held and privately managed separately by the household.¹⁵¹

Property held by social organizations and trade unions constitutes the third form of property recognized in the Soviet Union.¹⁵² Soviet social organizations were akin to American tax-exempt entities insofar as they were formed for social, cultural, scientific, and other non-economic purposes.¹⁵³ Technically, property held by social organizations was held by the system of social organizations as a whole, but in practice, the operative management rights of the particular organization could be equated with the same rights of operative management as those held by collectives and cooperatives.¹⁵⁴

A fourth form of land use rights recognized in the Soviet Union was private ownership.¹⁵⁵ Individuals enjoyed personal ownership in “their incomes from work and of their savings, of their dwelling-houses and subsidiary household economy, their household furniture and utensils and articles of personal use and convenience, as well as the right of inheritance of personal property of citizens.”¹⁵⁶ More relevant to our inquiry of real property rights, the U.S.S.R. abolished private ownership of homes in 1918, only to return them to their former owners in 1921.¹⁵⁷ By 1948, individuals were allowed to purchase or construct a residential home on their personal property, and plots were allocated “for an indefinite time, i.e., in perpetuity.”¹⁵⁸ Possession, use rights, and alienability of homes were all permitted.¹⁵⁹ Individuals could even

151. *Id.* at 105 (“Within the new collective farming, an old-fashioned family farming continues to exist.”). “The relations between collective farming and the private farming within it, are far from settled.” *Id.* Three separate models for farming can be identified: collectivized land but retention of privately owned equipment and livestock; a “commune” where members worked without pay, dined at a common table, lived in communal housing, and essentially all private property was abolished; and an “artel” where members worked at a social sector of a farm but retained a personal plot, equipment and livestock. Butler, *supra* note 122, at 238 (“All three models were structured as voluntary self-governing entities that divided, after meeting obligations to the State or creditors, their proceeds (or losses) among the members.”).

152. Bregman & Lawrence, *supra* note 98, at 193.

153. *Id.*

154. *Id.*

155. Berman, *supra* note 123, at 325-26.

156. *Id.* at 325 n. 6 (quoting U.S.S.R. CONST. art. X (1936)).

157. Samuel Kucherov, *Property in the Soviet Union*, 11 AM. J. COMP. L. 376, 376-77 (1962). The land remained nationalized, and the owners regained “possession only of the buildings but could use the plots on which the building rested.” *Id.* at 377.

158. *Id.* at 385.

159. Hazard, *supra* note 124, at 384. However, a seller could not sell more than one private home in any three year period. See Gsovski, *supra* note 147, at 107.

mortgage their homes.¹⁶⁰ The land itself belonged to the government, however.¹⁶¹

Three points emerge from the foregoing sketch of Soviet property principles in historical context. First, focusing exclusively on the question of ownership of real property fails to take account of the fact that Soviet property law was less concerned with ownership than use rights and central planning. The second point is that some degree of private property was, in fact, permitted, and seems to have been permitted more by Marx than by the U.S.S.R. Private property was restricted to personal use, household, and modest set-asides of farming property, but possession and enjoyment by cooperatives and collectives of productive property was also encouraged. Third, the law of property in the Soviet Union was not static; it was variable and responsive to needs and social forces over time.¹⁶² In short, Soviet real property principles—even if given full force under a reading of the OST—can make room for the initial needs of Martian settlement groups. Some preliminary precepts that can accommodate the vague, yet socialist-sounding, provisions of the OST will now be outlined.

C. *Potential Solutions and Proposals*

Any solutions to the OST Article I and Article II problems should hew as closely as possible to the non-appropriation and common use text, thus minimizing the possibility of outright judicial rejection of a request to recognize and enforce private property rights on the Martian surface.¹⁶³ In plumbing the non-appropriation and common use language for concrete meaning, consultation with Marxist property principles recognized in the former Soviet Union can provide illumination, if one assumes that the OST broadly derived from a compromise between Soviet and free market ideologies, or was at least influenced by the Soviet's view of property.¹⁶⁴ As demonstrated above, a consideration of customary practices regarding moon rocks by the principal state parties to the OST and a contrast of the complete Marxist property regime that the Moon Agreement would have accomplished are also useful exercises.¹⁶⁵

160. Gsovski, *supra* note 147, at 107.

161. *Id.*

162. See John N. Hazard, *Gorbachev's Attack on Stalin's Etatisation of Ownership*, 28 COLUM. J. TRANSNAT'L L. 207, 222 (1990) (describing steps towards privatization which retain ideological ties to socialism and retention of state ownership).

163. OST, *supra* note 5, art. I, II.

164. See *supra* notes 43-45 and accompanying text.

165. See *supra* Part II Section (B)(3)(a), (b).

The common law should be expected to govern a Martian property dispute as here contemplated, except to the extent displaced by statute or treaty.¹⁶⁶ Two common law paradigms (one traditional, the other *nouveau*) may be capable of providing appropriate rubrics for the two primary OST problems in a principled and efficient manner.¹⁶⁷ The first possible solution comes from the longstanding paradigm of adverse possession.

1. Traditional Adverse Possession Doctrine

Ancient prescription and adverse possession doctrines can be traced back to post-feudalistic English local customs.¹⁶⁸ One policy behind adverse possession is linked to the limited availability of real property and the aim of encouraging scarce resources to be put to their most productive use.¹⁶⁹ Thus, “possession which has continued for a long time without interruption, and which has been accompanied by an uninterrupted claim of ownership, ought to prevail against all the world.”¹⁷⁰ Some scholars have recently called for the abolition or containment of adverse possession on the basis of contemporary advancements in title registry certainty and other justifications.¹⁷¹ On Mars,

166. See O'Donnell & Goldman, *supra* note 70, at 323-24 (noting that common law informs space law).

167. See Shyamkrishna Balganesh & Gideon Parchomovsky, *Structure and Value in the Common Law*, 163 U. PA. L. REV. 1241, 1243 (2015) (“The persistence of the common law and its continuing vitality is in large measure attributable to the subtle balance that it achieves between stability and change, a balance for which it relies almost entirely on its conceptual structure.”).

168. William G. Ackerman & Shane T. Johnson, *Outlaws of the Past: A Western Perspective on Prescription and Adverse Possession*, 31 LAND & WATER L. REV. 79, 82-3 (1996). From the twelfth century, a limitations period was imposed on “the writ of right, namely, that it should not avail to recover real property where the right of the claimant accrued prior to the time of Henry I, that is, the first year of his reign (A.D. 1100)” RALEIGH COLSON MINOR & JOHN WURTS, *THE LAW OF REAL PROPERTY* 628 (1910). “And this policy has been ever since pursued, not only in the mother country, but also generally in the United States.” *Id.* at 629.

169. Henry W. Ballantine, *Title by Adverse Possession*, 32 HARV. L. REV. 135, 135 (1918); Lua Kamál Yuille, *Toward a Heterodox Property Law and Economics*, 2 TEX. A&M L. REV. 489, 490 (2015).

170. Ballantine, *supra* note 169, at 136 (quoting CHRISTOPHER COLUMBUS LANGDELL, *SUMMARY OF EQUITY PLEADING* § 121 (2nd ed. 1883)).

171. See, e.g., Matthew Sipe, Comment, *Jagged Edges*, 124 YALE L.J. 853, 865 (2014) (“Successful adverse possession claims, through the application of actual possession requirements, can lead to both parcel-by-parcel and aggregate changes in boundary irregularity.”); Jeffrey Evans Stake, *The Uneasy Case for Adverse Possession*, 89 GEO. L.J. 2419, 2473 (2001) (“Rationales that easily justified the ancient English doctrine of adverse

however, adverse possession doctrines will mesh particularly well with the Martian environment and projected orientations of first settlements' property disputes.¹⁷²

The elements of adverse possession necessary to sustain a claim to occupied property as against a true titleholder are fairly settled.¹⁷³ For an adverse occupier to obtain title to property, the occupier must first actually enter onto the property and then hold (1) exclusive, (2) open and notorious, (3) adverse, and (4) continuous possession for a given minimal period of time.¹⁷⁴ The exclusive element requires that the adverse occupier not share

possession have been undermined by modern surveying and record-keeping technology . . .”).

172. Cf. Scott J. Shackleford, *The Tragedy of the Common Heritage of Mankind*, 28 STAN. ENVTL. L.J. 109 164 (2009). Schackleford's proposal for allocating extraterrestrial property involves, as he describes it, something similar to the People's Republic of China's approach to allocating long-term leases and use rights: "Property rights could be auctioned off in a free market to the first investor(s) to arrive at a new resource area, occupy the territory, improve it, and equitably share some of the benefits. This arrangement is reminiscent of the Homestead Act. It would award adverse possession in line with the labor theory of value, and would have the effect of not only efficiently allocating property rights to those entities most capable of using them, but also would raise capital that could be used to develop new infrastructure, fund multilateral enforcement efforts, and scientific studies to ensure minimal environmental impact." *Id.* (citation omitted); see also Pop, *supra* note 67, at 100-20 (invoking 19th century homesteading in an extraterrestrial property context). For criticisms of the Homestead Act see Roger D. Billings, *The Homestead Act, Pacific Railroad Act and Morrill Act*, 39 N. KY. L. REV. 699, 712-721 (2012). I reject Shackleford's proposal primarily because a government auction of tracts of Martian property would directly invoke a challenge based on the OST Article II ban on appropriation by a national body. Patents issued to homesteaders were signed by the President himself. *Id.* at 715. "It became a solemn public act of the government of the United States . . ." *Id.* Similarly, the federal 1842 Armed Occupation Act allowed settlers in Florida to claim title to property from the U.S. government without payment of any kind by staking a claim, cultivation and occupancy for five years. Glenn Boggs, *Free Florida Land*, 83 FLA. B.J. 10, 16 (2009).

173. Courts do vary in their recitation of the specific elements supporting a claim of adverse possession. See, e.g., *Heacock v. Madsen*, 696 P.2d 916, 917 (Idaho Ct. App. 1985) (Phrasing adverse elements as constituting the elements of "intent, adverse possession in fact, and knowledge or notice."); *Garriott v. Peters*, 878 N.E.2d 431, 438 (Ind. Ct. App. 2008) (articulating the elements of adverse possession as control, intent, notice, duration, and payment of real property taxes on the parcel in question). Intent can be shown by acts such as ejecting hunters, entering into contracts regarding the land, and selling timber off of the land. *Garriott*, 878 N.E.2d at 442.

174. Jessica A. Clarke, *Adverse Possession of Identity: A Radical Theory, Conventional Practice*, 84 OR. L. REV. 563, 566 (2005) (quoting JESSE DUKEMINIER & JAMES E. KRIER, PROPERTY 131 (4th ed. 1998)).

possession with the titleholder.¹⁷⁵ The open and notorious element means that occupation has to be visible, so that the titleholder will have, or at least will have available, a notice of occupation, had she periodically checked on her property.¹⁷⁶ The adverse requirement excludes occupiers that are holding possession with the permission of the titleholder—as a tenant, for example.¹⁷⁷ The continuous element requires the occupier’s occupation to be uninterrupted.¹⁷⁸

The 1870 case of *Brumagin v. Bradshaw* shows the doctrine in action.¹⁷⁹ The plaintiff there claimed that he, along with certain prior possessors with whom he shared privity of estate, had been in possession of a tract of land known as the Potero for several years and, therefore, ought to be recognized as the true owner under the doctrine of adverse possession.¹⁸⁰ Brumagin was positioned as the plaintiff in an action for trespass against the actual titleholder, Bradshaw.¹⁸¹ Brumagin prevailed in a jury trial, and Bradshaw appealed, arguing, *inter alia*, that erroneous jury instructions constituted reversible error; the Supreme Court of California agreed.¹⁸²

The jury instruction in question read essentially as follows: If you find that the plaintiff entered onto and enclosed the Potero in 1850, that he made a

175. *E.g.*, *Bowen v. Serksnas*, 997 A.2d 573, 577 (Conn. Ct. App. 2010) (“The use is not exclusive if the adverse user merely shares dominion over the property with other users.”) (citation omitted).

176. *E.g.*, *Riley v. Andres*, 27 P.3d 618, 621 (Wash. Ct. App. 2001) (A plaintiff “can satisfy the open and notorious element by showing either (1) that the title owner had actual notice of the adverse use throughout the statutory period or (2) that the claimant used the land such that any reasonable person would have thought he owned it.”) (citation omitted).

177. *See* *Minor & Wurts*, *supra* note 168, at 638 (“the possession must be adverse to that of the true owner under some claim of right such as will exclude any recognition of the latter’s rights” though not necessarily under “color of title (that is, written evidence of title, such as a deed”).

178. *E.g.*, *Ebenhof v. Hodgman*, 642 N.W.2d 104, 109-10 (Minn. Ct. App. 2002) (reversing a trial court’s conclusion that possession was not continuous where crops were cultivated on the tract for 44 years without interruption). “Hostility” is sometimes included as an additional element of adverse possession. *Riley*, 27 P.3d at 621 (“The hostility element requires simply ‘that the claimant treat the land as his own against the world throughout the statutory period.’” (citation omitted)); *see also Ebenhof*, 642 N.W.2d at 110-11 (“Hostility is flexibly determined by examining the ‘character of the possession and the acts of ownership of the occupant.’”) (citation omitted). Hostility is typically seen as part of the “adverse” element of adverse possession. *E.g.*, RALPH E. BOYER, *SURVEY OF THE LAW OF PROPERTY* 236 (3d ed. 1981) (defining the “hostile and adverse” element as “meaning that the possession is held against the whole world including the disposed owner”).

179. *Brumagin v. Bradshaw*, 39 Cal. 24 (1870).

180. *Id.* at 35.

181. *Id.* at 25, 41.

182. *Id.* at 38, 51.

complete enclosure of the Potero, that the enclosure was sufficient to turn and protect livestock, and that he actually used the enclosed land for pasturage, then you must find for the plaintiff.¹⁸³ In explaining the rather subtle deficiencies with the instruction, the court provided a detailed description of the Potero:

The testimony shows the Potrero to be a peninsula, containing about one thousand acres bounded on the north by Mission creek and bay, on the east by the bay of San Francisco, on the south by the same bay and Precita creek, and on the west by a stone wall and ditch, running from Mission creek on the north to Precita creek on the south, across the neck of the peninsula. It further appears that the wall and ditch were ancient works, probably built by the priests of the adjoining Mission of Dolores at an early day; and that in 1850, they had become considerably dilapidated, so as no longer to prevent the ingress and egress of cattle; that John Treat, or George Treat, or the two jointly, in the summer or autumn of 1850, repaired the wall and ditch, so as that, thereafter, it was sufficient to turn cattle; that they erected a gate in the wall, through which admission was had to the Potrero, and a small corral, for herding cattle, inside the wall, together with a shanty, in which the gate-keeper resided; that, immediately after the wall was repaired and the gate erected, they commenced to receive horses for pasturage and used the Potrero for that purpose . . . [T]he Potrero, in the year 1850, was separated from the City of San Francisco, as it then was, only by Mission creek and bay, and that it is now a portion of the city, divided into lots, blocks and streets.¹⁸⁴

The Court held that “[t]he acts of ownership and dominion over land, which may be sufficient to constitute an actual possession, vary according to the condition, size and locality of the tract.”¹⁸⁵ The acts of occupancy “must correspond, in a reasonable degree” with its “appropriate use.”¹⁸⁶ The Court reversed, admonishing the trial court to instruct the jury that if an enclosure and use were proven, the jury must then determine whether the occupation and “acts of dominion were sufficient and had the effect, upon the facts proven, to

183. *See id.* at 26.

184. *Id.* at 39-40.

185. *Id.* at 44-45. *See also, e.g.,* *Garriott*, 878 N.E.2d at 440 (Noting that “far less extensive use of the property” is required where a disputed tract “consists mainly of undeveloped wooded area and swampland.”); *but see* *Luttrell v. Stokes*, 77 S.W.3d 745, 749 (Mo. Ct. App. 2002) (Reasoning that since wild or undeveloped land “may make it more hidden from public view, actions one takes in an effort to be open and notorious” are “beyond those necessary to meet that element in non-wilderness property.”) (citation omitted); *Minor & Wurts*, *supra* note 168, at 636 (“[W]ild and uncultivated lands, remaining completely in a state of nature, cannot be the subject of adversary possession.”).

186. *Brumagin*, 39 Cal. at 50.

give notice” that the plaintiff “had appropriated the land and claimed the exclusive dominion over it,” by looking to the land’s quality and quantity when making the determination.¹⁸⁷

Like *Brumagin*, other cases also suggest that adverse possession does not merely depend on a showing of the traditional black letter elements or a variation thereof.¹⁸⁸ The *character* of the possession must match up with the characteristics of the land, its location, its use or uses, and its quantity.¹⁸⁹ Where the land in question is partially enclosed by natural barriers, the enclosure “must be varied according to the circumstances of each particular case.”¹⁹⁰ With a small parcel containing a mine, “the working of the mine, in the usual manner, might establish” adverse possession without any enclosure.¹⁹¹ With a 1,000-acre tract with a quarry on the margin, merely working the quarry could not establish possession of the whole tract.¹⁹² This factually sensitive element of adverse possession in particular makes it adaptable to an initial property dispute on Mars.

2. An Application of Adverse Possession to an Initial Martian Property Dispute

Because of its flexible and equitable nature, and because its theoretical underpinnings are unencumbered by OST Article II sovereign pre-appropriation credo, the doctrine of adverse possession is particularly well suited to forming an OST-sensitive basis for recognizing the first Martian

187. *Id.* at 51.

188. *E.g.*, *Wailuku Agribusiness Co. v. Ah Sam*, 155 P.3d 1125, 1134 (Haw. 2007) (“In order to establish title to real property by adverse possession, a claimant ‘must bear the burden of proving by clear and positive proof each element of actual, open, notorious, hostile, continuous [,] and exclusive possession for the statutory period.’”) (citations omitted).

189. *See, e.g.*, *Emerson v. Linkinogger*, 382 S.W.3d 806, 811 (Ark. Ct. App. 2011) (“[W]hether the character of a possession is hostile ‘is determined by the occupant’s own views, actions and intentions and not those of his adversary.’”) (citation omitted); *Ortmeyer v. Bruemmer*, 680 S.W.2d 384, 393 (Mo. Ct. App. 1984) (The “continuous” element, “[a]s with every element of adverse possession . . . must be resolved in light of the location, character and use to which the land in dispute may reasonably be put.”) (citations omitted).

190. *Brumagin*, 39 Cal. at 47.

191. *Id.* at 45.

192. *Id.* (“Neither actual occupation, cultivation or residence are necessary to constitute actual possession, when the property is so situated as not to admit of any permanent, useful improvement; and the continued claim of the party has been evidenced by public acts of ownership, such as he would exercise over property which he claimed in his own right, and would not exercise over property which he did not claim.”) (quoting *Lessee of Ewing v. Burnet* 36 U.S. (11 Pet.) 41 (1837)).

settlers' exclusive use and alienability rights to occupied territory.¹⁹³ The OST envisions the Martian surface in its present, unoccupied state as a common-pool resource.¹⁹⁴ This imprint of community-oriented ownership, or even a socialist-oriented approach, will not preclude disputes between differently situated settlement communities posed to compete over a scarcity.¹⁹⁵ Similarly, the principles of the OST can be honored while giving effect to a rubric by which some anticipated disputes could be resolved.

The "adverse" element of adverse possession in particular has a poor fit with facts as anticipated to arise on Mars, since the first Martian settlement cannot really be said to be occupying property against another owner's rights, unless it be adverse to the OST principle that all extraterrestrial property is held for the common interest of all mankind; essentially, as public land.¹⁹⁶ Therefore, the scenario anticipated here with a first Martian property law dispute would not involve one party who slept on their rights, but rather one party who arrived later to the planet and then encountered the first.¹⁹⁷ Other than the first Martian settlement's actual use and occupation of the planet's surface, the planet would remain *res nullius* in fact and consistent with the OST.¹⁹⁸ Adverse possession, sensitive to the specific uses appropriate to the property, will cautiously grant a reasonable amount of land occupied and used by the first Martian settlers prior to the arrival of the second wave, while leaving unused and unoccupied tracts available to the newcomers. Any attempt by the first settlers to simply stake out or preemptively enclose large swaths of property prior the second settlers' landing will be constrained by the fact and

193. See OST, *supra* note 5, art. II.

194. OST, *supra* note 5, preamble; see generally, R. Quentin Grafton, Dale Squires, & Kevin J. Fox, *Private Property and Economic Efficiency: A Study of Common-Pool Resource*, 43 J.L. & ECON. 679 (2000) (examining the effects of "privatizing the commons" of halibut fishery).

195. See, e.g., Will Englund, *China's Fisherman Explain Why They Think the Sea is Theirs* (June 7, 2015), <http://www.washingtonpost.com/blogs/worldviews/wp/2015/06/07/chinas-fishermen-explain-why-they-think-the-sea-is-theirs/> (preserving the views of Chinese fishermen towards China's assertion of sovereignty over the South China Sea).

196. See generally Eric Larsson, et al., 2 C.J.S. *Adverse Possession* § 20 (2015) ("Generally, title by adverse possession may not be acquired to land owned by a county or municipality where such land is dedicated to public use."); but see *Minor & Wurts*, *supra* note 168, at 631 (explaining that statutes may provide otherwise).

197. State statutes now govern adverse possession claims and may establish the period during which the adverse possessor must retain possession variously. E.g., WIS. STAT. 893.25 (2015) (20 years); MINN. STAT. § 541.02 (2015) (15 years); *Louisa County Conservation Bd. v. Malone*, 778 N.W.2d 204, 207 (Iowa 2012) (10 years).

198. See Pop, *supra* note 67, at 73 (quoting Grotius, *supra* note 93, at 22); see also Gorove, *Exploitation*, *supra* note 112, at 33 (tracing the "common heritage" principle in the Moon Agreement and the law of the sea to Hugo Grotius).

situationally sensitive common law doctrine that adapts a test appropriate for particular circumstances, landscapes, and uses.¹⁹⁹

For example, assume the following fact pattern: A Mars One settlement arrives on the Martian planet surface. Within a short time, the settlers have occupied and are actively using about twenty hectares of surface area for solar collecting, water-extraction, cultivation and habitation. Ownership of the infrastructure itself would be vested in the settlers' corporate employer.²⁰⁰ Certain land topographies and locations will be better suited for some uses than others; some areas may be suitable for single-use purposes, while others may be capable of sustaining simultaneous or successive uses. Since it is unlikely that the ideal tracts for various uses will all be contiguous or contained within a single larger parcel, the settlers can be expected to utilize paths or primitive roadways to access the various parcels that they are putting to use.

Several years later, the Mars One settlement learns of a second private company's plans to land settlers nearby and establish its own Martian settlement. Anticipating the possibility of competition over the limited availability of accessible tracts of land suitable for the various uses required by the settlers, the Mars One settlers begin surveying, marking, and crudely enclosing currently unutilized, but attractive, tracts of nearby land. Naturally, the Mars One settlers hope to establish prior rights to lands into which they plan to expand in the coming years. They seek to preserve, for future use, suitable land in their vicinity.

The second group of "Mars Two" settlers then arrives and makes contact with the Mars One settlers nearby. Initially, the Mars Two settlers are unlikely to come into direct competition with the Mars One settlers over land use or occupation. At some point, however, assuming the vigor and expansion of both groups, the Mars Two settlers may find it in their interests to make use of tracts

199. *See* *Brumagin v. Bradshaw*, 39 Cal. 24, 51 (1870) (It is the province of the jury in an adverse possession case "to decide upon the sufficiency of the acts to impart the requisite notice to the public, and whether or not, under all the circumstances, these acts were such as carried with them 'the marks and evidences of ownership, which apply, in ordinary cases, to the possession of real property.'"); *see also* *Engquist v. Wirtjes*, 68 N.W.2d 412, 415 (Minn. 1955) ("[T]he erection of a fence by an adjoining landowner has little significance on the issue of adverse possession unless the disseizor uses and occupies the land up to the line established by the fence.") (citation omitted); Larson, *supra* note 70 (Considering how the law of prior appropriation could be applied to water rights on Mars with rights dependent on the user's diligence in "putting the water to beneficial use.").

200. *See* OST, *supra* note 5, art. VIII ("[The] [o]wnership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth."). The questions posed here relate to the ownership and exclusive use rights of the realty on which infrastructure is constructed.

claimed by the Mars One settlers. In this context, adverse possession doctrine will provide a fulcrum on which the dispute can be resolved in a manner that is likely to be respected by both groups.

As outlined in *Brumagin v. Bradshaw*, “the acts of dominion and ownership which establish adverse possession must correspond, in a reasonable degree, with the size of the tract, its condition and appropriate use, and must be such as usually accompany the ownership of land similarly situated.”²⁰¹ Depending on these factors, those lands actually being occupied and productively used for a specific purpose or purposes will be deemed owned by the Mars One corporation. Those tracts which the Mars One settlers put to no actual use, but merely attempted to enclose or mark off for future use, will still be deemed a part of the pooled resource belonging to no one and everyone.²⁰² Those tracts with levels of use and occupation falling somewhere in between will be weighted and ruled upon by the fact finder, consistent with the principles outlined in *Brumagin*.

The Mars One settlers will also enjoy rights in their rights of way or access paths to and from the various parcels now deemed to be under their ownership.²⁰³ Tracts that Mars Two settlers have openly used and occupied will enjoy similar protections. The judicial recognition of property rights so acquired conform to the OST Article II’s ban of national appropriations and also give recognition to the principles of common use insofar as even property rights which are exclusively acquired by, say, Mars One, will have been acquired not as an individual right of one particular settlor, but rather a kind of collective right shared by the Mars One settlers vis-à-vis their employer-corporation.²⁰⁴ Exclusive use rights by Mars One settlers to certain parcels and

201. *Brumagin*, 39 Cal. at 50.

202. Agency principles govern adverse occupancy carried out in one’s capacity as an agent or tenant. *See, e.g., Ebenhoh*, 642 N.W.2d at 109 (“The possession of a tenant is, to third parties, the possession of the landlord.”) (citation omitted); *infra* note 204 and accompanying text.

203. *See, e.g.,* RESTATEMENT (THIRD) OF PROPERTY, SERVIDITUDES § 2.17 (2000) (providing for the creation of servitudes by prescription where the use is open or notorious and continuous); Michael V. Hernandez, *Restating Implied, Prescriptive, and Statutory Easements*, 40 REAL PROP., PROB. & TR. J. 75, 95-96, 102-04 (2005) (describing easements implied from a prior use and prescriptive easements).

204. *See, e.g.,* *Pioneer Inv. & Tr. Co. v. Bd. of Educ. of Salt Lake City*, 99 P. 150, 151-52 (Utah 1909) (affirming a claim of adverse possession in favor of a corporation where its officers occupied the property); *Lee v. County School Bd.*, 132 S.E. 863, 865-66 (Va. 1926) (affirming a claim of adverse possession in favor of a school board); *see also supra* note 24 and accompanying text (confirming that Mars One settlers will have the status of employees on Mars).

exclusive use rights by Mars Two settlers to others can be analogized to the agricultural collective property scheme in the former Soviet Union.²⁰⁵

Free divisibility and alienability of property rights ought to accompany the first judicially recognized property rights vesting by means of adverse possession. The alienability and divisibility of real property will enhance efficient and productive use of scarce Martian resources. Settlers may wish to trade, exchange, barter, sell, or even lease parcels to which they have gained rights with other settlement groups. The settlers' employers, Earth-operating firms, will, it is hoped, accommodate exchanges and transactions which benefit their employees on the Martian surface.²⁰⁶

The free alienability and divisibility of Martian real property rights are likely to be accompanied by the availability of shared uses of given tracts of land through the negotiation of profits or easements.²⁰⁷ Mars Two may have recognized rights to a ten hectare grid of land, which it is currently devoting to water extraction, and which is situated roughly an equal distance from its settlement and the Mars One settlement. The particular circumstances of the Mars Two settlement may make it impractical for the Mars Two settlers to utilize the property for cultivation, while the Mars One settlers could make efficient use of the property for cultivation without interfering with Mars Two's water extraction operations. Through a negotiated agreement, Mars Two could grant Mars One the rights to conduct cultivation on the tract without diminishing Mars Two's water extraction uses. Although transferability and divisibility of property is generally antithetical to non-private Soviet real property precepts, the dearly held Western repugnancy to restraints on alienation should prevail where the OST lacks any express directive against alienation.²⁰⁸ Moreover, the reliable judicial enforcement of transfers will enhance efficient decision-making and productive use of critical resources on Mars.

205. See discussion *supra* Section II.B.3.c.

206. Conceivably, a corporation-principal on Earth could find it in the best interests of its shareholders to sell lands acquired by adverse possession to other Earth-bound speculators. Such an option would pit the interests of the corporation's employees against those of its shareholders and typically the interests of the shareholders would prevail.

207. See generally HERBERT HOVENKAMP, SHELDON F. KURTZ & THOMAS P. GALLANIS, *THE LAW OF PROPERTY* 275-78 (6th ed. 2014) (outlining easements and profits).

208. See generally, JOHN CHIPMAN GRAY, *RESTRAINTS ON THE ALIENATION OF PROPERTY* 2 (2d ed. 1895) ("If there are any restraints on . . . free alienation, such restraints are not imposed on them by public policy, but by the will of those persons who have created or transferred them.").

3. A Secondary Martian Property Dispute

Following the successful establishment of a second settlement colony on Mars and the resolution of the anticipated initial disputes by reference to adverse possession doctrines, the two settlements can be expected to develop parallel expansions into neighboring territory, again assuming vitality and expansion accompanies the settlers' fates. The second anticipated variety of property disputes occurs where neither settlement claims prior appropriation of a tract, but both settlements more or less simultaneously form a desire to appropriate an open tract for their own use. One Martian morning, for example, a contingent of Mars One settlers may encounter a contingent of Mars Two settlers making preliminary preparations for the installation of solar collectors or water extraction machines on a hitherto unoccupied slope ideally situated for both camps' use. Given that the tract in question has not been the subject of prior occupation and use by either group, adverse possession doctrines will not prove instructive.

An elucidation of these conflicting and essentially balanced assertions of property rights that avoids the costs of a forceful expulsion of one group by the other is essential. To what mechanism or forum can the two groups turn for a resolution that both sides will find in their best interests to accept, regardless of the outcome? The first solution is a government-overseen allocation of rights via an Earth-based regulatory agency.²⁰⁹ A kind of property allocation paradigm that suggests itself is one similar to the ones the United States federal government utilized in encouraging and rewarding homesteading across the nineteenth century American West.²¹⁰ But a grant of Martian land rights by an Earth-based government body would unavoidably require *a priori* an appropriation by a national body of the land to be granted, an act specifically outlawed by the OST.²¹¹ While it is conceivable that some regulatory framework could be devised on Earth, either by the United States acting alone after drafting around OST Article II limitations or by the international community, the political sluggishness in responding to the Mars-based conflict with comprehensive legislative solutions would present a serious

209. See, e.g., Moon Agreement, *supra* note 110, art. XI; 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, 356 (1995) (Article XI of the generally rejected Moon Agreement "provide[s] that the exploitation of resources on the moon shall be governed by an international regime which will manage all resources and see that they are equitably shared" but that no "provisions are specified for the time between implementation of the Agreement and the setting up of the regime.").

210. See *supra* note 172 and accompanying text.

211. OST, *supra* note 5, art. II.

impediment.²¹² Similarly, amendment of the OST or unilateral withdrawal from the treaty are conceivable, but should not be viewed as easily achievable.²¹³

For different reasons, a Mars-based solution wherein the Martian settlers are self-governing without recourse to Earth-based systems or codes seems equally unrealistic. Simply put, there may be no availability of a neutral forum. All of the actors on Mars in this scenario are expected to be employees and agents of one or the other adverse parties to the dispute. Not only would the settlers find it difficult to agree on a suitable, trained, and objective Martian arbiter, they would find it equally and perhaps more challenging to agree upon a framework and rule-set for resolution of the dispute once the dispute is already in play. Moreover, the Earth-bound principals of each settlement would doubtless prefer the more familiar and established judiciary and legal code on Earth to the idea of having to abide by a Mars-based framework created by their employees. No, at this still-early stage of Martian settlements, an Earth-based judicial outcome predicated upon existing common law precepts within the confines of the OST will be required, quite possibly without any pre-existing legislative framework designed for these disputes.

4. Inverse Partition

An existing dogma for the resolution of a paradigmatic second-stage Martian property law dispute over open ground as described above does not readily present itself. Still, the flexibility and responsiveness of a common law system ought to be capable of crafting an appropriate framework. The one proposed here is based on a presumption of tenancy-in-common ownership that might be termed “inverse partition.”²¹⁴ In black letter Restatement-like format, inverse partition might be phrased as follows:

212. Cooper, *supra* note 69, at 114 (“Proper administration would require large cooperative and possibly coercive efforts”).

213. See John Hickman, *Still crazy after four decades: The case for withdrawing from the 1967 Outer Space Treaty*, SPACE REV. (Sept. 24, 2007), <http://www.thespaceview.com/article/960/1> (Spacefaring nations should withdraw from the OST which “deserves much of the credit for reducing space exploration and development from a toddle to a crawl after the Apollo program.”); Pop, *supra* note 67, at 107 (discussing the feasibility of withdrawal from the OST).

214. See Jack K. Levin & Elizabeth Williams, 86 C.J.S. *Tenancy in Common* § 1 (2015) (Defining a tenancy in common as “the holding of property by several persons by several and distinct titles, with unity of possession only” where “[e]ach tenant in common owns a separate fractional share of undivided property, and each cotenant’s title is held independently of the other cotenants.”); see also *id.* at § 3 (“The central characteristic of a tenancy in common is that each tenant is deemed to own by himself or herself, with most of the attributes of independent ownership, a physically undivided part of the entire parcel, that is, an interest that encompasses the entire property. A tenant in common does not own a fee

Restatement of the Law – Property
Restatement (Fourth) of Property – Martian Property
§ 10.0 Inverse Partition

Other than property and property rights obtained by prescription, adverse possession, or other means, Martian real property which is reasonably available for productive use or occupation by one or more Martian settlement organizations operating within proximity to one another on Mars shall be conclusively presumed to be held by those settlement organizations as tenants in common upon an express affirmative declaration by such a settlement organization claiming the property for its present or future use.

Again in Restatement-like format, comments and illustrations can show the operation of the presumption in context:

a. Rationale and scope. The inverse partition rule establishes a presumption of common ownership between two or more Martian settlement organizations operating within proximity to one another on the planet Mars. The rule does not apply to chattels or intangible property; nor does the rule does apply to individual Martian settlers, but only to the corporate bodies supervising and typically employing the Martian settlers in question. The rule is consistent with the 1967 Outer Space Treaty's prohibition on national appropriation of celestial bodies as it merely recognizes land rights or land use rights in private corporate bodies which can be thought of as holding land as a joint collective. Moreover, the rule gives recognition to the treaty's requirement that outer space used in the common interest of all mankind while allowing corporate actors to efficiently allocate and exchange land and/or land use rights between themselves in a manner that puts Martian real property to its highest and best use. Only property that falls within the scope of the rule can be claimed by affirmative declaration; when it is so claimed it is deemed held in common ownership with the other settlement or settlements within reasonably close proximity; the vast other land areas of Mars remain entirely open present and future settlements without discrimination.

simple interest in half of the property, nor is a cotenant's one-half interest part of the other cotenant's estate. A cotenant cannot claim a specific portion of the property. A cotenant is not entitled to the exclusive possession of any particular part of the land, as each is entitled to occupy the whole in common with the others or to receive a share of the rents and profits.”).

b. Proximity. The term “proximity” is factually dependent. No one measure of distance will be appropriate in all circumstances but will depend on the use, population and capacities of settlements as well as the terrain in the area. Settlements may be initially some distance apart and not in any direct competition with one another but with technological improvements and expansions brought into proximity to one another over time.

Illustrations:

1. Martian settlement organization A and Martian settlement organization B expand to the point where each could reasonably make productive use of a parcel of land situated between them for solar power generation. As to this parcel, the two settlement organizations are in proximity to one another for purposes of the rule.

2. Martian settlement organization A and Martian settlement organization B are in proximity to one another with regards to several unoccupied parcels of land. Martian settlement C is nearby but a canyon separating it from settlement organizations A and B makes it impractical to make use of any lands on the opposite side of the canyon. Martian settlement C is therefore proximate to neither settlement A nor B. Martian settlement C makes an express affirmative declaration claiming the property on the opposite side of the canyon for its present or future use. The declaration has no effect.

c. Formal declaration. No specific form of a declaration is contemplated although typically a settlement organization will document a formal declaration in an electronic or written document delivered to the other settlement organization(s) in proximity to it and describe the tract or tracts of land in reasonable detail. Staking or marking an area can also provide clarity.

Illustration:

3. Settlement organization A and settlement organization B are in proximity to one another with regards to an unoccupied tract of land suitable for cultivation. Settlement organization B delivers an e-mail to settlement organization A stating, “We claim a tract situated between the Bradbury Crater and the Asimov Crater, comprised of approximately 10 hectares in area, for our future use.” The tract is, upon delivery of the declaration, held by settlement organizations A and B as tenants in common.

d. Exclusions: Property acquired by adverse possession or prescription. Property acquired by adverse possession and access or other property rights acquired by prescription fall outside the operation of the rule.

Illustrations:

4. Settlement organization A has acquired a tract of land from settlement organization C and uses the tract for solar collection purposes. Later, it acquires another tract better suited for solar collection and ceases all use and occupation of the first tract. Settlement organization B makes an express affirmative declaration claiming the first tract for its present or future use. The declaration has no effect.

5. Settlement organization A has established by prescription a pathway to a tract of land which it utilizes for water extraction. The pathway bisects a tract of land suitable for solar collection which is only in proximity to settlement organizations B and C. Settlement organization C makes an express affirmative declaration claiming the tract for its future use. The declaration does not revoke or impair settlement organization A's right-of-way but is otherwise effective as to settlement organizations B and C.

e. Exclusions: Property acquired by other means. The rule implicitly recognizes the alienability and divisibility of Martian land held as tenants in common or acquired through adverse possession. Thus, a settlement may also acquire land by purchase or exchange with another settlement. Lands so held cannot be involuntarily converted into tenancy in common ownership by application of the rule. Moreover, it is contemplated that property held as tenants in common will often be the subject of trade or exchange with other settlements.

Illustration:

6. Settlement organization A begins to enclose two different unoccupied areas and settlement organization B in close proximity responds by making an express affirmative declaration claiming the properties for its present or future use. Settlement organizations A and B may simply share the use and occupancy of the two parcels as co-owners. Alternatively, the settlements might agree that settlement organization A will convey its rights in the first parcel in exchange for settlement organization B's rights in the second parcel. Because full ownership in both parcels was acquired "by other means" it is then held in fee simple by each separate owner and thenceforth outside the scope of the rule.

f. Estoppel. The rule implicitly recognizes estoppel principles in order to remove an incentive for failing to make an express declaration when a neighboring settlement organization which may be in proximity begins to occupy and improve a given tract. The essential elements to establish a defense of estoppel are (1) voluntary conduct or representation; (2) reasonable reliance; and (3) detriment. Estoppel precludes an adverse possession claimant from asserting rights which otherwise may have existed against another person who relied upon the conduct in good faith, and has been led thereby to change his position for the worse.

Illustrations:

7. Settlement organization A notices settlement organization B occupying and improving a tract that appears to be in proximity. Rather than make an express declaration with regards to the tract, settlement organization A allows settlement organization B to grade the tract for solar collection use. Settlement organization A then makes an express affirmative declaration claiming the property for its present or future use. Settlement organization A will not be estopped from asserting common ownership to the tract because settlement organization B did not reasonably rely on any assertions or statements by settlement organization A.

8. Settlement organization A notices settlement organization B occupying and improving a tract that appears to be in proximity. Settlement organization A states to B: "It's our view that that tract is not in proximity and we will not make any assertions to the contrary." If settlement organization B undertakes improvements in reasonable reliance on A's statement, A will be estopped from later making an express affirmative declaration claiming the property for its present or future use.

g. Latches. The doctrine of latches has long been recognized in connection with adverse possession claims. Its application relates to whether a party can be charged with a lack of due diligence in failing to institute a claim where the opposing party has been injured or materially prejudiced because of the delay. The doctrine applies under inverse partition as well.

Illustration:

9. Settlement organization A occupies a tract of land for purposes of habitation, levels the ground and begins erecting infrastructure. Before settlement organization A's occupation of the tract has matured into an actionable adverse possession claim, settlement

organization B tells settlement organization B that it is claiming the tract for its present use. If settlement organization B exhibited a lack of due diligence or unreasonable delay in making its declaration and settlement organization A would be materially harmed by invoking inverse partition, it may raise laches as a defense and bar B's declaration from taking effect. Whether settlement organization A would be materially harmed will depend, in part, on whether the planned uses by settlement organization B are incompatible with the uses to which settlement organization A is putting the tract.

Inverse partition provides recognition of the land use rights of Martian settlers and applies tenancy in common ownership to those tracts that can reasonably be put to use on Mars. The doctrine therefore deters speculation, preserving unutilized tracts for future use. The rule's principles abide by the "common use" commands of OST Article I and avoid any prior requirement of national appropriation to the allocation of property rights in contravention of Article II.²¹⁵ Moreover, restricting application of the doctrine to those tracts in proximity to more than one settlement organization accommodates separate use and enjoyment wherever possible, invoking common ownership as to other tracts, staying within the arguably quasi-Marxist principles on which Article II and the preamble of the OST rest.²¹⁶ Finally, sustainable practices are encouraged by the lack of incentives to degrade or exhaust property before a rival settlement organization can lay claim to it, since the doctrine is restricted in application to settlement organizations in proximity to a given tract.²¹⁷ What

215. OST, *supra* note 5, art. I, II; *see* U.S. CONST. amend. V (The Article II non-appropriation command would, however, prohibit the United States government from exercising the power of eminent domain over any ripened property rights of the settlement organizations on Mars). By the same token, Article II would seem to bar any assertion of *ad valorem* taxation over Martian real estate. *See generally*, County of Yakima v. Confederated Tribes and Bands of Yakima Indian Nation, 502 U.S. 251, 270 (2002) (holding that counties may impose ad valorem tax on Indian lands patented in fee but may not enforce an excise tax on sales of such land).

216. OST, *supra* note 5, preamble, art. II.

217. Tan, *supra* note 114, at 148 ("[a]n essential first step it to make the notions of sustainable development and intergenerational responsibility applicable to the outer-space environment"); *see also* Jonathan C. Thomas, *Spatialis Liberum*, 7 FLA. COASTAL L. REV. 579, 623 (2006) (Standing alone, "[t]he Outer Space Treaty adds little, if anything, to protect the environment including an enforcement mechanism for compliance."); Pop, *supra* note 67, at 89; Claudia Pastorius, *Law and Policy in the Global Space Industry's Lift-Off*, 19 BARRY L. REV. 201, 229-232 (2013) (arguing for the importation of the public trust doctrine into outer space as a means of achieving environmental protections); Brian C. Weeden & Tiffany Show, *Taking a common-pool resources approach to space sustainability: A Framework and potential policies*, 28 SPACE POL'Y 166, 169 (2012) (International regulatory

constitutes sustainable practices in an environment without any apparent biodiversity and where greenhouse emissions could, by increasing average temperatures, improve habitability, remain to be mapped out.²¹⁸

Many scholars have asserted that advance delineation of extraterrestrial property rights is an essential prerequisite to human settlement on other planets or the moon.²¹⁹ They argue that the realities of market-based economics dictate that the investment required for settlement of a celestial body will be strongly deterred by an unknown and unsettled legal framework, such as that arguably instilled by the OST. Surely, legal uncertainty in the area of property rights negatively impacts investments in property and capital improvements. Yet, history demonstrates that even high levels of legal uncertainty will deter neither human adventure nor substantial investments in property when profits beckon.²²⁰ Moreover, the common law itself, bracketed within the general outlines of the OST, can provide sufficient predictability to permit the human exploration and settlement of the red planet. The launch of the first rocket with

oversight which does not operate on a consensual basis to avoid gridlock might ultimately be required “in order to fully satisfy [Elinor] Ostrom’s [common pool resource] principal . . . [but] [t]his will not be easy.”)

218. See PAUL BURKETT, *MARXISM AND ECOLOGICAL ECONOMICS: TOWARD A RED AND GREEN POLITICAL ECONOMY* 303 (2006) (defining sustainable development as that which protects ecosystems, preserves biological diversity, caps harmful emissions and avoids irreversible damage to the environment) (citation omitted). On Mars, “sustainable resource exploitation” might be a better term. *Id.* at 304 (invoking this term in a non-Martian context).

219. *E.g.*, Cherian & Abraham, *supra* note 69, at 211 (“there is a growing convergence of opinion that private property rights must be granted in some form to ensure that proper, optimum and unhindered use and utilization of resources available in space can be effectively implemented”); Fountain, *supra* note 35, at 1777 (“[w]ithout assurance of property rights, private industry will not invest in . . . outer space”); Benjamin D. Hatch, Comment, *Dividing the Pie in the Sky: The Need for a New Lunar Resources Regime*, 24 EMORY INT’L L. REV. 229, 262 (2010) (claiming that “the vague and generic OST will not be able to sufficiently stop state conflict” over moon resources); Rosanna Sattler, *Transporting a Legal System for Property Rights: From the Earth to the Stars*, 6 CHI. J. INT’L L. 23, 27 (2004) (Arguing for “an overhaul of the current treaties and laws that govern property rights in space in order to develop better and more workable models that will stimulate commercial enterprise on the moon, asteroids, and Mars.”).

220. See GREGORY M. STEIN, *MODERN CHINESE REAL ESTATE LAW: PROPERTY DEVELOPMENT IN AN EVOLVING LEGAL SYSTEM* 20-23 (2012) (explaining how the Chinese real estate market has seen international investment on a wide scale without anything approaching a comprehensive legal framework). “China seems to be confounding the predictions of traditional law and development theory . . . [T]his theory presupposed that a stable body of law must precede significant levels of economic development. China appears at first glance to disprove these forecasts.” *Id.* at 22. [T]he Chinese legal system is surprisingly undeveloped given how advanced the Chinese property markets have become.” *Id.* at 21.

a human payload to the surface of Mars need not delay its mission for lawyers or legislators.

III. CONCLUSION

The almost limitless resourcefulness of the common law appears prepared for the challenges of basic real property rights frameworks on Mars. The two proposed doctrines outlined above avoid doing violence to either the general or the more specific provisions of the Outer Space Treaty that speak to extraterrestrial property law. Adverse possession doctrine provides a careful balancing test, recognizing the reasonable use and occupation of tracts by the first settlement organization prior to the arrival of the second, while leaving unoccupied or unutilized properties open and available. These open areas may soon be subject to dispute between competing settlements, but the proposed “inverse partition” doctrine may provide a suitable rubric for these types of disputes by generating a presumption of co-ownership, all without rejecting the applicable provisions of the OST.

If the OST contemplates a hybridized form of private capitalist-infused ownership of property with 1960’s-era socialist principles, it may be a synthesis which is outdated, unpredictable, and in serious need of reconsideration and revision. A speculation-fueled land market on Mars relying entirely on free market forces for optimal use in decision-making, however, could prove to be less than ideal, at least in the first stages of settling the planet. The historical origins of the language found within the OST may be largely irrelevant today, yet the general overlay of a common pool resource that is free from claims of national appropriation may be well suited for Mars if it is blended with consistently bounded private property rights that effectuate the reasonable expectations of the settlers while encouraging the highest and best use of a cold, dry, but beckoning planet.