

TECHFREEDOM

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120 Cannon House Office Building
Washington, DC 20515

Rep. Kilmer (D, WA)
1520 Longworth House Office Building
Washington, DC 20515

cc: All Members of the House of Representatives

May 19, 2015

Dear Members of Congress:

We commend the House Science, Space, and Technology Committee for its efforts to create effective space property rights. The technologies needed to open the space frontier to sustainable settlement will never be developed, let alone deployed, unless investors know that they have enforceable rights to the fruits of their investments and the ability to operate peacefully without interference. Without effective property rights, the vast resources of the moons, planets and asteroids of our Solar System will benefit no one. Yet without amendments, your legislation, H.R. 1508, the Space Resource Exploration and Utilization Act,¹ may violate U.S. treaty obligations while also doing less than legislation should to protect property rights in space.

Effective space property rights are not only consistent with international law, they are *required* by it. Article VIII of the Outer Space Treaty of 1967 (OST) explicitly recognizes property rights in “objects launched into outer space, including objects landed or constructed on a celestial body.” Article I provides that “outer space... shall be free for exploration and use” and Article IX directs that the “use of outer space” be conducted without “harmful interference” to other parties. The U.S. and Soviet Union both established the precedent that, once extracted, space resources may be owned, just as man-made objects in space may be owned. Yet the rights to such resources, and to non-interference with peaceful operations (a hybrid of property and tort law) remain undefined under U.S. law and lack effective enforcement mechanisms.

The bill would create property rights in extracted resources and non-interference rights around ongoing operations, enforceable through private rights of action in Federal court. In principle, we fully support such a common law approach as both necessary for space development and consistent with international law. Indeed, now that private companies are actually planning asteroid mining missions, we believe Congress has a duty to enact legislation to govern such activities. Article VI of the OST continues: “The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty.” To date, the United States has not established a mechanism that allows for the “authorization and continuing supervision” of entities wishing to make use of the vast resources of outer space.

However, Article II of the OST forbids territorial appropriation, whether by states or by private actors whose appropriation might be recognized by states, and Article I requires that “Outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all States ... and there shall be free access to all areas of celestial bodies.”

¹ <https://www.govtrack.us/congress/bills/114/hr1508/text>

As drafted, the bill could be read to allow for expansive territorial claims over both asteroids and planetary surfaces well beyond what can be justified on the basis of Article IX's non-interference principle — indeed, potentially without any actual ongoing physical operations on the surface. This distinction is vital: any attempt to confer anything like “land grants” would clearly violate Article II's prohibition on territorial appropriation. Even proposing legislation that could be read to do so risks sparking an international backlash against the property rights that *are* consistent with the Treaty — those over extracted resources and the area immediately surrounding ongoing operations to the minimal distance necessary to prevent harmful interference. Such a backlash could reignite interest in the Moon Treaty of 1979, which the U.S. Senate wisely rejected, since it would have heavily restricted private property in space and made resource utilization the monopoly of United Nations bureaucracy.

On the other hand, the bill is also too narrow, in conferring property rights only over resources extracted from asteroids, rather than all space resources. The bill also lacks Congressional findings that may prove vital in ensuring that the bill is implemented as intended by U.S. courts and that the State Department does not block its implementation out of excessive concern about foreign governments' sensitivity. The bill must clearly explain *why* the property rights it confers are consistent with international law, as we believe they would be, if the bill were amended as proposed in the attached Appendix A.

We urge Congress to consider adding three further things:

- Biennial reports by the President to follow the initial report making recommendations on additional legislation.
- A specific requirement that the President recommend a system of exclusive mining claims: like traditional mining claims, these would reward significant investments in exploring and identifying valuable resources by conferring exclusive rights to mine a limited area within a limited period, subject to completion of specific milestones. These differ fundamentally from non-interference rights over ongoing operations, yet may be conflated by the bill as currently drafted.
- Either a mechanism for addressing disputes with foreign parties or a requirement that the President propose one.

Finally, we note that this bill has not been considered through regular order — *i.e.*, without any hearing. Legislation on so complex an issue, affecting such delicate matters of international law, and potentially laying the groundwork for centuries of common law in space requires careful consideration, which means hearings — if not in the House, then in the Senate. We urge you to make the amendments proposed in Appendix A before any floor vote on the bill. For your review, we also attach — as appendices B, C, and D — several of our recent articles on this subject.

Respectfully,

Berin Szoka, President, TechFreedom
James Dunstan, Principal, Mobius Legal Group and Senior Adjunct Fellow, TechFreedom

Appendix A: Proposed Amendments to H.R. 1508

Findings (new 501501). The bill contains no Congressional findings or statements of purpose. These are essential to ensuring that legislation is given its intended effect, especially when there is no other legislative history (as would be true here, in the absence of hearings) and when the surrounding issues are subject to legal debate (as is true of the debate in the international space law community over either the precise interpretation of the Outer Space Treaty or whether to replace the treaty with the Moon Agreement of 1979). In addition, enacting this legislation without any findings or statements of policy could allow the President to negate the legislation to the extent that the initial report ordered by the legislation took a position that the property rights called for in the legislation were somehow inconsistent with international law, thus thwarting the intent of the legislation.

We urge Congress to consider adding the following findings and statements of purposes, beginning with citations to key aspects of U.S. law that we believe lay the foundation for the property rights called for in this bill:

Amendment #1: Add 51301, renumber subsequent sections. Add the following:

“(a) Noting that:

- (1) In Sec. 20102(c) of the NASA Act of 1958 Congress declared that “the general welfare of the United States requires that the Administration seek and encourage, to the maximum extent possible, the fullest commercial use of space;” and
- (2) In Sec. 20102(d)(5) of the NASA Act of 1958 Congress declared a goal of preserving “the role of the United States as a leader in aeronautical and space science and technology;” and
- (3) In Sec. 20102(d)(9) of the NASA Act of 1958 Congress declared a goal of preserving “the United States preeminent position in aeronautics and space through research and technology development related to associated manufacturing processes;” and
- (4) In Sec. 20112(a)(4)&(5) of the NASA Act of 1958 Congress directed the NASA Administrator to “seek and encourage, to the maximum extent possible, the fullest commercial use of space; and encourage and provide for Federal Government use of commercially provided space services and hardware, consistent with the requirements of the Federal Government;” and
- (5) Presidents from both parties have long-supported commercial space efforts through Executive Orders and Policy Directives such as:
 - (a) "Presidential Directive on National Space Policy," issued February 11, 1988 (Ronald Reagan);
 - (b) Executive Order 12675, issued April 20, 1989 (George H.W. Bush);
 - (c) Presidential Decision Directive 7, issued September 19, 1996 (William Clinton);
 - (d) “National Space Transportation Policy,” issued November 21, 2013 (Barack Obama);
- (6) The United States is a signatory to four international agreements on space:
 - (a) The [Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies](#) (the "Outer Space Treaty" or “OST”), adopted by the General Assembly in its [resolution 2222](#)

- [\(XXI\)](#), opened for signature on 27 January 1967, entered into force on 10 October 1967;
- (b) The [Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space](#) (the "Rescue Agreement"), adopted by the General Assembly in its [resolution 2345 \(XXII\)](#), opened for signature on 22 April 1968, entered into force on 3 December 1968;
 - (c) The [Convention on International Liability for Damage Caused by Space Objects](#) (the "Liability Convention"), adopted by the General Assembly in its [resolution 2777 \(XXVI\)](#), opened for signature on 29 March 1972, entered into force on 1 September 1972;
 - (d) The [Convention on Registration of Objects Launched into Outer Space](#) (the "Registration Convention"), adopted by the General Assembly in its [resolution 3235 \(XXIX\)](#), opened for signature on 14 January 1975, entered into force on 15 September 1976;
- (7) Significant evidence that the term "Celestial Body" in the Outer Space Treaty was intended to be limited to objects that are too large to move, most notably, in 1964, Working Group III of the International Institute of Space Law excluded from the definition of "Celestial Body" any object that could be "shifted from its natural orbit."²
- (8) In ratifying the Outer Space Treaty in 1967, the Senate found the OST to allow for commercial sector operations in Outer Space (Treaty on Outer Space, Hearings before the Committee on Foreign Relations, United States Senate, 90th Congress, First Session, March 7, 12 and April 12, 1967, pp. 10, 12, 27);
- (9) Under Article I of the Outer Space Treaty, "Outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies;"
- (10) Under Article II of the Outer Space Treaty, "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."
- (11) Notwithstanding the language above, it has become the practice of states and private entities to recognize certain property rights in space, including, but not limited to:
- (a) Exclusive orbital locations for communications and other satellites to operate for decades at a time;
 - (b) The right to exchange, and in some cases sell, the extracted resources of outer space, such as those extracted from Moon;
- (12) Under Article VI of the Outer Space Treaty, "The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty;
- (13) The United States does not currently have a regime to authorize and supervise the activities of private parties in space; and
- (14) Under Article IX of the Outer Space Treaty, parties engaging in peaceful space activities have a right to do so free from "harmful interference" from others.

² Michael Smirnoff, *Report from Working Group Three on the Law of Outer Space* (1964), 7 Proc. Coll. L. Outer Sp. 352.

(b) Therefore, The Congress finds the following:

- (1) Allowing private entities to explore and utilize space resources is consistent with the international treaty regime so long as those activities are conducted consistent with the overall intent of the party members to the the treaty regime.
- (2) Because there are United States companies who have an interest in conducting activities on and around asteroids and other natural space objects, it is time to establish a regulatory regime that meets the requirement set forth in Article VI of the Outer Space Treaty that states authorize and supervise the activities of U.S. nationals.
- (3) Ownership of resources extracted from natural space objects can be recognized under United States law consistent with Article II and customary international law;
- (4) To ensure that the maximum number of interested parties have free access to space resources, no property rights shall be recognized by the United States until the resource has physically been extracted;
- (5) If a space resource is physically moved by a party into a safe orbit closer to Earth where its resources may be extracted, the United States will recognize a property right in the entire space recourse; and
- (6) The “harmful interference” language in Article IX of the Outer Space Treaty is hereby interpreted by the United States to extend only to physical interference and not to economic or other forms of interference.

(c) Policy

It is the policy of the United States—

- (1) To promote the continued development of space commerce, the utilization of the resources of the Solar System, and the permanent settlement of the space frontier by protecting private property in extracted resources and non-interference rights around ongoing operations;
- (2) That, in establishing a regulatory regime for space operations, no regulation should be adopted that burdens private company activities any more than is absolutely necessary for the United States to comply with its obligations under Article VI of the Outer Space Treaty; and
- (3) To coordinate with other nations to ensure reciprocal recognition of the private property rights of their citizens in extracted resources and to non-interference with ongoing operations, consistent with international law.”

Equal Property Rights in All Space Resources (throughout). As drafted, the bill talks generally of “space resources” but it creates legal rights only in “asteroid resources” extracted in situ (and non-interference rights to the process of doing so). This means that space resources extracted from a planetary surface (*e.g.*, the Moon or Mars) would not be protected, nor would those extracted from a comet, which differs from an asteroid only in that it is composed primarily of ice rather than metals. (Comets may someday be highly valued as sources of water, hydrogen, and oxygen.) There is no reason to limit the property rights created by the bill to asteroids alone. The same legal regime should extend to all space resources for the same basic reason: to create the long-term certainty necessary for investment.

Amendment #2: Delete the definition of “Asteroid resource” in 51301(2) and replace all references to “asteroid resources” with “space resources.”

Property Rights (51503(a)). The ownership of resources extracted from the Moon by both the U.S. and U.S.S.R. have both been recognized by the world community. These “Moon Rocks” have been gifted and sold, arguably establishing customary international law. Legal scholarship preceding the OST suggests that the term “Celestial Body” was intended to mean objects that are too large to move. We believe that international law allows for recognition in space resources extracted from their natural location.

However, as drafted, this subsection could allow for “gaming the system”: claiming entire asteroids based on doing nothing more than finding them because of the ambiguity in the word “obtained.” At worst, this term could be interpreted to mean remote observation and categorization of the asteroid — mere “telepresence” under the decision in *SS-Central America*.³ Claiming ownership of an entire asteroid, even based on active mining operations on *part* of the asteroid, would violate Article II’s prohibition on territorial appropriation. Instead, the bill should:

- Clearly create property rights in extracted resources rather than ownership of the asteroids themselves;
- Require physically touching such objects (defeating telepresence claims);
- Recognize ownership of small objects if they are moved, safed (*i.e.*, moved to an orbit that will not intercept the Earth), and then worked on — to prevent a late-comer from sidling up to an asteroid that has been moved and mining it; and
- Limit the size of such an object that can be owned entirely to 100,000 m³, which is about a 50x50x40 meter asteroid. Such an asteroid would be small enough to be moveable and also small enough that having two companies trying to mine it simultaneously would probably result in interference. Rights over larger asteroids should be addressed by the mining claim system proposed in Amendment #6.

Amendment #3(a) (if Amendment 2 is made): In 51501(a), strike both uses of “obtained.” After the first “obtained,” add “extracted from their natural location.” At the end, add: “No claim of ownership of an entire asteroid shall be recognized unless:

- i) The asteroid has a volume of less than 100,000 m³;
- ii) The entity has moved the asteroid into a new orbit that will not significantly increase the threat of its collision with the Earth; and
- iii) The entity is actively engaged in extracting resources from the asteroid.”

Amendment #3(b) (if Amendment 2 is not made): Strike “asteroid” and both uses of “obtained.” After the first “obtained,” add “extracted from asteroids.” After the second, add “extracted.” At the end, add: “No claim of ownership of an entire asteroid shall be recognized unless:

- i) The asteroid has a volume of less than 100,000 m³;
- ii) The entity has moved the asteroid into a new orbit that will not significantly increase the threat of its collision with the Earth; and
- iii) The entity is actively engaged in extracting resources from the asteroid.”

³ *Columbus-America Discovery Group v. Sailing Vessel*, 742 F. Supp. 1327 (E.D. Va. 1990) (adjudging disputed claims to salvage from S.S. Central America).

Conforming Amendment: In 51503(d)(2), strike “exploration and.”

Non-Interference Zones. The question of whether “non-interference zones” consistent with Article IX need to be established now has come into sharp relief over the past few months. In December, 2014, the FAA/AST issued a response to a payload review filed to Bigelow Aerospace, in which Bigelow requested a non-interference zone of 200 km around future bases on the lunar surface⁴ similar to the safety zone of 200 km that surrounds the International Space Station.⁵ While the FAA response did not directly address the 200 km zone requested by Bigelow, the letter did indicate that FAA/AST intends to “leverage” its existing launch and reentry authority to support Bigelow’s efforts to put a private station on the Moon. Moreover, a recent report by the House Appropriations Committee regarding its approval of the Fiscal Year 2016 Transportation, Housing and Urban Development Bill⁶ appears to endorse this approach. The issue needs to be studied and eventually acted upon, but to adopt a blanket 200 km non-interference zone at this time — or to allow such zones to be created by federal courts deciding cases under 51303(d) — would be ill-advised for a number of reasons.

- 1) Application of the ISS safety zone to the Moon mixes apples and oranges. Because the ISS is travelling at 17,500 miles an hour at a particular orbit, any object traveling near the ISS has the potential of doing extreme damage if the orbits intersect because of the kinetic energies involved. On the Moon (or elsewhere on a Celestial Body), objects on the Moon would have differential velocities of a maximum of a few miles per hour, allowing for much closer proximity without the running a significant risk of “interference.”
- 2) A 200 km non-interference zone on the Moon would create an exclusive operating zone of 125,660 square kilometers, or more than 30 million acres (roughly 0.3% percent of the lunar surface). The first landing at a vital spot on the Moon, such as near the lunar South Pole, which contains significant water-ice deposits, would result in a *de facto* claim of rights on all those vital resources.
- 3) There is no guarantee that the first group to land in a vital area would be American, yet establishing a 200 km zone could be used against American interests by a foreign entity that is first to the surface, including over vital resources at the poles.
- 4) The proper non-interference range will differ from space resource to space resource, and may differ based on the type of operations that are to be established and of potential conflicting uses. Vital in the analysis must be the recognition that under Article I of the OST, “there shall be free access to all areas of celestial bodies,” meaning that non-interfering ingress and egress of areas of Celestial Bodies must be protected.
- 5) It should be noted, for example, that the horizon on the Moon is only 2.43 kilometers away. Any operations beyond that would not be within line of sight of the other operator. The likelihood of interference significantly beyond the horizon would appear small, although additional study as to

⁴ See Yves-A Grondin, *Bigelow: Moon Property Rights Would Help Create Lunar Industry*, NASASPACEFLIGHT (Feb. 14, 2014), <http://www.nasaspaceflight.com/2014/02/bigelow-moon-property-create-lunar-industry/>.

⁵ *Id.*

⁶ “The Committee applauds actions taken by the FAA Office of Commercial Space Transportation confirming the FAA’s willingness to leverage its existing launch licensing authority to encourage private sector investment in lunar systems that will work in tandem with SLS and Orion, by ensuring that commercial activities can be conducted on a non-interference basis. The Committee urges the FAA to continue to add details, such as specified zones of exclusive operation on the lunar surface.”

Report at 20-21 <http://appropriations.house.gov/uploadedfiles/hrpt-114-hr-fy2016-thud.pdf>

ballistic trajectories of lunar regolith kicked up by a launch or landing should be studied and included in a non-interference zone analysis.

- 6) The bill should ensure that non-interference zones created by judicial decisions are not so expansive as to violate Article II's ban on territorial appropriation and Article I's right to peaceful use and exploration of space:

Amendment #4: Add to 51303(d) a new paragraph (3): "The degree of harmful interference caused at the distance between the operations of the two entities is not outweighed by the right of all parties to peaceful use and exploration of space. Thus, any exclusive rights conferred by this section shall be limited to the smallest possible distance necessary to balance the non-interference principle with other principles set forth in the Outer Space Treaty. In no event shall any non-interference rights created under this section prohibit "free access to all areas of celestial bodies," as mandated by Article I of the Outer Space Treaty, provided that access does not cause harmful interference, as prohibited by Article IX of the Treaty."

The bill should also ensure that the non-interference right protected is that of ongoing operations in situ, rather than of prospective operations that might be "conducted" on an asteroid.

Amendment #5: At the end of 51303(d)(1)(B), after "the activity," add "in situ."

Mining Claims. Any space mining plan will unfold slowly: years will likely elapse between the identification of a target, telepresence observation of that target, in situ prospecting and commencement of actual operations. It is certainly possible that companies may "interfere" with each other in these early stages of "conducting" operations. Such interference can constitute a significant business risk; indeed, the possibility of it can discourage any investment in the first place. But it is not harmful interference of ongoing operations, which is clearly grounded in Article IX and which can be addressed through private rights of action brought in federal court. Instead, this kind of interference should be addressed the way such interference has always been addressed: through mining claims. Congress created such a system with the Deep Seabed Hard Mineral Resources Act of 1979, which recognizes mining claims to the seabed floor in a manner carefully designed to avoid constituting territorial appropriation, and is thus highly analogous to the OST. While it is not necessary to draft such a statute in this bill, this bill should at least lay the foundation for such a system.

Amendment #6: At the end of 51302(b), add a new subsection as follows: "a legal framework for recognizing exclusive mining claims to space resources modeled on that contained in 30 U.S.C. § 1411 et seq."

Resolving International Disputes. As drafted, the bill protects U.S. entities against appropriation of their space (or asteroid) resources, or interference, only by other U.S. entities — and does so entirely through private rights of action brought in U.S. courts. This leaves unresolved how such disputes will be addressed as between U.S. companies and foreign companies. While it is not necessary to "boil the ocean," to address all potential problems, the bill should, at a minimum, require further study of how to craft legislation to address such disputes. The DSHMRA authorizes the State Department to recognize, as "reciprocating

states,” nations with laws that are “compatible” with the DSHMRA, and that protect the rights of those with U.S. licenses issued under the Act.

Minimal Amendment #7(a): Add to 51302(b) a new paragraph (3), as follows: “a system for resolving disputes regarding ownership of space resources and harmful interference between United States commercial space resource utilization entities and such entities based in ‘reciprocating states,’ as that concept is defined in 30 U.S.C. § 1428.

The DSHMRA is not an exact analogy to the approach taken in this bill, because it relies on a regulator to issue mining claim licenses, rather than relying on common law actions to protect rights to extracted resources and non-interference zones. Thus, the ‘reciprocating states’ approach of 30 U.S.C. § 1428 can be simplified significantly — if the President is given discretion to negotiate appropriate dispute resolution mechanisms. The following is a simplified version of Section 1428:

Alternative Amendment #7(b): Add to 51304, entitled “International Legal Framework”:

“(a) The Secretary of State, in consultation with the heads of other appropriate departments and agencies, may designate any foreign nation as a reciprocating state if the Secretary of State finds that such foreign nation—

- (1) regulates the conduct of its citizens and other persons subject to its jurisdiction engaged in exploration for, and commercial recovery of, space resources in a manner compatible with that provided herein, and with international law, and includes effective enforcement provisions;
- (2) recognizes the rights conferred herein;

(b) Effect of designation

Disputes regarding ownership of space resources or harmful interference between United States commercial space resource utilization entities and reciprocating state commercial space resource utilization entities shall be resolved in a manner prescribed by the President and consistent with agreements entered into under subsection (d).

(c) Revocation of reciprocating state status

The Secretary of State, in consultation with the heads of other appropriate departments and agencies, shall revoke the designation of a foreign nation as a reciprocating state if the Secretary of State finds that such foreign nation no longer complies with the requirements of subsection (a) of this section.

(d) Authorization

The President is authorized to negotiate agreements with foreign nations necessary to implement this section."

(f) International consultations

The Secretary of State, in consultation with the heads of other appropriate departments and agencies, shall consult with foreign nations which enact, or are preparing to enact, domestic legislation governing space resources. Such consultations shall be carried out with a view to

facilitating the designation of such nations as reciprocating states and, as necessary, the negotiation of agreements with foreign nations authorized by subsection (d) of this section and for dispute resolution mechanisms authorized by subsection (b).”

Biennial Progress Reports (51502(b)). The bill requires an initial report from the President, but makes no provision for follow-up reports.

Amendment #8: Before “Report required,” insert “Initial.” At the end of the subsection, thereafter, add a new subsection (c), as follows:

“Every other year thereafter, the Office of Space Commercialization shall submit to Congress a report on the progress made since the last report and containing additional recommendations.”

How the U.S. Can Lead the Way to Extraterrestrial Land Deals

Berin Szoka and James Dunstan



Editor's Note: This Wired Opinion is in response to [Rand Simberg's proposal](#) to allow individuals and private companies to stake land claims on bodies in space.

We strongly support private property rights in space. And we believe in the power of private enterprise and are convinced that only entrepreneurship can lower the cost of doing business enough to fuel a space-based economy. On these important points we agree with [Rand Simberg](#).

But we disagree completely on the path America should take to achieve space property rights.

Berin Szoka and James Dunstan

About

The basic idea is nothing new. In his book [Unreal Estate: The Men Who Sold the Moon](#), Virgiliu Pop tracked hundreds of outer-space property rights claims over thousands of years, from individuals, kings, and countries, under various theories of law. All have failed the test of time.

The negotiators of the 1967 [Outer Space Treaty](#) knew that such claims would never stop unless the countries agreed once and for all that: "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.”

James Dunstan

But wait, Simberg and others argue that Article II of the Treaty only prohibits national appropriation, leaving individuals free to do whatever they want in space. Well, not so fast. Article VI of the Outer Space Treaty states:

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States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty.

Launching states are required to ensure that their nationals conduct activities in conformity with the provisions of the Treaty. There is, therefore, no way that the United States could confer the kind of private land grants Simberg proposes.

The “loophole” simply doesn’t exist.

Even if the United States withdrew from the Treaty in order to implement such land grants, what would stop the Chinese from adopting domestic legislation that went further? What if the first time a Chinese probe lands on the moon, the moon could be claimed by the “Great Wall Company,” owned by the People’s Liberation Army? The United States would then be left to argue that our law should be followed, but the Chinese law shouldn’t. That’s precisely the kind of territorial jockeying the Outer Space Treaty was intended to prevent.

So what would a truly practical proposal for securing space property rights look like? First, the Outer Space Treaty recognizes full ownership rights in objects and vehicles launched into, or constructed, in space.

Satellites are regularly bought and sold. In 2000, when a [private company](#) attempted to lease the Mir Space Station from the Russians, one of us (Dunstan) negotiated the deal — using a standard commercial building lease!

While many international space lawyers once defended the satellite monopoly of Intelsat, an intergovernmental consortium, the rise of PanAmSat in the 1980s clearly established the rights of private companies to operate in space. Similarly, the argument that orbital “slots” could only be allocated for short durations, lest they become “appropriated,” has given way to recognition of *de facto* property rights in orbits.

Together, these two developments have allowed the satellite industry to flourish, generating over \$168 billion a year in revenue. Similarly, international law has evolved to recognize property rights in extracted resources. When the United States brought back 800 pounds of lunar rocks during the Apollo missions, and declared them to be “national assets,” there was an outcry from the international space law community that the samples should be turned over to the United Nations and distributed amongst all the nations of the world.

In one of the shrewdest moves in the history of international relations, the U.S. — rather than trying to establish the principle of private property unilaterally — turned to its archenemy, the Soviet Union, and exchanged Apollo samples for Soviet Luna samples. The Russians subsequently resold some samples, creating a small secondary market, and establishing customary international law.

Ultimately, tapping the resources of the Moon and asteroids will require two further steps. The Outer Space Treaty already restricts “potentially harmful interference.” Many international space lawyers interpret this to imply a narrow

(say, half a mile) “safety zone” around active facilities or operations. Codifying this in a multilateral agreement, as [proposed by space lawyer Wayne White](#), could help encourage investment. Simberg describes various potential business models for lunar mining. But rather than land grants, what these ventures really require is exclusive mining rights for limited durations to reward them for investing in prospecting.

Here, the law of the sea provides a helpful precedent. In the late 1970s, the Moon Treaty and the Law of the Sea Treaty were developing in parallel directions, declaring space and the seabed floor both to be the “common heritage of mankind,” and thus requiring that any economic activity be conducted by a U.N. agency.

The U.S. rightly rejected both treaties as socialism. Instead, Congress enacted [legislation granting prospectors exclusive seabed mining claims](#). Other developed nations followed suit, and created a framework of interlocking national laws recognizing each others’ licenses.

But unlike Simberg’s land grant proposal, these licenses did not amount to permanent territorial claims that could be resold to raise capital — which is forbidden by both the Law of the Sea Treaty and the Outer Space Treaty — but only the exclusive right to mine a limited area for a limited time. As White proposes, a similar mining claim system for the Moon should be negotiated multilaterally.

But the best place to establish another pro-property precedent is right above our heads: We need clear rights to remove discarded satellites and used rocket stages from Earth orbit. Today, governments retain jurisdiction and control (as well as liability) over objects whose launch they licensed, even after they are abandoned. Thus, cleaning-up orbital debris — a serious and growing problem — requires the permission of the government that originally licensed each launch.

In contrast, the maritime laws of Wrecks, Finds, and Salvage, reward private parties for removing derelict vessels that are a threat to navigation. Congress could start by enacting a law stating that any object over which the United States has jurisdiction (except for classified payloads) is to be deemed orbital debris and abandoned once its useful life is over, meaning that any U.S. company could appropriate the debris by safely removing it. This could allow reuse or recycling of valuable satellites and rocket upper stages that are currently nothing but hazards.

Further, Congress should direct the State Department to begin working with other countries on the removal of debris that poses a collision threat. Safety zones, mining claims and salvage rights may not excite the “property rights base” the way land grants do. But they’re far more necessary, and practical, than land grants. They’re also well grounded in the basic Lockean conception of property that undergirds free markets (“mixing your labor with the soil”), unlike having governments give away land they don’t, and can’t, own under the Outer Space Treaty, as subsidies for space settlement.

Image: [NASA](#)

Opinion Editor: John C. Abell [@johncabell](#)

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Space Law: Is Asteroid Mining Legal?

Berin Szoka and James Dunstan



Can a private company claim ownership of an asteroid based on sending a probe out to it? Can it at least get exclusive mining rights? Would it own the gold, platinum or other materials mined from the asteroid?

Last week, a new private company, [Planetary Resources](#) announced an ambitious plan to [prospect for and eventually mine](#) near-Earth asteroids. Backed in part by Google execs Larry Page and Eric Schmidt, this venture has stirred the pot once again on the question of outer space property rights.

Understanding the legality of asteroid mining starts with the 1967 [Outer Space Treaty](#). Some might argue the treaty bans all space property rights, citing Article II:

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.

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About

Others [have argued](#) that because Article II only applies to nations, individuals are free to claim chunks of the solar system. But as [we've noted before](#), the treaty also requires nations to ensure their citizens comply with the other provisions of the Outer Space Treaty — including a prohibition against sovereign claims of property rights. So neither nations nor individuals can appropriate territory in space. But what about asteroid mining?

While Article II clearly bans “appropriation,” other provisions actually support property rights. The treaty makes clear that both the exploration and use of outer space shall be free of restraint and discrimination, and that there will be free

access to all parts of space. It also states that the use of equipment and facilities necessary for peaceful activities is fine. And anything launched into (or built in) space remains the private property of its owner.

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To make sense of the Treaty, we must turn to customary international law — how nations have interpreted what these treaty provisions mean in their dealings, both internally, and with other nations. These other sources of international law are critical because the Outer Space Treaty itself is at best confusing and, at worst, internally inconsistent on space property rights.

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Blanket claims to celestial bodies have been attempted for millennia, yet none has been recognized by customary law. The only court case we have in this respect arose when [Greg Nemitz](#), a space activist, filed a claim for the asteroid Eros with an online database known as the Archimedes Institute, and then sent NASA a bill for parking fees when NASA landed the NEAR-Shoemaker probe on Eros in 2001. The U.S. 9th Circuit Court of Appeals dismissed the suit because Nemitz was unable to prove actual ownership rights for Eros.

While Nemitz failed, customary international law has essentially recognized property rights based on possession — which, as the old saying goes, is nine-tenths of the law. Satellite orbits, for instance, are allocated by the International Telecommunications Union. Strictly speaking, they are not “owned” by the assignee, but can be renewed on a regular basis, and can be leased to other parties. This and Outer Space Treaty’s recognition of property rights for satellites are the basis for the more than \$300-billion-per-year private satellite industry.

Similarly, asteroid mining will depend on customary international law established by the 1960s moon race between the U.S. and USSR. The six Apollo landings brought back 842 pounds of lunar material. NASA has strictly controlled use of the material, and less than 10 percent has ever been experimented on.

[NASA itself claims](#) (.pdf) that the lunar samples are “a limited national resource, a future heritage, and [requires] that samples be released only for approved applications in research, education, and public display.” The United States government has vigorously prosecuted anyone thought to have improperly obtained any such samples. Yet NASA exchanged some of these samples with the Soviet Union, which drew from the approximately 300 grams of lunar material brought back by three Soviet Luna robotic sample return missions.

Under any definition of ownership, the United States clearly owns the Apollo lunar samples. Any entity that can claim something as an exclusive resource, control its transport and distribution, and can exchange it for something else of value (in this case, other lunar samples), clearly owns that object. Russian lunar samples have been re-sold by private individuals, establishing that portions of a celestial body can be subject to ownership if they are removed from that celestial body — whether by governments or private parties — even if the celestial bodies themselves are not subject to appropriation.

This is the single most important legal precedent for property rights in space, and should provide great comfort to those who wish to exploit the resources of outer space. It is also consistent with many commentators, who allege that the Outer Space Treaty’s prohibition on “appropriation” relates only to entire celestial bodies as they exist “in nature,” and that both individuals and nations can claim ownership of resources extracted from celestial bodies. The only real question, then, is the extent of this ownership: Can an entire asteroid be claimed if it is being mined?

Under the Outer Space Treaty, if a company is mining an asteroid, no other entity could come along and start mining on the other side if doing so could interfere with the first set of miners. If the asteroid were large enough to accommodate two independent mining operations, both could likely proceed, each gaining ownership of whatever material they extract. Thus, customary international law already gives would-be asteroid miners a sound basis for

their business model.

But what if a mining company captured an asteroid, changing its orbit to bring it closer to Earth and thus make return of extracted materials easier? Would the entire asteroid belong to the mining company because the asteroid, as a whole, was “extracted” from its “natural” orbit — becoming more like a single rock or an artificial satellite than a moon or a planet?

This question is too far in the future to answer. But the day that question arrives, we can all pop the champagne corks to celebrate: Mankind will have become a truly spacefaring species. We will have taken the first steps toward bringing the nearly limitless resources of space into the economic sphere of humanity.

Image: NASA/Wired

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Commentary | Space Property Rights: It's Time, and Here's Where to Start



Fortunately, what's needed to drive private investment isn't the right to own a plot of land on the Moon or resell it to raise capital. It's the rights sought by Bigelow: to extract, use and profit from extraterrestrial resources without interference. Credit: Deep Space Industries artist's concept

'We can lick gravity,' quipped Wernher von Braun, "but sometimes the paperwork is overwhelming."

Robert Bigelow is trying to do what von Braun could only dream of: Build a Moon base — and a profitable one at that. He's not just dreaming. Funded by his hotelier fortune, Bigelow Aerospace already has two autonomous prototype habitation modules in orbit. Another Bigelow module is headed to the international space station next year. The company plans a full-scale space station once domestic crew transportation becomes available.

But as for von Braun, Bigelow's challenge isn't merely technological (or economic). Just like the first private rocket company 30 years ago, Bigelow Aerospace needs sign-off from the U.S. government — and again, there's no clear path forward. The company also needs two other things, as Bigelow himself made clear at a press conference in November. First is the U.S. government's assurances that it won't allow other U.S. companies to interfere with Bigelow's operations. Second, obviously, Bigelow must own any resources it mines: minerals, water, rocket fuel, etc.

"Without property rights, any plan to engage the private sector in long-term beyond [low Earth orbit] activities will ultimately fail," declared a recent report Bigelow produced for NASA.

Far from seeing the company as competition, NASA "finally understands the need for such public-private partnerships," says James Pura, president of the Space Frontier Foundation, an organization long critical of NASA's traditional go-it-alone approach but which has cheered the agency for buying commercial cargo and crew transportation services to the international space station.

Not everyone is onboard, though. In the Dec. 9 issue of *SpaceNews*, space lawyer Michael J. Listner insisted that “[The Time is Not Ripe To Tackle Space Property Rights](#)” [Commentary, page 18]. He’s right: The United States needs to tread carefully. But he falls into the typical trap of lumping all “property rights” together — and thus defaults to calling for careful international negotiation, the last refuge of most space lawyers.

While resolving disputes among companies from different countries may indeed require some kind of negotiation, the U.S. government can and should address Bigelow’s other two problems by exercising its jurisdiction over U.S. companies to (1) recognize Bigelow’s ownership of extracted resources and (2) bar interference with Bigelow’s operations by other U.S. companies.

Listner is also wrong that Bigelow is alone in pushing the issue: The U.S. Federal Aviation Administration’s (FAA) space industry advisory council just unanimously approved a resolution calling for precisely what Bigelow wants.

Many blame the lack of space “property rights” for the lack of commercial success beyond Earth orbit. Some insist governments need to incentivize development of the Moon, our “eighth continent,” by giving away huge tracts of land to the first companies to build bases. Such celestial land grabs are specifically outlawed by Article II of the Outer Space Treaty of 1967, whether such claims are made by countries or by private entities.

Fortunately, what’s needed to drive private investment isn’t the right to own a plot of land on the Moon or resell it to raise capital. It’s the rights sought by Bigelow: to extract, use and profit from extraterrestrial resources without interference. These are not only consistent with international space law, but required by it. Article I of the treaty guarantees free access to explore “and use” space. Article VIII explicitly recognizes that ownership of facilities and vehicles isn’t changed by being in space. Article IX implies that the United States could recognize a limited exclusive “safety” zone around such facilities to protect against harmful interference.

Bigelow’s territorial rights would be limited in scope, contingent on ongoing operations, and not absolute — lest they constitute territorial “appropriation,” which the treaty explicitly bars. Article 9’s noninterference clause is a two-way street: Depending on where Bigelow sets up operations, in order to allow for “the corresponding interests” of others, it might have to allow others some limited form of access through its safety zone — think easements. But none of these limitations undermines the core function of property rights: to operate without interference and exclude others from the revenue stream generated by finding and utilizing extraterrestrial resources.

Customary international law already recognizes that extraterrestrial materials brought back to Earth can be owned and sold — just like the thousands of space meteorites available today on eBay. The U.S. and Soviet Union both claimed ownership in lunar resources extracted and returned to Earth, and exchanged samples without international objection. (The 1979 Moon Agreement would have banned appropriation of extraterrestrial materials in space but has been ratified by only a handful of countries, and was firmly rejected by the U.S. Senate.)

Bigelow’s one small legal step — within the Outer Space Treaty — would be one giant leap for space development. But Bigelow faces the same problem the first private rocket company had in 1981: Which U.S. agency has authority?

Officially, no one — but the FAA’s Office of Commercial Space Transportation (FAA/AST) has general responsibility to ensure that all U.S. launches and payloads comply with the international obligations of the United States. The “payload review” process allows companies like Bigelow to get that determination long before they’re actually ready to launch — a vital mechanism for removing uncertainty that might otherwise chill new ventures. And besides, FAA/AST has earned great respect for both its unique expertise and how well it has balanced its dual missions: protecting the public while promoting the launch industry.

Even with strong support for commercial space development from President Barack Obama, it’s not entirely clear what will happen to Bigelow’s request in the opaque interagency coordination process. While NASA leadership talks about the importance of commercial ventures, its old guard still equates “space” with “NASA.” The State Department has primary jurisdiction over international issues and is generally extremely cautious. The Defense Department tends to be even more cautious, perhaps fearing that greater clarity might reduce its “freedom of action” in some

hypothetical military space scenario.

Perhaps the biggest problem with Bigelow's approach is that FAA/AST's statutory authority is limited to launch and re-entry. Politically, this statutory gap could be used as a pretext by those uneasy about any discussion of how to operationalize the treaty's vague principles. (It also means whatever clarity a payload review might provide about property rights may be tempered by the possibility of future legal challenges to FAA/AST's jurisdiction.)

But doing nothing isn't an option. Article VI requires the United States to provide "authorization and continuing supervision" of what U.S. companies do in space to ensure compliance with the treaty. In practice, that means every time a private company pushes the boundaries of the space economy, the U.S. government has to do something — and that "something" is usually going to sound a lot more like "regulation" than "property rights."

When Space Services Inc., the first private rocket company, sought permission to launch the Conestoga 1 in the early 1980s, it required approval from 17 government agencies. The U.S. government was unprepared to regulate the activities of American companies in space — as Article VI requires. Congress scrambled to respond, finally passing the 1984 Commercial Space Launch Act. FAA/AST has since licensed more than 200 launches and re-entries, making possible the private launch industry critical to the success of every other private venture in space.

Similarly, the entire global satellite industry rests on the elaborate international system that has evolved since the 1960s for coordinating national radio frequency spectrum regulations. The International Telecommunications Union coordinates the assignment of orbit slots based largely on the demonstrated ability to use them as early as possible. The assignees don't own those slots. They're merely exercising their right under the treaty not be interfered with for some period of time. Bigelow merely wants the same thing on the Moon.

But if Bigelow gets the answers he needs out of the executive branch, this may be more a catalyst for congressional action than a permanent solution — just as with rocket launches back in 1984. Congress will eventually have to clarify who (FAA/AST? Commerce Department?) has jurisdiction over lunar (and asteroid) activities, and to govern interference between U.S. companies. Domestic legislation could lay the groundwork for minimizing interference between companies from different countries. That's what the United States did with a 1979 law that recognized deep seabed mining claims (of limited duration) issued by any country with compatible legislation. This can all be done without territorial appropriation — consistent with the Outer Space Treaty.

By 2044, with any luck, the U.S. government will have issued more than 200 licenses to U.S. companies reaching out to do something productive to the Moon and asteroids. Without that kind of activity, we — NASA, would-be miners and everyone else — will all be stuck on this rock, probably still arguing about whether the "time is right" to let space commerce take off.

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