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On “The Mineral Supply Chain and the New Space Race”

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I. Introduction – It is a Race

Chairman Gosar, Ranking Member Stansbury and Members of the Subcommittee.

My name is Michelle Hanlon. I am a space lawyer and the executive Director of the Center for Air and Space Law at the University of Mississippi. We are the only ABA accredited law school in the country to offer a Juris Doctorate degree with a concentration – as well as an advanced master of laws – in air and space law. The University of Mississippi possesses a deep tradition of research, analysis, education and advancement in space law going back to the 1960s when the first international treaties governing space activities were being negotiated. I am also the co-founder, President and CEO of For All Moonkind, a nonprofit that is the only organization in the world focused on protecting human cultural heritage in space, like the Apollo lunar landing sites. We are a Permanent Observer to the United Nations Committee on the Peaceful Uses of Outer Space, a position which affords a view into international deliberations regarding space activities.

Finally, I am the founder of the Institute on Space Law and Ethics, an organization that brings together diverse perspectives on space exploration. Our mission is to ensure that ethical considerations continuously serve a foundational role in shaping the legal and normative frameworks governing the exploration and use of outer space, with the goal of enhancing mutual understanding, transparency, trust and the sustainable use of space and its resources for the benefit of all humankind while minimizing misunderstandings and the potential for conflict.

I am grateful for the opportunity to testify today in respect of the Mineral Supply Chain and the New Space Race. It is without question that the decisions made today with respect to the exploration and use of space and its resources will have far-reaching implications for future generations, and indeed, all humanity, whether in communities here on Earth or elsewhere in the cosmos. Some regard space and its resources as a savior of our Earth, able to provide energy and other resources as our terrestrial supplies dwindle. Others will tell you that space exploration is a wasted investment. But what is inarguable is that humanity has greatly benefited from the use of assets in space. It is also incontrovertible that the future sees only more dependence on space assets and resources. We do not – we cannot – know what solutions space may hold, and we will not unless we continue to explore and expand into the upper reaches of space.

For these reasons, I am heartened to see growing recognition of both the promise of space resources and the fact that we find ourselves, once again, in a space race. Only this time, the stakes are much higher than before. This race is not about prestige, it's about access to resources that can benefit the lives of all Americans – all humanity – and it's about the governance framework that will support the management of these resources and all future space activities. Contrary to popular belief, space is not a lawless wonderland. There are four widely-ratified international treaties that govern space activities. Negotiated in the 1960s and 70s, they provide a solid baseline. Nevertheless, they are broadly worded, suffer from internal inconsistencies and glaring gaps and are subject to varied interpretations. Chief among the grey areas are questions related to the ownership and use of extraterrestrial resources. For example, while binding international law states that the exploration and use of outer space shall be free for exploration and use by all, which implies that resource extraction is permissible, it also states that a nation may not claim territory in space, which calls into question how a space resource mining operation would be able to protect its investment. Given these and other grey areas, there exists a potentially serious first mover advantage which the United States must understand and take into consideration as it implements space and natural resource policies and competes in this new space race.

II. The Outer Space Treaty Regime Was Not Designed for Space Mining

A. President Eisenhower Initiated Negotiations to Keep Space Peaceful

In October 1957, Sputnik 1 became the first human-made object to reach space. Shortly thereafter, President Eisenhower initiated negotiations to secure space for peaceful purposes. His efforts ultimately led to the development by the United Nations (UN) of an ad hoc committee, the Committee on the Peaceful Uses of Outer Space (COPUOS), which was made a permanent

UN body in 1959. The COPUOS above all recognizes “the common interest of [hu]mankind in outer space” and “the common aim that outer space should be used for peaceful purposes.”¹

COPUOS was the backdrop for the negotiation and implementation the treaties which today govern space activities. The first, 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), was ratified in 1967. This Treaty, with 114 signatories including the United States (US), Russia, China and most every spacefaring nation, enshrines the fundamental concept that outer space “shall be free for exploration and use by all.” Essentially a demilitarization instrument, the Treaty does not contemplate the management and use of extraterrestrial natural resources. In fact, it does not once mention the word resource. However, it does impose limitations on the freedom of exploration and use. First, is the non-appropriation principle, which stipulates that no country may claim territory in space. And second, the Treaty requires that all activities in space be conducted with due regard for the corresponding interests of others.

Four other treaties related to sovereign space activities were negotiated in the wake of the Outer Space Treaty. These are colloquially known as the Rescue Agreement, the Liability Convention, the Registration Convention and the Moon Agreement. As their names suggest, these agreements respectively offer more detailed guidance on how countries should act in relation to the rescue of astronauts; responsibility and liability for damage caused by space objects; and the registration of objects launched or intended to be launched into orbit. The Moon Agreement was the international community’s first attempt to regulate the access to and management and utilization of extraterrestrial natural resources. It has been ratified by only 18 States. The United States, China and Russia are not parties to that Agreement and Saudi Arabia is withdrawing from the treaty in January 2024.

The bottom line is that there are gaps in the law which may be filled by the first mover.

B. Space Cannot Be a “Global Commons”

Earth occupies a very small part of space. Around us are an infinite source of resources. How we characterize the extraterrestrial domain is important. Many say that space is a global commons. The UN defines the term “global commons” as “those resource domains that do not fall within the jurisdiction of any one particular country, and to which all nations have access.”² Global commons require global governance, a notion that has been executed well in only rare circumstances. The UN identifies four “global commons:” the high seas, the atmosphere, Antarctica and outer space.

This notion that space is a global commons must be challenged. First, the Outer Space Treaty does not identify outer space as a global commons. Second, the very term “global” suggests that global commons must be bound, in some way, to Earth. Things that happen in the high seas, the atmosphere or even Antarctica could have direct impact on the health and welfare of countries, communities and individuals around the world. These areas also play an integral role in the health of our global ecosystem and environment. If someone, entity, or country operates a mine

¹ U.N.G.A. Res. 1472 (XIV) (Dec. 12, 1959).

² United Nations System Task Force on the Post-2015 UN Development Agenda.

on a random asteroid in the Kuiper Belt, while the ultimate impact will benefit human society by providing a new supply of resources, it surely will not have a direct impact on the health and welfare of Earth communities or the Earth's ecosystem (except, again, perhaps as a benefit by moving heavy industry off-Earth).

Finally, the concept that the vast infinity of space is a human resource domain is the utmost of anthropocentric hubris. Are we truly asserting that all of space is the sole responsibility and domain of Earthlings alone?

Despite the UN stance, the United States has never, as a matter of international policy, considered space to be a global commons. A 2020 Executive Order issued by President Trump formalized this position and characterized space, instead, as a unique domain of human activity. This, is a far more flexible description of the cosmos as it allows for responsible stewardship while leaving open possibilities we have not yet had the opportunity to contemplate. Indeed, we may one day agree that the broad expanse of space is susceptible to not one, but several different categorizations. We must use our terrestrial experience to inform, not constrain, our view of the universe and the management and use of the resources it holds.

It is notable too that recently proposed legislation, the Commercial Space Act of 2023, also includes a provision stating that “outer space may not be considered a global commons.”

That said, the United States is bound by the Outer Space Treaty which does place limits on space activities.

C. The Exploration and Use of Space is the Province of All Humankind

Article I of the Outer Space Treaty describes the exploration and use of space as “the province of all [hu]mankind.” This is markedly different from term used in Article 11 of the Moon Agreement which characterizes the Moon and its natural resources as “the common heritage of [hu]mankind.” It is an important distinction.

Ambassador Arvid Pardo of Malta is credited with introducing the principle of “common heritage of humankind” as a system of resource management in 1967 during the negotiation of the Law of the Sea Treaty.³ The concept of was more fully developed by the United Nations in a 1970 resolution which declares “the sea-bed and ocean floor, and the subsoil thereof, beyond the limits of national jurisdiction, as well as the resources of the area, are the common heritage of [hu]mankind.” This means, the resolution goes on to note, that these areas and resources “shall not be subject to appropriation by any means by States or persons, natural or juridical.”⁴

The concept of “common heritage” as encapsulated in the Moon Agreement suggests that: 1) no State or private entity may claim or use resources until and unless authorized and approved by a,

³ Statement of Mr. Pardo, 22nd Session of the United Nations General Assembly, U.N. Doc. A/C.1/PV.1515, 1516 (Nov. 1, 1967) (It would “be wise to establish some form of international jurisdiction and control over the sea-bed and ocean floor underlying the seas beyond the limits of present national jurisdiction.”).

⁴ U.N.G.A. Res. 2749 (XXV), ¶ 1 (Dec. 16, 1970).

presumably, United Nations-driven common management; and 2) any benefits which accrue as a result of any exploitation or use must be equitably shared.

It is deeply significant that the Outer Space Treaty does not adopt this nomenclature, suggesting that outer space and its resources shall be considered and utilized in a manner different from that which governs “common heritage” as described in the Moon Agreement or the Law of the Sea.

Regardless of what is meant by the term “province of all [hu]mankind,” the concept of freedom of exploration and use of space is the guiding force governing space activities. This is further buttressed by the additional agreement in the Outer Space Treaty that “there shall be free access to all areas of celestial bodies.” These freedoms to explore, use and access are barely curtailed by the other provisions of the Treaty. The only restrictions imposed on these freedoms are that:

- Exploration and use shall be carried out for the benefit and in the interests of all countries (Article I)
- States may not claim territory in space (Article II).
- International law applies in space (Article III).
- Nuclear weapons or any other kinds of weapons of mass destruction may not be placed in orbit or on any celestial bodies (Article IV).
- The Moon and other celestial bodies shall be used exclusively for peaceful purposes (Article IV).
- All activities in outer space must be conducted with “due regard” for the corresponding interests of others (Article IX).

The benefits, non-appropriation and due regard principles, have the most bearing on the extraction and use of extraterrestrial mineral and other resources.

For clarity’s sake, it is important to note here that the Treaty does reach private, non-State activity. Article VI obligates countries to assure that all “national activities are carried out in conformity with” the Treaty. The Article also makes it quite clear that countries bear “international responsibility for national activities in outer space . . . whether such activities are carried on by governmental agencies or by non-governmental entities.” In space, essentially, everything that is done even by a nongovernmental entity is considered to be done by the State even if it otherwise had no involvement in the mission or activity.⁵

⁵ To demonstrate how Article VI might affect space mining activities, we turn to events that occurred in Low Earth Orbit in 2021. On December 3, 2021, the Chinese government used a diplomatic message known as a Note Verbale to complain that small satellites owned and operated by SpaceX had forced them to implement “preventive collision avoidance” measures to protect their space station on two separate occasions. Helpfully, the Chinese government also took the opportunity to remind all countries of their Article VI responsibilities. The message was clear. US, you have created a space hazard by not properly supervising your non-governmental entity and if something happens to our space station or our astronauts, you will be liable. In its response, the US chided the Chinese government for not reaching out bilaterally, however, it also implicitly recognized US responsibility for the privately-owned and operated SpaceX spacecraft even though it was not undertaking any tasks at the behest of the US government. If a private entity causes damage in space, the State in which the entity was formed, or in which it may be considered a national, will be liable regardless of the level of due diligence it may have exercised in respect of the activity.

D. Space Mining Benefits All

Returning to the restrictions on freedom of exploration and access, Article I is clear that any exploration and use shall be carried out for the benefit and in the interests of all countries. Some would argue that the concept of shared benefits means sharing monetary profits. This is a very narrow view of the word “benefit.” The phrase also offers no indication of when a benefit must accrue. Removing immediacy, there is no doubt that every single country on Earth has benefited in some way from space activities, be it from remote sensing satellites that share weather predictions and climate information to GPS and telecommunications.

Space mining will also provide benefits to all countries, indeed all humanity on multiple levels. First, as we have seen so often with space activity, the tools developed to implement off-Earth mining operations require technological advancement that will enhance the human experience on Earth in ways we cannot even begin to imagine. Mining for water in particular, may provide direct benefits to areas here on Earth where water is a scarce resource. Second, mining will also increase our scientific knowledge of the universe around us. Understanding the composition of our celestial neighbors will provide much insight which can ultimately help us better care for our Earth. Third, extracting and using off-Earth resources will make it more efficient for us to explore further into the reaches of the Universe, again compounding our potential scientific discovery. Finally, discovering and mining resources on other celestial bodies will relieve the pressure on our own and help us protect and even heal our terrestrial environment and end our reliance on children and other laborers earning less than \$2 a day mining for cobalt in places like the Congo.⁶

In the short term, it may appear that only a select few entities – whether national or private – have the capability to even consider commencing mining operations in space. There was a time that only a select few entities had the capability to sustain a national or private airline, and yet today the air industry is the backbone of our global economy. That said, care must be taken to assure that benefits are accessible to all, including future generations which implies that while the multiple benefits described above create an ethical imperative to develop extraterrestrial mining operations, there is an equal imperative to do so responsibly.

III. Opportunity for Interpretation Creates a First Mover Advantage

A. The Non-appropriation Principle: So Much Left Open

Article II of the Outer Space Treaty states in full: “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.”

1. National Appropriation Does Not Apply to Extraction

Article II could have been interpreted to apply both to territory in space and the resources in that territory. However, reference must be made once more to the Moon Agreement which clearly states in Article 11(3) that “[n]either the surface nor the subsurface of the moon, *nor any part*

⁶ <https://www.npr.org/sections/goatsandsoda/2023/02/01/1152893248/red-cobalt-congo-drc-mining-siddharth-kara>

thereof or natural resources in place, shall become property of any State, international intergovernmental or non- governmental organization, national organization or non- governmental entity or of any natural person.”

Once again, it is deeply significant that the Outer Space Treaty does not include this language, suggesting that Article II does not apply to parts of celestial bodies or the resources contained therein.

As far as resources contained in celestial bodies, it is also worth noting that each of the US, China, Russia and Japan have obtained material directly from the Moon or other celestial body for use – albeit scientific rather than commercial – without objection by any other country. This supports the interpretation that the non-appropriation principle does not apply once a resource is extracted from its source.

The US interprets Article II in this way. The Commercial Space Launch Competitiveness Act,⁷ signed into law by President Obama in 2015, recognizes commercial property rights in resources extracted from celestial bodies stating unequivocally that:

A United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.

President Trump reaffirmed this in his 2020 Executive Order which, among other things, proclaims that “American should have the right to engage in commercial exploration, recovery, and use of resources in outer space,” and urges executive departments to “take all appropriate actions to encourage international support for the public and private recovery and use of resources in outer space.” Luxembourg, United Arab Emirates and Japan have similar legislation and India has recently released a space policy that also supports this interpretation.

It is also captured in the Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids, known colloquially as the Artemis Accords.⁸ Although these Accords are not a binding instrument, the Accords have been agreed by 33 nations (as of December 8, 2023). Included in the Accords is the affirmation “that the extraction of space resources does not inherently constitute a national appropriation under Article II of the Outer Space Treaty . . .” Neither China nor Russia has signed the Artemis Accords.

2. What About Parts of the Moon?

The language of Article II of the Outer Space Treaty can be interpreted to mean that no nation may claim *the whole* of outer space, the Moon or any other celestial body as territory. Arguably,

⁷ U.S. Commercial Space Launch Competitiveness Act, H.R. 2262, 114th Cong. (2015).

⁸ *The Artemis Accords*, NASA, <https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf> (last visited Apr. 17, 2022).

then, it is silent as to *parts*. Does this mean a nation can claim a part of the Moon, or a part of an asteroid so long as it does not claim the whole? Arguments can be made for this interpretation.

3. If You Mine it, You Own it, But Can You Protect it?

Interpreting Article II to permit space resource extraction is just a first step. How can any country or private party establish a resource extraction operation if territory cannot be claimed?

Clearly, if a country is simply occupying or using an area in space, it cannot be considered that country's territory, but what rights does it, or a private entity acting in conformity with the Outer Space Treaty have with respect to that occupancy? And what is meant by the concept of "by any other means?" These provisions conflict with other parts of the Outer Space Treaty. Pursuant to Article VIII, objects left in space remain under the ownership and control of the State that put them there. In fact, pursuant to Article VII of the Outer Space Treaty and Article III of the Liability Convention, States are "internationally liable" for damage caused to an object in space belonging to another State. So, you cannot cause damage to someone else's object without incurring liability. Yet leaving the objects *in situ*, or forcing others to give them wide berth in order to avoid liability, essentially results in perpetual occupation of the surface upon which they rest. And perpetual occupation feels like appropriation and a violation of the free access principal.

Interestingly, Article XII of the Outer Space Treaty does contemplate the installation of facilities on the Moon and other celestial bodies. Any such facilities shall be open to all, on the basis of reciprocity and after appropriate consultation. It is not difficult to anticipate that this provision may be easily abused.

4. Claim of Sovereignty Prohibited – But What if Not a Sovereign?

Should we treat private entities differently? The international community seems largely to agree that no nation may make a claim to extraterrestrial territory. Nevertheless, a colorable argument can be made that this particular provision does not apply to non-State entities. First, the Article plainly indicates that space shall not be subject to *national* appropriation. Second, the primary restriction is against appropriation by claiming *sovereignty*. Arguably, then, if a non-State entity asserts proprietary rights, it is not a "national appropriation," nor is it "by claim of sovereignty." This interpretation is supported by the United Nations Declaration of Human Rights, which, in Article 17 plainly states that "[e]veryone has the right to own property alone as well as in association with others."⁹ The Declaration applies to space activities through Article III of the Outer Space Treaty which requires States to "carry on activities in . . . space in accordance with international law." Surely, this would require States to support and defend fundamental human rights even in a space environment. As such, arguably, it would be a violation of international law to not permit ownership in space.

As Stephen Gorove, the founder of our air and space law program at the University of Mississippi put it back in 1968: "an individual acting on his [or her] own behalf or on behalf of another individual or a private association or an international organization could lawfully

⁹ U.N. Declaration of Human Rights, art. 17, <https://www.un.org/en/about-us/universal-declaration-of-human-rights>.

appropriate any part of outer space, including the moon and other celestial bodies.”¹⁰ Though this position has not been formally advanced by any nation, the concept of sovereign versus non-sovereign appropriation bears further consideration. While in the short term it seems a dependable barrier to territorial claims by adversary countries, it also may preclude the ability to protect or decline access to sites that require protection whether due to the presence of sensitive instruments or cultural artifacts.

B. Due Regard – A Definition TBD by the First Mover

Also layered on top of the non-appropriation principle of Article II are the requirements, contained in Article IX of the Outer Space Treaty that, among other things: 1) all activities in outer space be conducted with “due regard” to the corresponding interests of other States; and 2) if one country “has reason to believe” that its activity will cause “potentially harmful interference” to another, it must “undertake appropriate international consultations.” To be clear, harmful interference is not prohibited – it must simply be accompanied by a warning to the party which may be harmed. In short, this provision has no teeth and can be considered little more than a notice requirement.

Both the concept of due regard and the admonition to warn of harmful interference suggest that States should not interfere with or otherwise despoil the objects of another and clearly conflicts with freedom of access enshrined in Article I of the Treaty and the “by any other means” provision of Article II. Plainly, a balance must be struck between access, appropriation and “due regard.” But “due regard” is a standard that remains undefined. An international arbitral tribunal considered the meaning of “due regard” in 2015 and determined that “due regard” requires a balancing test, taking into consideration the rights of the State that have been impinged by the contested activity, the extent of the impairment, the nature and importance of the contested activity, and the availability of alternative approaches. This balance will produce different outcomes on a case-by-case basis, an uncertainty which in and of itself is enough to make States and their nationals consider carefully their international obligations in respect of extraterrestrial mining activities.

Thus, under the Outer Space Treaty, simply maintaining a presence in one specific area of a celestial body, be it the Moon or an asteroid, triggers the non-appropriation principle. However, the concept of due regard suggests that if one entity is already occupying and using a specific area, others must avoid interfering. This gives an advantage to those who establish a presence first. And so the race begins. Without a more specific construct of “due regard,” the entity that gets to a desirable area first can easily make the argument that “due regard” requires other parties maintain a distance measured in kilometers in order to assure the protection of their object or objects. What’s worse, these rules, could by default apply not just to one particular celestial body, but can become the foundation for all extraterrestrial resource management, wherever the source.

In 2011, NASA issued voluntary guidelines¹¹ intended to protect the instruments left at Apollo and certain US robotic landing sites. These guidelines established exclusion zones that were set

¹⁰ Stephen Gorove, *Interpreting Article II of the Outer Space Treaty*, 37 *FORDHAM L. REV.* 349, 352 (1969).

¹¹ https://www.nasa.gov/wp-content/uploads/2017/10/617743main_nasa-usg_lunar_historic_sites_reva-508.pdf

arbitrarily by scientists and engineers who made assumptions about potential damage from the lunar regolith ejecta which is known to be particularly abrasive. In 2020, President Trump signed the One Small Step Act which made these guidelines binding on any entity in a contractual relationship with NASA. They do not bind any other countries or entities.

The Artemis Accords, which were developed in part to fill gaps in international space law, also seek to establish guidelines to satisfy the concept of due regard. In a section entitled “Deconfliction of Space Activities,” the Accords require signatories to “respect the principle of due regard” and “refrain from any intentional actions that may create harmful interference.” The signatories to the Accords further commit to “provide notification of their activities and commit to coordinating with any relevant actor to avoid harmful interference. The area wherein this notification and coordination will be implemented to avoid harmful interference is referred to as a ‘safety zone’ . . .” Finally, the Signatories agree to “respect reasonable safety zones to avoid harmful interference with operations under [the] Accords, including by providing prior notification to and coordinating with each other before conducting operations” in the safety zone of another Signatory.

This safety zone construct is essentially a proposal to bring certitude to the balancing test of Article IX’s due regard. However, the language states that the signatories will “respect reasonable safety zones.” The concept of reasonableness will necessarily be determined by the party that was their first. As noted above, neither China nor Russia has acceded to the Artemis Accords. In fact, they have collaborated on their own lunar project, the International Lunar Research Station (ILRS), which, as of December 8, 2023, has eight countries formally involved. Unlike the Artemis Accords, the ILRS is focused on scientific and engineering collaboration and thus do not, as yet anyway, incorporate any policy or legal principles with respect to appropriation or due regard. However, the Accords offer non-signatory countries the opportunity to take advantage of the publicly distributed language. Should China land on the lunar South Pole and claim a “reasonable” zone of a 20-kilometer diameter, how can Artemis signatories complain?

IV. The Potential for the First Mover to Exploit “Due Regard”

The Outer Space Treaty has no enforcement mechanism. Disputes are intended to be settled through diplomatic channels. Barring that, claims may be brought to the International Court of Justice. There is no definition of “due regard” and thus the outcome of claims will be uncertain. Indeed, the broad language of and gaps in current international space law can be exploited to rationalize activities and claims others would consider unreasonable or in violation of the law. Moreover, international laws and norms are easily ignored and even flouted without consequence on Earth. There is no reason to believe that this will change when implementing activities beyond Earth.

Make no mistake. Right now, we are in race. Even if interested parties were inclined to enter into negotiations to establish a treaty on extraterrestrial resource management and utilization, treaties take a long time to develop. In the meantime, legal norms will be established by activity, and the first actors will establish those norms.

Some have speculated that the Chinese government will withdraw from the Outer Space Treaty when it established a permanent presence on the Moon. But it does not need to. The Chinese government need only interpret the Treaty, and particularly the concept of “due regard” in a manner that will satisfy its strategic goals.

If a Chinese spacecraft lands, or even crashes, in a mineral-rich area of the Moon or another celestial body, how will the Chinese government interpret its rights and obligation? How will it define “due regard?” While the future actions of the Chinese government cannot be predicted, we can learn from past statements about space and acts taken on Earth and in Low Earth Orbit.

- The US-China Economic and Security Review Commission observed that “China seeks to control access to the Moon for strategic aims.”
- The Chinese government’s space policy has evolved subtly but tellingly.
 - Its 2006 White Paper, states that “China's government holds that outer space is the commonwealth of all mankind, and all countries in the world enjoy the equal right to freely explore, develop, and utilize outer space and celestial bodies.”
 - Its 2011 White Paper report leaves out language on space as a commonwealth, reading instead that the “Chinese government believes that the free exploration, development and use of outer space and its celestial bodies are equal rights enjoyed by all countries in the world.”
 - It’s 2016 White Paper replaces the phrase “free exploration” with “peaceful exploration” though it does maintain that all countries have “equal rights” to explore.”
 - It’s 2021 White Paper opens with the statement that China’s “eternal dream” is to “explore the vast cosmos, develop the space industry and build China into a space power.” It acknowledges that “peaceful exploration, development and utilization of outer space are rights equally enjoyed by all countries.”
- China’s Earth activities indicate a willingness to disregard norms and act decisively even in the face of international objection. For example, the Chinese government has made sweeping territorial claims over virtually the entire South China Sea, and appears willing to defend these by force. It is not difficult to imagine similar actions being taken with respect to an installation on the Moon or another celestial bod, especially under the cover of “due regard.”.
- China is not a responsible or transparent space actor.
 - While the majority of US spacecraft share information regarding their planned maneuvers to a global database to support space domain awareness and space traffic management, the majority of Chinese spacecraft do not.
 - Chinese space objects routinely enter the atmosphere with little guidance or control.
 - Chinese launches often cause damage in local environs.

In a worst-case scenario, a first mover like China can block access to extraterrestrial resources under the legal cover of the Outer Space Treaty – particularly the concept of due regard as it has been conceptualized to support exclusion or safety zones.

V. Conclusions and Recommendations: Acknowledge Extraterrestrial Resources

The space beyond Earth is a domain of human activity. A domain filled with natural resources that can significantly improve life on Earth. This Hearing is a first but significant small step. US policy as a whole, and not just space policy, must acknowledge and embrace the vast resources that the Universe offers. In addition:

- The US should continue to encourage countries to accede to the Artemis Accords and create as large a coalition as possible.
- The US should continue to adopt licensing and regulatory actions that support transparency and responsibility.
- The US should increase support for commercial space activities that specifically include extraterrestrial resource extraction and utilization activities.
- The US should continue to actively participate in the COPUOS and, in particular, its Working Group on the Legal Aspects of Space Resource Activities.
- The US should work with Artemis partners to enable the research necessary to better define the concept of safety zones and due regard.

As Walter Cronkite said: “We are the lucky generation. We first broke our earthly bonds and ventured into space. From our descendants — perches on other planets or distant space cities, they will look back at our achievement with wonder at our courage and audacity and with appreciation at our accomplishments, which assured the future in which they live.”

We have a responsibility to the future to get this right, and I am confident we can.