A Primer on Space Mining Law

Understanding the Law(s) on Space Resources Five Years after Title IV

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Authors Note

This primer is intended to provide a broad overview of the developments in space law and policy relating to space resources over the past five years. During most of those five years I have been working on my PhD on exactly that subject. I was also actively involved in The Hague Space Resources Governance Working Group, first as an observer, then later as a member representing the Space Generation Advisory Council. While I was not involved in the Vancouver group, I have signed their open letter.[1] Nevertheless, hopefully this primer achieves its ambition of providing a broad, and fair, overview of the topic. The Centre for a Spacefaring Civilization may provide subsequent updates as developments require, with luck an annual update may be necessary.

[1]Outer Space Institute *International Open Letter on Space Mining* August 2020. Available at: http://www.outerspaceinstitute.ca/docs/InternationalOpenLetterOnSpaceMining.pdf

Introduction

Five years ago, President Obama signed into US law the Commercial Space Launch Competitiveness Act of 2015. Most of the new law was about commercial space launch. However, tucked away on the last two pages of a twenty pages law was the bit that would get all of the attention; Title IV or the Space Resource Exploration and Utilization Act of 2015. Title IV says that a US citizen can commercially recover asteroid or space resources. Space resource utilization, space resource activities space mining, in situ resource utilization or whatever your preferred term is had been discussed before - the Reagan era Paine Report or John Lewis' 1997 *Mining the Sky*, among many others – but this legislation certainly changed things. It sparked debate, both within the space community and the general public. It promulgated new laws from other countries following the US' lead. There was also discussion of the issue at the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and the creation of groups such as The Hague Space Resources Governance Working Group. This work will provide an overview of these developments and provide an accessible and useful summary. It will primarily discuss legal and policy issues; there is not an examination of the economic or technical feasibility of space resource activities. This primer is intended for a general audience, at least one which is interested in space resources. It is divided into five sections; first a look at the history and context that led to the US law; second, the international law governing outer space; third, the various national laws and instruments that have been promulgated over the last five years; fourth, the international efforts to develop an international regime; and finally, a consideration of the implications of these developments and what the future may hold.

Some History

Space resources are not a new topic for space law, indeed some of the founders of space law discussed and debated whether the 'appropriation' of space resources was compatible with the 'non-appropriation' principle several years before it was codified in Article II of the Outer Space Treaty[2]. Andrew Haley, perhaps laying the foundation for the current overuse of the fishing analogy, referenced the pearl farmers of the Persian Gulf and argued that,

> the nations which first develop resources on the moon could obtain exclusive rights over those resources which no other nation could legally challenge. It must be emphasized, however, that they would not 'own' the land on which the resources exploited are located.[3]

Whereas Myres McDougal, one of the other 'founders' of space law, seems to have preferred a "great international public utility" approach to resources.[4] Over 50 years later the space law community is, in essence, still having the same debate. That said, there have of course been developments between Andrew Haley's writing and the US space law of 2015.

One of these developments is the acquisition of extraterrestrial material. Several countries have acquired materials from various celestial bodies, most notably the United States and the lunar materials returned through the Apollo programme. NASA has also acquired dust samples from

[2]Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205 (Outer Space Treaty/OST)

[3]Andrew Haley, *Space Law and Government* (Appleton-Century-Crofts 1963), 121

[4]Myres S. McDougal 'The Prospects for a Regime in Outer Space' in Maxwell Cohen, eds., *Law and Politics in Space: Specific and Urgent Problems in the Law of Outer Space* (Leicester University Press 1964), 122

a comet. The Soviet Union has also returned material from the lunar surface. Japan has taken samples from asteroids. These countries have all claimed ownership or at least control over these materials and this has not been challenged by other states. Indeed, the Russian Federation even sold a portion of the lunar material it inherited from the Soviet Union at auction in 1993.[5] There is debate as to what, if any, precedent this sets under international law for space resource activities. All these missions were scientific endeavours not commercial mining operations. However, the fact that states have been able to remove portions of celestial bodies and take ownership of those portions is not without significance.

However, most focus on space resources is, and has been, on future proposals for their utilization. Serious consideration of using space resources in support of expanding human activities in outer space was laid out in the US's *Pioneering the Space Frontier: The Report of the National Commission on Space*[6], better known as the Paine Report after former NASA administrator Thomas Paine who led the commission. It highlighted the necessity of 'living off the land' if a sustained human presence in outer space was to be maintained and that the utilization of space resources was therefore necessary. The Paine Report had been intended to inform future US plans for space activities, however as it was released in the wake of the Challenger disaster it had little immediate impact on US policy,[7] although its influence can clearly be seen over the decades since.

It was John Lewis and his 1997 *Mining the Sky*[8] which popularised the notion of space mining. This book continues to be referenced when discussion of the mineral wealth of the solar system is discussed. It was this potential wealth which gave rise to the greatest interest in space mining. Around 2012 two companies Deep Space Industries and Planetary Resources announced their existence and their intentions to conduct space mining.[9] They were not the first, in 1997 Jim Benson's SpaceDev beat them to that accolade.[10] SpaceDev aimed to spur the sort of legal developments that would occur twenty years later.[11] However, SpaceDev's plans did not come to fruition, although the company would eventually become part of what is now Sierra Nevada Corporation[12] (perhaps most famous for the Dream Chaser). History may be repeating itself with Deep Space Industries and Planetary Resources. The former has been acquired by Bradford Space Systems and is now focusing on propulsion systems.[13] Planetary Resources was sold to a blockchain company who have sold off its physical assets and made its intellectual

[5]Brian Harvey, *Soviet and Russian Lunar Exploration* (Springer-Praxis 2007), 246

[6]The National Commission on Space *Pioneering the Space Frontier: The Report of the National Commission on Space* (Bantam Books 1986)

[7]John M. Logsdon *Ronald Reagan and the Space Frontier* (Palgrave Macmillan 2019), 236-237, 320-321

[8]John S. Lewis, *Mining the Sky: Untold Riches from the Asteroids, Comets and Planets* (Helix Books 1997)

[9]Adam Mann, 'Tech Billionaires Plan Audacious Mission to Mine Asteroids' *Wired* 23 April 2012. Available at: https://www.wired.com/2012/04/planetary-resources-asteroid-mining/; 'Planetary Resources: The New Asteroid Mining Project Backed by James Cameron and the Google Executives' *The Verge* 18 April 2012- https://www.theverge.com/2012/4/24/2971461/planetary-resources-mining; Rod Pyle, 'Deep Space Industries: A New Asteroid-Mining Company Is Born' *Space.com* 28 January 2013. Available at: https://www.space.com/19462-asteroid-mining-deep-space-industries-birth.html

[10]Rex Ridenoure '*NEAP*: 15 years later' *The Space Review* 17 June 2013. Available at: http://www.thespacereview.com/article/2315/1

[11]Mark Alpert 'Making Money in Space' (1999) 10 *Scientific American Presents* 92, 95

[12]'Space Dev' *Wikipedia*. Available at: https://en.wikipedia.org/wiki/SpaceDev

[13]Alan Boyle 'Bradford Space Group Buys Deep Space Industries, Shifting Focus from Asteroid Mining to Propulsion' *Geekwire* 2 January 2019. Available at: https://www.geekwire.com/2019/bradford-buys-deep-space-industries-shifting-focus-asteroid-mining-green-propulsion/

property public domain.[14] There are other companies still looking at space resources, although the focus has now shifted to providing operational support to planned national missions to the Moon, such as the US Artemis programme. Though, as one headline put it the space mining 'bubble' does seem to have 'burst.'[15]

What are Space Resources?

The definition of space resource is seemingly now agreed upon. The US Title IV, the Luxembourg Space Resources law, the UAE law, and the Hague Building Blocks all use some variation of "an extractable abiotic resource *in situ* in outer space."[16] This is a new definition for space law as it does not appear in any of the five space treaties, not even the Moon Agreement. However, it is similar to the definition of 'resources' found in UNCLOS[17] and this definition brooked little opposition at the several sessions of UNCOPUOS Legal Subcommittee since the enactment of the US Title IV.[18] Granted, the definition is not necessarily all that clear, at least at first reading, and it is meant as a broad term. The main point of this definition is what it does not cover, and that is biotic (or living) 'resources'. Some, such at the Hague Group, go further and exclude satellite orbits, radio spectrum and solar energy. Although that is primarily due to the group's decision to focus on 'extractable' resources.[19] This broad approach makes sense, particularly at this stage. While most of the focus is on water, usually in the form of ice, there are many other potential resources in the solar system to consider, such as the full suite of metals, as well as the elusive 'holy grail' of helium-3. However, it is also worth contemplating whether regolith itself may be a 'resource' which will need regulating. In the future there may be 'quarries' on the Moon or Mars extracting regolith as a building material. Indeed, after water this may prove to be the most valuable 'resource'. Eventually there will need to be greater detail on what exactly constitutes a 'resource', at least as far as specific regulations are concerned but that level of detail is premature.

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[14]Alan Boyle 'Everything Must Boldy Go! Defunct Asteroid Mining Company's Hardware Put Up for Auction' *Geekwire* 4 June 2020. Available at: https://www.geekwire.com/2020/everything-must-boldly-go-planetary-resources-hardware-auction-heats/

[15]Jeff Foust 'The Asteroid Mining Bubble Has Burst' *The Space Review* 7 January 2019. Available at: https://www.thespacereview.com/article/3633/1

[16]US Commercial Space Launch Competitiveness Act, Title IV, §51301; Luxembourg Draft Law on the Exploration and Use of Space Resources, Available at: https://gouvernement.lu/dam-assets/fr/actualites/communiques/2016/11-novembre/11-presentation-spaceresources/Draft-law-space_press.pdf; The Hague International Space Resources Governance Working Group, *Building Blocks for the Development of An International Framework on Space Resource Activities* (The Hague Building Blocks) Available at: https://www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht--en-ruimterecht/space-resources/final-bb.pdf, Building Block 2.1

[17]United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397 (UNCLOS),133(a); Yoshifumi Tanaka *The International Law of the Sea* (2nd edn. Cambridge University Press 2015), 180

[18]UNCOPUOS, 'Report of the Legal Subcommittee on its Fifty-eight Session, held in Vienna from 1 to 12 April 2019' (18 April 2019) UN Doc A/AC.105/1203, paras 239-267; UNCOPUOS, 'Report of the Legal Subcommittee on its fifty-seventh session, held in Vienna from 9-20 April 2018' (30 April 2018) UN Doc A/AC.105/1177, paras 229-265; UNCOPUOS, 'Report of the Legal Subcommittee on its fifty-sixth session, held in Vienna from 27 March to 7 April 2017' (18 April 2017) UN Doc A/AC.105/1122, paras 34, 50 and 221-250; UNCOPUOS, 'Report of the Legal Subcommittee on its fifty-fifth session, held in Vienna from 4 to 15 April 2016' (27 April 2016), UN Doc A/AC.105/1113, paras 74-83

[19]Olavo de O. Bittencourt Neto, Mahulena Hofmann, Tanja Masson-Zwaan, Dimitra Stefoudi, *Building Blocks for the Development of an International Framework for the Governance of Space Resource Activities: A Commentary* (Eleven 2020), 23

Understanding International Law

Outer space is an 'area beyond national jurisdiction' (or perhaps more accurately beyond territorial jurisdiction) but it is not a lawless realm. Space law governs activities in outer space. It is a specialised regime (aka *lex specialis*) of international law. There are several possible founding dates but to avoid delving too deeply into questions of customary international law we will take the 'Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space'[20] as the initiation of international space law. UN General Assembly Resolution 1962 or the Declaration of Legal Principles was not the first UN General Assembly Resolution on outer space but it did outline the core principles which would eventually serve as the foundation of the Outer Space Treaty. These are, in short, that outer space is free for use by all states; outer space and celestial bodies are not subject to 'national appropriation'; international law applies to activities conducted in outer space; states bear "international responsibility for national activities" whether carried out by governmental or non-governmental actors; as well as a few others that are not directly relevant for this work. It is widely accepted that these principles are now customary international law, and their inclusion in the Declaration of Legal Principles is part of the rationale for that assessment.

As mentioned, these principles provided the foundation for, and were codified within, the Outer Space Treaty of 1967. It is worth discussing the different instruments that form the body of space law. The Declaration of Legal Principles is a UN General Assembly Resolution, which while not binding as law is a proclamation of the UN General Assembly. Which as Paul Kennedy says is probably "the only real forum for world opinion – or, better, the opinions of the world governments that we have…" and therefore provides them with a certain legitimacy.[21] So while a UN General Assembly Resolution does not have binding legal force, it can have normative value and give rise to customary international law. The Outer Space Treaty is a treaty, which *is* binding international law, but only on those States which are parties to it. However, provisions of a treaty can also become customary international law.

Customary international law is an important element of international law. Specifically, as laid out in the Statute of the ICJ "international custom, as evidence of a general practice accepted as law."[22] Generally the view is that that customary international law is a practice that has been accepted over time to constitute a legal obligation. These two elements work together, it is not enough for the practice to exist, but it needs to be followed by states because they feel under a legal obligation to adhere to it. Generally, it is thought that the practice needs to have occurred for some time however neither the ICJ Statute nor any other document or provision actually specifies a timescale. Determining when something has gone from merely 'common practice' to customary law is tricky. Customary international law applies to all states unlike treaties which only apply between the parties. Customary international law enables international law to develop and adapt to new developments based on the opinions and actions of states, it therefore plays an important role in the maintenance of international law. However, customary international law can be a complex and murky thing making it difficult to determine if and when a principle has become legally binding.

[20]UNGA Res 1962 (13 December 1963) UN Doc A/RES/1962 (XVIII)
[21]Paul Kennedy, *The Parliament of Man: The United Nations and the Quest for World Government* (Penguin 2006), 275
[22]Statute of the International Court of Justice (adopted 26 June 1945, entered into force 24 October 1945) UKTS 67 (ICJ Statute)

An additional aspect of the international legal system is commonly referred to as 'soft law.' These are non-binding norms, which while not formally legally binding on States exist to create standards of behaviour and conduct. Examples in space law are such things as the Space Debris Mitigation Guidelines.[23] Space law is comprised of treaties, customary international law, and 'soft law', all three need to be examined to understand how outer space is governed.

International Space Law

The Outer Space Treaty is the foundational treaty of the space law regime. It also contains most of the relevant treaty provisions for questions relating to the use of space resources.

Article I declares that space is "free for exploration and use by all States…" although this use "shall be carried out for the benefit and in the interests of all countries… and shall be the province of all mankind." Article I of the Outer Space Treaty is one of the two most important treaty articles, not just of the Outer Space Treaty, but in space law in general (Article II being the other). These two articles establish space as part of the 'global commons'. Article I focuses on freedoms enjoyed by all states whereas Article II is prohibitive, barring national appropriation by any means. The two work together; freedom of exploration is unavailable where a state is able to exercise a right of exclusion. They are also what makes space part of the 'global commons' or having the status of a *res communis*. This is a descriptive statement; outer space is *res communis* by virtue of the provisions of Articles I and II.

The definitions of the terms used in Article I and the rest of the treaties are important. Many terms are reasonably clear, others need further examination. For example, exploration is an uncontroversial term in space law, there is not much written on the topic and it is generally agreed what it means. Exploration of outer space is what Apollo 11, Cassini, Hayabusa and Rosetta did.

Use, however, is not explicitly defined by the treaty, but its meaning can be interpreted. First, regarding any question of whether the freedom of use covers commercial activities is reasonably answered by the fact that there have been considerable commercial operations in outer space already. That does not necessarily extend to mining though. The Outer Space Treaty does not make reference to resources nor does it use the term 'exploitation.' Furthermore, the meaning of the word 'use' was not discussed during the negotiations of the Outer Space Treaty.[24] According to the rules of the Vienna Convention on the Law of Treaties[25], the 'plain ordinary meaning' of a term should be the first recourse, particularly if that definition accords with the general 'object and purpose of the treaty'. Therefore, it is worth noting that the *Concise Oxford English Dictionary* defines use as 'take, hold, deploy as a means of achieving something' or 'take or consume (an amount) from a limited supply.'[26] At least within the confines of other provisions of international space law, such as the requirement, within the very same article that use "…be carried out for the benefit and in the interests of all countries…", it is therefore reasonable to view space resource activities as permitted under the

[23]UNCOPUOS 'Inter-Agency Space Debris Coordination Committee Space Debris Mitigation Guidelines' 29 November 2002 UN Doc A/AC.105/C.1/L.260

[24]Fabio Tronchetti, *The Exploitation of Natural Resources of the Moon and Other Celestial Bodies: A Proposal for a Legal Regime* (Leiden, Netherlands: Martinus Nijhoff, 2009), 4, 31-32, 222-223

[25]Vienna Convention on the Law of Treaties (adopted 23 May 1969, entered into force 27 January 1980) 1155 UNTS 332

[26]*Concise Oxford English Dictionary*, (Oxford University Press 2011), 1593

Outer Space Treaty. However, that is not necessarily as straightforward as it sounds due, in no small part, to Article II of the Outer Space Treaty.

Article II of the Outer Space Treaty is the other 'most important article' in the outer space treaty and space law more generally. Article II of the Outer Space Treaty embodies what has been described as a "cardinal principle of space law."[27] This principle, the non-appropriation principle, is widely, even universally recognized as a fundamental principle of space law.[28] Furthermore, the non-appropriation principle was one of the earliest principles which was agreed upon and one which enjoys broad support.[29] It has certainly attained the status of customary international law[30] (and may even have done so before the Outer Space Treaty came into force).[31]

On the face of it the meaning of Article II of the outer space treaty is fairly clear. No state can make claims to any territory in space or indeed to space itself. There are no mechanisms by which a state can make these claims, this is the implication of the 'by any other means' in the article. So it does not matter that the Soviets were the first to land a probe on the Moon and

[27]I.H.Ph. Diederiks-Verschoor and V. Kopal, *An Introduction to Space Law* (3rd edn, Kluwer Law International 2008), 26

[28]Steven Freeland and Ram Jakhu 'Article II' 44-63 *in* Stephan Hobe, Bernhard Schmidt-Tedd and Kai-Uwe Schrogl eds., *Cologne Commentary on Space Law*, vol 1 (1st edn, Carl Heymanns Verlag, 2009), 45, 63; I.H.Ph. Diederiks-Verschoor and V. Kopal, *An Introduction to Space Law* (3rd edn, Kluwer Law International, 2008), 26; Virgiliu Pop (2001) 'A Celestial Body is a Celestial Body is a Celestial Body...' *52nd IAF Congress*, Toulouse, France, 1-5 October, AIAA . Available at: http://www.spacefuture.com/pr/archive/a_celestial_body_is_a_celestial_body_is_a_celestial_body.shtml (accessed: 10 June 2015); Ricky J. Lee, 'Article II of the Outer Space Treaty: Prohibition of State Sovereignty, Private Property Rights or Both?' (2004) 11 Aust. Int'l L. J. 28, 128; Fabio Tronchetti, 'Legal Aspects of Space Resource Utilization' (769-813) *in* Frans von der Dunk and Fabio Tronchetti eds., *Handbook of Space Law* (Edward Elgar, 2015), 778; Ricky J. Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space* (Springer 2012), 166; Ricky J. Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space* (Springer 2012), 166; Fabio Tronchetti, 'The Non Appropriation Principle Under Attack: Using Article II of the Outer Space Treaty in its Defence' IAC-07 E6.5.13, 1,6; Virgiliu Pop, *Who Owns the Moon? Extraterrestrial Aspects of Land and Mineral Resources Ownership* (Springer 2009), 60

[29]Maxwell Cohen 'Introduction: Law and Politics in Space' 11-20 *in* Maxwell Cohen, eds., *Law and Politics in Space: Specific and Urgent Problems in the Law of Outer Space* (Leicester University Press, 1964),13, 18; C. Wilfred Jenks, *Space Law* (Stevens and Sons, 1965), 200; Paul G. Dembling and Daniel M. Arons (1966) 'The United Nations Celestial Bodies Convention' 33 J. Air L. & Com. 535, 535-537; Paul G. Dembling and Daniel M. Arons (1967) 'The Evolution of the Outer Space Treaty' 33 J. Air L. + Comm. 419, 421-422; James Crawford, *Brownlie's Principles of Public International Law* (8th edn, Oxford University Press, 2012), 347-348; Fabio Tronchetti, 'The Non Appropriation Principle Under Attack: Using Article II of the Outer Space Treaty in its Defence' IAC-07 E6.5.13, 5; Fabio Tronchetti, 'Legal Aspects of Space Resource Utilization' (769-813) *in* Frans von der Dunk and Fabio Tronchetti eds., *Handbook of Space Law* (Edward Elgar, 2015), 778

[30]Maxwell Cohen 'Introduction: Law and Politics in Space' 11-20 *in* Maxwell Cohen, eds., *Law and Politics in Space: Specific and Urgent Problems in the Law of Outer Space* (Leicester University Press, 1964),13, 18; C. Wilfred Jenks, *Space Law* (Stevens and Sons, 1965), 200; Ricky J. Lee, 'Article II of the Outer Space Treaty: Prohibition of State Sovereignty, Private Property Rights or Both?' (2004) 11 Aust. Int'l L. J. 28, 134-135, 141; Steven Freeland and Ram Jakhu 'Article II' 44-63 *in* Stephan Hobe, Bernhard Schmidt-Tedd and Kai-Uwe Schrogl eds., *Cologne Commentary on Space Law*, vol 1 (1st edn, Carl Heymanns Verlag, 2009), 46-47, 63; Francis Lyall and Paul B. Larsen *Space Law: A Treatise* (Ashgate 2009), 180; Ricky J. Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space* (Springer 2012), 171; Paul B. Larsen, 'Asteroid Legal Regime: Time for a Change?' (2014) 39 J. Space L. 275, 289

[31]Maxwell Cohen 'Introduction: Law and Politics in Space' 11-20 *in* Maxwell Cohen, eds., *Law and Politics in Space: Specific and Urgent Problems in the Law of Outer Space* (Leicester University Press 1964),13, 18; C. Wilfred Jenks, *Space Law* (Stevens and Sons 1965), 200;

that that probe contained symbols which included the official seal of the Soviet Union, nor does it matter that the United States was the first to land a human on the Moon and that human stuck an American flag into the surface of the Moon. However, the situation for resources is not as clear. Broadly speaking there are two schools of thought regarding resources. The first is that resources are part and parcel of the celestial body they are found in and therefore appropriation of them constitutes appropriation of the celestial body and is therefore prohibited by the non-appropriation principle.

The second position is that resources are separate from the body they are found in and can be appropriated once removed from their original location. The extractor is not claiming the territory the resource is found in nor is the resource being claimed while it is *in situ*. This is the position adopted by the United States, Luxembourg, the UAE and others.

There are those who argue that Article II and its prohibition on national appropriation of outer space, the Moon and other celestial bodies is only for the attention of states and does not apply to private individuals or corporations. However, given **Article VI** of the Outer Space Treaty this is not the case.

This article makes states responsible for the actions of their nationals (natural, legal, or otherwise) in space. In fact, it goes further and requires that their activities be authorized and supervised by the appropriate state. An examination of even a handful of state space laws reveals that States certainly feel obligated to authorise and supervise the activities of their nationals (legal or natural). The UK, for example, requires British nationals to gain authorisation for space activity regardless of where that activity is being conducted.[32] As does the United States.[33]

States cannot authorize their nationals to undertake actions that are prohibited to themselves, therefore as states are not permitted to appropriate outer space, the Moon or other celestial bodies they cannot authorize their nationals to do so either and as all activities of their nationals in space require their authorization their nationals are also subject to the Article II prohibitions. However, that does not necessarily mean that there is a prohibition on commercial mining operations. States can authorize and license ocean going fishing vessels without needing to lay claim to areas of the high seas they are going to be operating from. This is the line of reasoning followed by both the Luxembourg and American space mining laws; indeed Luxembourg even stated this fact in the explanatory document published in conjunction with their draft space mining law.[34] Therefore, while private individuals, corporations etc are prohibited from appropriation of territory on the Moon and other celestial bodies as are states this does not necessarily apply to resources found within the moon and other celestial bodies.

The Moon Agreement[35] is the fifth in the series of major space law instruments. The treaty was adopted in 1979 but did not enter into force until 1984. It has the lowest participation of any of the major space treaties having only 17 parties (Venezuela being the most recent, ratifying in November 2016) and 11 signatories.[36] Nonetheless it is a valid treaty, albeit binding

[32]Outer Space Act 1986, c 38; Space Industry Act 2018, c 5.
[33]See, Title 51 USC §50904
[34]See footnote 16
[35]Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (adopted 18 December 1979, entered into force 11 July 1984) 1363 UNTS 3 (Moon Agreement)
[36]UNCOPUOS 'Status of International Agreements Relating to Activities in Outer Space as at 1 January 2019' (1 April 2019) UN Doc A/AC.105/C.2/2019/CRP.3

on only those who have signed up to it (as is true of all treaties), and it is worth spending some time on it.

By and large the Moon Agreement replicates the Outer Space Treaty though there are a few noticeable differences such as the decision to limit its scope to this solar system, something not done in the Outer Space Treaty. The biggest difference is contained within Article 11; the much-maligned Common Heritage of Mankind Principle.

Much of Article 11 merely elaborates on the provisions in the Outer Space Treaty regarding the prohibition on national appropriation. However, there are a few additions that need to be considered. The first is the declaration that "the Moon and its natural resources are the common heritage of mankind." There is no elaboration on what exactly this means. 'Common Heritage' is usually taken to be a stronger, more communal statement than the 'province of all mankind' found in the Outer Space Treaty however it is a phrase which is open for interpretation like several of the other phrases found in the space treaties. It is frequently linked to the UN Convention on the Law of the Sea which also contains the phrase 'Common Heritage of Mankind' but this is a separate treaty and one which contains more explicit and elaborate provisions on 'benefit sharing'.

Article 11 of the Moon Agreement would provide a mechanism for providing legal certainty vis a vis space resources, however it is a politically toxic provision in several key states (i.e. the United States, but the Soviets were never keen on it either) and it likely a dead end for that reason, though it is worth bearing in mind, especially as it remains relevant for those States that are parties to the Moon Agreement. State Parties to the Moon Agreement have an obligation to establish an international regime when space resource activities become feasible, which could potentially have implications for the 'unity' of space law (and is another reason why despite the 'failure' of the Moon Agreement it cannot simply be ignored.) However, Article 11 of the Moon Agreement is not necessary for the creation of an international regime. Those states which are not parties to the Moon Agreement are free to create an international regime should they opt to do so. Indeed, given the paucity of specific provisions in Article 11 it would seem prudent to bypass promoting signing and ratifying the Moon Agreement and focus on creating an international regime.

The international regime provides a well-established framework, laying out the principles and basic obligations of states. How those principles apply to individuals and corporations is elaborated by national regulatory regimes.

National Laws

National space law is how a state fulfils its obligation under Article VI of the Outer Space Treaty to 'authorise and continually supervise' the activities of its nationals (people and corporations) in outer space. Most states with an active space sector have legislation which requires its citizens to acquire a licence to conduct a space activity. The space resources legislation that has developed over the past five years is part of that. This is necessary because international law does not directly apply to people or companies, it applies to states. It is the US government, not Jane Doe, that has to comply with the Outer Space Treaty. However, as per Article VI OST, the US government has an obligation to ensure that Jane Does' activities or those of the company that she runs do comply with the Outer Space Treaty.

National legislation can also be part of the process of developing or evolving international law, it can be considered 'subsequent practice' and help to address "points of interpretation."[37] However, it is important to note that national legislation cannot be used to justify a breach of a state's international obligations.[38] Generally speaking states are obliged to bring their national laws into line with their obligations under international law. Failure to do so is not by itself a breach of international law, that only arises when the state "fails to observe its obligations on a specific occasion."[39] National courts need to determine whether and how to bring international law into consideration regarding the issue before them. This is usually a constitutional question and can be different for customary international law and treaty law.[40]

The **United States** has led the way in terms of national legislation and policy on space resources. While Title IV of the Commercial Space Launch Competitiveness Act was the first enacted legislation it was not the first bill which garnered serious attention from the US Congress. The **ASTEROIDS ACT** or the American Space Technology for Exploring Resources Opportunities in Deep Space Act or HR 5063[41], was introduced into the US House of Representatives in 2014. It was the first major attempt to provide a legal process for the acquisition of property rights over extracted resources in US law. The bill failed but was resurrected, albeit after some alteration, in 2015 as part of the wider US Commercial Space Launch Competitiveness Act.[42] The bill was intended to promote the development of the US commercial asteroid mining industry, as well as provide and protect property rights over extracted resources for the American companies who extracted them. It also would have provided a mechanism for foreign companies to obtain similar rights by voluntarily submitting "to the subject matter and personal jurisdiction of the courts of the United States."[43] It also stated that this should be done in accordance with the international obligations of the United States.[44]

The ASTEROIDS Act was resurrected, at least in part, in **Title IV of the US Commercial Space Launch Competitiveness Act** which became law in November 2015. The Commercial Space Launch Competitiveness Act covers a range of space related topic, but Title IV or the Space Resource Exploration and Utilization Act of 2015, is focused specifically on space mining. This is the first distinction between Title IV and the ASTEROIDS Act. The ASTEROIDS Act as its name would suggest focused on 'asteroid resources' whereas Title IV takes a broader approach and distinguishes between asteroid and space resources. However, there is no distinction between the two made elsewhere in the legislation and it appears to be little more than a shadow of the ASTEROIDS Act (although it could be grounds for future developments). Beyond that Title IV drops the mechanism for foreign companies to obtain property rights over space or asteroid resources by voluntarily submitting "to the subject matter and personal jurisdiction of the courts of the United States." Only United States Citizens and

[37]Richard Gardiner *Treaty Interpretation* (2nd edn, Oxford University Press 2017), 257
[38]Malcolm N. Shaw *International Law* (7th edn. Cambridge University Press 2014), 95; James Crawford, *Brownlie's Principles of Public International Law* (8th edn, Oxford University Press 2012), 51
[39]James Crawford, *Brownlie's Principles of Public International Law* (8th edn, Oxford University Press 2012), 52
[40]James Crawford, *Brownlie's Principles of Public International Law* (8th edn, Oxford University Press 2012), 55-57
[41]HR 5063 'ASTEROIDS Act' 113th Congress. Available at: https://www.congress.gov/bill/113th-congress/house-bill/5063
[42]US Commercial Space Launch Competitiveness Act, Public Law 114-90, 114th Congress, 25 November 2015, 51 U.S.C.
[43]ASTEROIDS Act §51303(2)(c)
[44]ASTEROIDS Act §51301(2)(3)(4), §51302(b)

companies can benefit directly from Title IV. Title IV also includes a disclaimer explicitly stating that it does not constitute an assertion of "sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body."[45] This was included to deflect any claims that it violates Article II of the Outer Space Treaty.

Title IV was enacted to enable the US to develop a framework for regulating space resource activities, and should be seen as part of the US' understanding of its obligations to 'authorise and supervise' the activities of their nationals in outer space as stipulated under Article VI of the Outer Space Treaty. This piece of legislation has provoked considerable controversy as it supposedly conflicts with Article II of the Outer Space Treaty. The argument essentially goes that under the Act as the US grants itself the right to grant property rights over space resources to US companies, therefore the Act could be seen as US trying to claim jurisdiction over space resources, and by extension, the bodies they are found in.[46]

The Act does require the "accordance with the international obligations of the United States"[47] and make the disclaimer that "the United States does not thereby assert sovereignty or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body."[48] However, some are sceptical of the value of such assurances:

> references to 'consistency with international obligations' are vaguely phrased and such a consistency is to be evaluated from a national, US, perspective, which may not be shared, or agreed to, by other States Parties to the UN space treaties.[49]

There is also the additional issue regarding enforcement of the Act. The Act clearly only applies to citizens of the United States or US Companies, and clarifies that the act is not intended to extend US jurisdiction to any celestial body.[50] Therefore, enforcement of the property rights protections supposedly provided by this act will potentially be problematic to action against foreign nationals or corporations. However, this was, and is, the first initial step.

In 2018 the US House of Representatives passed the **American Space Commerce Free Enterprise Act** (H.R. 2809)[51] however it was not voted on by US Senate. In July 2019 it was reintroduced into the US House[52] as H.R. 3610 although the text (as of 13 July 2019) remained unchanged.[53] The US Senate had its own 'competing' bill, the Space Frontier Act. Most of the political fight surrounded whether the US Department of Commerce or the Federal Aviation

[45]US Commercial Space Launch Competitiveness Act, Title IV, §51303 Sec. 403
[46]Fabio Tronchetti, 'The Space Resource Exploration and Utilization Act: A Move Forward or a Step Back?' (2015) 34 Space Policy 6, 8
[47]US Commercial Space Launch Competitiveness Act, Title IV, § 51302(a)(2), § 51302 (a)(3)
[48]*Ibid* § 403
[49]Fabio Tronchetti, 'The Space Resource Exploration and Utilization Act: A Move Forward or a Step Back?' (2015) 34 Space Policy 6, 7
[50]US Commercial Space Launch Competitiveness Act, Title IV, §403
[51]HR 2809, American Space Commerce Free Enterprise Act, 115th Congress. Available at: https://www.congress.gov/bill/115th-congress/house-bill/2809
[52]Marcia Smith, 'Babin Reintroduces Commercial Space Bill' *SpacePolicyOnline.com* 3 July 2019. Available at: https://spacepolicyonline.com/news/babin-reintroduces-commercial-space-bill/?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+Spacepolicyonline+%28SpacePolicyOnline+News%29&fbclid=IwAR1IkatuBmaMcDLs1Hay54GaEpZem5xZX54S52ebD8C2nOPjJ38Y6KnJ-cY
[53]HR 3610, American Space Commerce Free Enterprise Act of 2019, 116th Congress. Available at: https://www.congress.gov/bill/116th-congress/house-bill/3610/text

Administration should have primary responsibility for the supervision of commercial space activities. However, for the purposes of this work the key difference was that the American Space Commerce Free Enterprise Act contained provisions on space resource activities whereas neither version[54] of the Space Frontier Act contained any such provisions.

Section 2(b) stipulates that US citizens are free to utilize space resources without condition or limitation except as required by the national security of the United States and the international obligations of the US under the Outer Space Treaty. However, the US government shall interpret these obligations so as to "minimize regulations and limitations on the freedom of United States non-governmental entities…"[55]

Furthermore, the bill stipulates that the President shall protect US entities engaged in the exploitation of space resources "from acts of foreign aggression and foreign harmful interference"[56] as well as protect the "ownership rights" of US entities which have "obtained space resources."[57] Also, the bill, if passed into law, would have explicitly reject the notion that outer space is a global commons.[58] This was picked up an included in an Executive Order issued by President Trump.

On 6 April 2020 President Trump issued an **Executive Order** on 'Encouraging International Support for the Recovery and Use of Space Resources'.[59] First, it is worth discussing what an Executive Order is:

> An executive order is a signed, written, and published directive from the President of the United States that manages operations of the federal government… *executive orders… have the force of law, much like regulations issued by federal agencies…* Executive orders are not legislation; they require no approval from Congress…[60] (emphasis not in original)

However, the President does need to have the legal authority to issue an Executive Order either directly from the Constitution or via previous authorisation from Congress.

Indeed, the opening of this Executive Order cites Title IV of the US Commercial Space Launch Competitiveness Act of 2015 as the authoritative basis for the Executive Order (as well as the President's general powers under Article II of the US Constitution).

[54]S. 3277 is from the 115th US Congress, S. 919 is from the 116th US Congress
[55]American Space Commerce Free Enterprise Act Sec. 2(b)(3)
[56]American Space Commerce Free Enterprise Act §80111(1)
[57]American Space Commerce Free Enterprise Act §80111(2)
[58]American Space Commerce Free Enterprise Act §80308
[59]'Executive Order on Encouraging International Support for the Recovery and Use of Space Resources' 6 April 2020. Available at: https://www.whitehouse.gov/presidential-actions/executive-order-encouraging-international-support-recovery-use-space-resources/?fbclid=IwAR2VM927Uak4AE7iasdNH4ptwHYXDynkfbufZTZJzMy8pXtTSnhZFas4T8E
[60]'What is an Executive Order?' *American Bar Association*. Available at: https://www.americanbar.org/groups/public_education/publications/teaching-legal-docs/what-is-an-executive-order-/

The Executive Order itself is largely a restatement of existing US policy on space resources. The key points are:

- The US supports the right for commercial 'recovery' and 'use' of space resources
- The US is not a party to the Moon Agreement, and rejects the Moon Agreement as a basis for any space resources governance regime
- The US rejects the notion that the Moon Agreement is reflective or expresses customary international law
- The US repudiates the notion that space is a 'commons'
- The US will seek international support for the 'exploitation' and 'use' of space resources and to this end "the Secretary of State shall seek to negotiate joint statements and bilateral and multilateral arrangements"

As it is largely a restatement of existing US policy this Executive Order is not that significant however the formal rejection of the notion that outer space is a commons may be one of the more important elements. While it has been said by Trump administration officials before (most notably Scott Pace)[61] putting it in an Executive Order gives it more heft. This position should be read in conjunction with the repudiation of the Moon Agreement, the primary target is the Common Heritage of Mankind principle found in that agreement. It is important to remember that the US is one of the few countries that is not a party to the UN Convention on the Law of the Sea, in no small part because of their objection to the Common Heritage of Mankind principle.

The Executive Order discussed above foreshadowed the Artemis Accords. **The Artemis Accords**[62] is a soft law instrument promulgated by the United States in support of their Artemis programme for a return to the Moon. It contains a set of principles to which all countries who join the Artemis programme are expected to adhere. Most of these principles are derived from the Outer Space Treaty and related instruments although they are clearly intended to drive forward the development of international law. Notable examples include more details on the provision of emergency assistance and the avoidance of harmful interference. There are more novel elements such as the section on space resources, although as should be reasonably clear by now this is something the US has been pushing for some time now. There is also a section on space heritage. NASA has previously issued guidance on protecting space heritage particularly on the Moon but the inclusion in the Artemis Accords is part of the process of driving further development. The Accords have been signed by 7 countries as of October 2020 although they have received mixed reaction from the international community, with Russia being one of the more vocal in criticism.[63] As soft law it is not legally binding but will certainly

[61]Marcia Smith, 'Pace Outlines Trump Administration's Approach to Space Development and Law' *SpacePolicyOnline.com* 13 December 2017. Available at: https://spacepolicyonline.com/news/pace-outlines-trump-administrations-approach-to-space-development-and-law/

[62]The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids For Peaceful Purposes, 13 October 2020. Available at: https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf

[63]'Moon Mining Rush: Russia To Draw UN's Attention to US Plans To Grab Lunar Resources' TASS 27 October 2020. Available at: https://tass.com/science/1216983; 'US and 7 Friendly Nations Sign Artemis Accords to Carve Up Moon But Satellite Is Hard To Reach Without Russia's Help' *RT* 13

influence the practice of several key states which will in turn impact the development of binding international law. It is worth noting that the three States which currently have space resources legislation (United States, Luxembourg, and the UAE) have all signed on to the Artemis Accords, and Japan is in the process of developing such a law.

Luxembourg's Law on the Exploration and Use of Space Resources[64] came into effect on 1 August 2017. They first published a draft version of this law in November 2016. Luxemburg has embraced space resource activities in a big way, as in addition to this law they have also invested over 200 million Euros in the industry.[65]

Article I declares that "space resources are capable of being appropriated." Although it is notable that unlike the US law it does not provide a definition of space resources, however the explanatory document published with the initial draft of the law took the definition found in the US law to be the 'common definition.' This definition is that a space resource is an abiotic resource that can be found in situ in outer space including water and minerals. This is the definition adopted by The Hague Space Resources Governance Working Group in the Building Blocks for an International Framework on Space Resources.[66] The US law also provides the term asteroid resource, but the definition of that, as yet, is no different from space resource except for the fact that an asteroid resource is found in an asteroid.

The licence itself can only be granted to legal persons (i.e. companies) having its registered office in Luxembourg. A licence is non-transferable and needs to be used within 36 months of being granted (presumably this just means operations need to have started within 36 months). Furthermore, in order to obtain a licence, the applicant must demonstrate, among other things, a "robust scheme of financial, technical, and statutory procedures…" and plans for the exploration, utilization and commercialization phases of operations. Key sections of the Luxembourg law are backed up by criminal penalties, which range from fines of varying degrees and can include a prison term of between eight days and five years depending on which sections of the law have been infringed.

The government of Luxembourg articulated that the object of the law is to develop "a legal and regulatory framework providing for legal certainty as to the ownership of minerals and other

October 2020. Available at: https://www.rt.com/usa/503415-artemis-accords-unveiled-moon-nato2/; 'Russia Will Not Accept Attempts To Privatize the Moon, Says Roscosmos CEO' *TASS* 25 May 2020. Available at: https://tass.com/science/1159969

[64]Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace - (Law of 20 July 2017 on the exploration and use of space resources) Doc. parl. 7093; Sess. Ord. 2016-2017 - http://data.legilux.public.lu/file/eli-etat-leg-loi-2017-07-20-a674-jo-fr-pdf.pdf (Luxembourg) Unofficial English translation available at: - https://spaceresources.public.lu/content/dam/spaceresources/news/Translation%20Of%20The%20Draft%20Law.pdf

[65]Sarah Scoles 'Luxembourg's Bid to Become the Silicon Valley of Space Mining' Wired (1 October 2017) Available at: https://www.wired.com/2017/01/luxembourg-setting-silicon-valley-space-mining/; David Z. Morris 'Luxembourg to Invest $227 Million in Asteroid Mining' Fortune (5 June 2016) Available at: http://fortune.com/2016/06/05/luxembourg-asteroid-mining/

[66]The Hague Space Resources Governance Working Group (2017) 'Draft Building Blocks for the Development of an International Framework on Space Resource Activities' Available at: https://www.universiteitleiden.nl/binaries/content/assets/rechtsgeleerdheid/instituut-voor-publiekrecht/lucht--en-ruimterecht/space-resources/draft-building-blocks.pdf

valuable space resources identified in particular on asteroids."[67] They state that they hope that this will give rise to a new industry which will stimulate economic growth and offer new horizons in space.[68]

Regarding the provisions of the law itself they also made a point of stipulating that the "relevant legal framework shall be put in place in strict compliance with the international obligations of Luxembourg."[69] Though it is worth noting that the wording of Article I changed from the draft law published on 11 November 2016 to the approved law of 20 July 2017. In the 2016 draft, Article 1 said that "space resources are capable of being appropriated in accordance with international law."[70] In the 2017 law, Article 1 merely says "space resources are capable of being appropriated." Although Article 2(3) does stipulate that activities can only be carried out in accordance with "the international obligations of Luxembourg."[71]

Articles 1 and 2 are where the explanation of the justification for the law is laid out. Luxembourg argues that the basis for property rights over space resources can be found in the Civil Code which originated in 1804 and is inspired by 18th century French legal thinking. The analogy is made with the high seas. "Space resources are appropriable, in the same way as fish and shellfish are, but celestial bodies and asteroids are not, just like the high sea is not."[72] The argument is that the approach is in accordance with the "basic principles of French-inspired property law" as well as being consistent with international law.[73] The argument advanced is that the Outer Space Treaty is silent on the question of resources and Luxembourg's law only addresses resources, there is no attempt to allow, permit or even suggest the appropriation of celestial bodies or the extension of sovereignty or territory. "Only space resources and the appropriation of such resources are addressed here."[74] Additionally, the freedom of use in Article I of the Outer Space Treaty allows for the appropriation of space resources under the scope of the term 'use'.[75] As the explanatory note states

> the analogy with the high sea and mining advocates in favour of the appropriation of resources, and Article 1 is furthermore perfectly in line with the principle of the non-appropriation of outer space and celestial bodies as set out in Article II of the Treaty.[76]

Adding that

> The concept of appropriation includes all of the classic attributes of the right of ownership and in particular the right to possess, transport, use or sell resources in accordance with the provisions of this draft law and those of the international texts that are applicable here.[77]

[67]Luxembourg Draft Law on the Exploration and Use of Space Resources, Available at: https://gouvernement.lu/dam-assets/fr/actualites/communiques/2016/11-novembre/11-presentation-spaceresources/Draft-law-space_press.pdf, 1
[68]*Ibid*, 2
[69]*Ibid*, 1
[70]*Ibid*, 13
[71]Law of 20 July 2017 (see footnote 64)
[72]Commentary on Draft Law (see footnote 67), 3-4
[73]*Ibid*, 4
[74]*Ibid*, 4
[75]*Ibid*, 4-5
[76]*Ibid*, 5
[77]*Ibid*, 6

Luxembourg also recognizes that as a consequence of Article VI of the Outer Space Treaty any space resource activity carried out by a 'non-governmental entity' requires authorisation and supervision and therefore Article 2 requires Luxembourg based entities to obtain authorisation.[78]

The **United Arab Emirates' (UAE)** Federal Law No. 12 on the Regulation of the Space Sector[79] covers among many other things the Extraction, Exploitation and Utilization of Space Resources. Article 18 is the relevant article for the UAE Federal law. It is not a particularly complex provision, but it says that UAE nationals must obtain authorisation to conduct space resource activities but that further specific details "shall be determined by a Decision issues by the Council of Ministers or whomever it delegates." So as with the initial US law it is mainly about establishing the principle that the UAE regards space resource extraction, exploitation and utilization as within the scope of Article I of the Outer Space Treaty.

While not law as of 31 October 2020, **Japan** is in the process of implementing a law which would "allow private businesses to own mineral and other samples collected outside Earth."[80]

International Efforts

While national efforts, particularly those undertaken by the United States have garnered significant attention, especially outside of the community of space law and policy experts, there have been developments internationally. The discussions at the United Nations are the most formally significant but two efforts The Hague Space Resources Governance Working Group and the Vancouver Recommendations on Space Mining issued by the Outer Space Institute are also worth discussing as they were expert led high level groups.

The United Nations Committee on the Peaceful Uses of Outer Space (**UNCOPUOS**) is the leading international forum for space governance. It has two subcommittees a Scientific and Technical Subcommittee and Legal Subcommittee. The Legal Subcommittee has been responsible for developing the five 'UN space law treaties' as well as a host of declarations and General Assembly Resolutions on space governance issues. Unsurprisingly, in the wake of the passage of the US space resources legislation in November 2015 the UNCOPUOS Legal Subcommittee began discussing the issue of space resources. Over four sessions from April 2016 to April 2019 the international conversation has developed significantly and will be discussed.

At the session of the Legal Subcommittee of UNCOPUOS in 2016, initial opposition was raised to Title IV of the US Commercial Space Launch Competitiveness Act. The Russian delegation was the first to express disapproval, stating that UNCOPUOS is the main forum for the creation and discussion of space law. They further stated that the unilateral adoption of national

[78] *Ibid*, 6

[79] Federal Law No. (12) of 2019. Issued 19 December 2019. (United Arab Emirates). English: https://www.moj.gov.ae/assets/2020/Federal%20Law%20No%2012%20of%202019%20on%20THE%20REGULATION%20OF%20THE%20SPACE%20SECTOR.pdf.aspx Arabic (official): https://space.gov.ae/Documents/PublicationPDFFiles/SpaceSectorFederalLaw_AR.pdf

[80] Kyodo Jiji, 'Japanese Bill to Allow Ownership of Samples from Outside Earth' The Japan Times 6 November 2020. Available at: https://www.japantimes.co.jp/news/2020/11/06/national/science-health/japan-bill-space-samples/

legislation is unacceptable as the views of all states need to be accounted for, something than can only happen via UNCOPUOS.[81] The US delegation stated that there had been an inaccurate characterization by Russia of the US Space Resources Act. They further stated that the law has been general misunderstood. The law authorises space activities, it does not claim sovereignty over space or celestial bodies and is consistent with US obligations under international law.[82] Furthermore, the US stipulated that the Act operates within the framework of the Outer Space Treaty and will be interpreted and applied in accordance with international law.

The US delegation also asserted that the US has always been a strong supporter of the non-appropriation principle and that this law does not change the US position. Finally, they stated that the implementation of the Act had to be a 'unilateral action' as there is no multilateral mechanism for space resource management and implementation of national legislation is by its very nature a unilateral action.[83]

At the UNCOPUOS Legal Subcommittee in 2017 the topic of space resources featured on the agenda under item 14 "general exchange of views on potential legal models for activities in exploration, exploitation and utilization of space resources."[84]

Discussions on space resource activities at the UNCOPUOS Legal Subcommittee in 2018 continued with greater participation. In 2018 space resources appeared under agenda item 15 'general exchange of views on potential legal models for activities in exploration, exploitation and utilization of space resources.'[85]

At the 2019 session of UNCOPUOS Legal Subcommittee one of the key points of discussion was the working paper introduced by Greece and Belgium on the creation of a Working Group within the Legal Subcommittee of UNCOPUOS on space resources.[86] Belgium argued that while the 'general exchange of views' on space resources in the 2019 and previous Legal Subcommittee sessions had been a useful process they expressed the view that the Legal Subcommittee needs to try to move forward. They argued that establishing a working group on space resources is one potential way to do that. The Legal Subcommittee broadly agreed with the establishment of a working group. Due to COVID-19 further developments have not been undertaken at UNCOPUOS due to the cancellation of the 2020 session.

The Hague Space Resources Governance Working Group was an independent international forum comprised of academics, governments and other stakeholders. They produced a set of Building Blocks for the Development of an International Framework on Space Resource Activities. The purpose is to "lay the ground work for international discussions on the potential development of an international framework…"[87] These are not binding international law, nor are they intended to be but they have provided an important focal point for the debate on space resource governance.

[81]Russian Delegation, UNCOPUOS Legal Subcommittee, 4 April 2016 1052-1055
[82]US Delegation, UNCOPUOS Legal Subcommittee, 4 April 2016 1047-1051
[83]US Delegation, UNCOPUOS Legal Subcommittee, 5 April 2016 1116-1123
[84]UNCOPOUS, 'Annotated Provisional Agenda' (27 January 2017) UN DOC A/AC.105/C.2/L.299
[85]UNCOPUOS 'Annotated Provisional Agenda' (29 January 2018) UN DOC A/AC.105/C.2/L.303
[86]UNCOPUOS 'Proposal for Working Methods and Work Plan of the Working Group on Legal Aspects of the Exploration, the Utilization and the Exploitation of Space Resources, (with Reference to Document A/AC.105/C.2/L.311' UN Doc A/AC.105/C.2/2019/CRP.26
[87]The Hague Building Blocks (footnote 16), preamble

One potentially significant contribution of the Building Blocks is the provision of definitions. One of the more notable may be 'space made product'. The Building Blocks use the standard definition for space object[88] but introduce a new term 'space-made product' which is defined as a "product made in outer space wholly or partially from space resources."[89] The Building Blocks, having introduced the new term of 'space-made product', recognize that there needs to be international responsibility for these objects and essentially proposes extending the 'space object' regime to 'space-made products' while maintaining a distinction between those objects *launched* into outer space and those made from space resources.[90] A reasonable, non-revolutionary approach.

More novel is the Building Blocks call for the attribution of 'priority rights' which are limited in duration and area of application but international recognized so as to allow an operator the ability to search and/or recover space resources without undue interference.[91] The Building Blocks also stipulate that any international framework

> "should ensure that resources rights over raw mineral and volatile materials extracted from space resources, as well as products derived therefrom, can lawfully be acquired, and provide for the mutual recognition between States of such resource rights."[92]

Interestingly the Building Blocks do not provide a definition of resource rights. The term is generally used to refer to rights of indigenous peoples which is clearly not the intention here.[93] The use of the phrase in the Building Bocks more closely aligns with the term 'mineral rights'[94] Although again the term as used in the Building Blocks does not exactly align with the general use of the term which is usually about the right to extract resources (and so in the formulation of the Building Blocks would be 'priority rights').[95] The term as used in the Building Blocks seems to be an attempt to grant 'property rights' over extracted resources without using the phrase 'property rights' which does not appear anywhere in the Building Blocks.

The Building Blocks also provide for a 'claims register' for the registration of priority rights[96] as well as an international database for providing notifications of space resource activities.[97] The Building Blocks also call for the development of area-based safety measures although recognizing the limitations of Article II of the Outer Space Treaty stipulates that "such safety measures shall not impede the free access… to any area…"[98] Highlighting the necessity of international cooperation and coordination of space activities, whether they are engaged in the 'use' of space resources or not.

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[88]Essentially, any human made object launched into outer space – see: Building Block 2.4
[89]The Hague Building Blocks (footnote 16), Building Block 2.5
[90]The Hague Building Blocks (footnote 16), Building Block 6
[91]*Ibid*, Building Blocks 7 and 14(a)
[92]*Ibid*, Building Block 8.1
[93]World Resources Institute 'Land and Resource Rights'. Available at: https://www.wri.org/our-work/project/land-and-resource-rights; Global Forest Watch, 'Resource Rights'. Available at: https://data.globalforestwatch.org/datasets/165e621a0b4245f2b10df4ed8aabf271_0; Centre for International Environmental Law 'Land and Resource Rights'. Available at: https://www.ciel.org/issue/land-resource-rights/
[94]'Mineral Rights' *Wikipedia*. Available at: https://en.wikipedia.org/wiki/Mineral_rights
[95]Timothy Fitzgerald, 'Understanding mineral Rights' Montana State University (2017). Available at: http://msuextension.org/publications/AgandNaturalResources/MT201207AG.pdf
[96]The Hague Building Blocks (footnote 16), Building Blocks 14(a), 18(a)
[97]*Ibid*, Building Block 18(b)(i)
[98]*Ibid*, Building Blocks 11.3, 14(b), 18(b)(i)

Indeed this is a key and common point of the Building Blocks that there is the need for international or at least mutual recognition of the mineral/access/priority/property rights of operators as well as cooperation and coordination of efforts to regulate the associated activities. This is indeed key. Especially as space resource activities are likely to be international ventures, but also given the potential for operators from multiple potentially 'less than friendly' states proactive steps need to be taken in order to safeguard the peaceful nature of space, something which all parties to the Outer Space Treaty have an obligation to ensure not just of their own actions but also the actions of their nationals in outer space. However, there does need to be caution as mineral/access/priority/property rights can quite easily turn into 'national appropriation by means of use, occupation or any other means.'

The **Vancouver Recommendations** on Space Mining[99] were developed by the Outer Space Institute which is part of the University of British Columbia in Canada. These are a set of recommendations for the development of a governance framework for space resource activities. This effort is similar to the Hague Working Group as the Recommendations themselves acknowledge. The Vancouver Recommendations, like The Hague Building Blocks, recognize that space resource utilization is on the horizon and stipulate that "the existing regime for Space governance is poorly equipped for these developments." They stipulate that the Outer Space Treaty "does not say anything about the recovery and use of Space resources." Further, that "the absence of clear international rules could pose problems as Space mining companies emerge in multiple countries and governments adopt national legislation to support and regulate them." The Recommendations further warn that "it is possible that 'flag of convenience' states will emerge in this field, seeking to attract business through lax regulatory regimes and oversight." These Recommendations are therefore intended to build on the existing body of work and "help ensure that space mining, wherever and whenever it takes place, does so in a safe and sustainable manner."

Some of the highlights of the Recommendations are an acknowledgement that there continues to be debate about the meaning of Article II of the Outer Space Treaty, with the stipulation that interpretation cannot be legally binding without being "accepted by a significant majority of states." Further the Recommendations state that the "unilateral adoption of national legislation" is an inadequate approach to the regulation of space mining. Therefore the Recommendations recommend multilateral negotiation of an international regime. These negotiations should be open to all states and involve non-governmental stakeholders such as science and industry. Further, they should be guided by the precautionary principle and the requirements of planetary protection. Any legal framework for space resources, should, according to the Recommendations, ensure legal accountability, the protection of cultural, historical, natural and scientific sites of interest. There are numerous other technical recommendations contained within the document.

The Vancouver Recommendations do not seem to have generated the same interest as The Hague Building Blocks, however they were only released in April 2020 and as the world was in the midst of the COVID pandemic at the time the Legal Subcommittee of COPUOS was not held, which presumably impacted their impact.

[99]Outer Space Institute, *Vancouver Recommendations on Space Mining* 20 April 2020. Available at: http://www.outerspaceinstitute.ca/docs/Vancouver_Recommendations_on_Space_Mining.pdf

Final Thoughts

Whether, and how, space mining is 'legal' has been a long question within the academic space law community. In the early 2010s the question became more 'real' with the emergence of Deep Space Industries and Planetary Resources and their widely publicised plans. The questions around the legal aspects of space resources became even more pertinent with the enactment of the US space resources legislation. As discussed there have been a number of developments in the wake of that legislation. However, at least as a matter of international law, things are not necessarily that much clearer than they were in 2015.

It does seem reasonably clear that the international community accepts that space resource activities do fall within the freedom of 'use' of outer space as laid out in Article I of the Outer Space Treaty. However, and this is a key point, there is not consensus that States acting on their own national legislation can authorise such activities without violating Article II of the Outer Space Treaty. There does also seem to be broad agreement that whether or not an international approach to regulating space resource activities is legally required by the Outer Space Treaty it would be sensible to take such an approach.

While space resource activities have yet to occur the international community, particularly the space law community, can no longer afford not to take them or the issues raised by them seriously. International law is in development. Three states, soon to be four, now have legislation laying the initial legal groundwork for authorising space resource activities, others are sure to join them. The United States has, through the Artemis Accords, taken the first formal steps toward the development of a coalition of states which support their interpretation of international law with regards to space resource activities. It will only be a matter of time before the first licence is granted and the first activity is actually conducted. However, there is a considerable amount of detail that will have to be worked out before then. For example, safety zones have been proposed and are increasingly accepted as necessary and sensible but now the concept needs defining; how big is a safety zone? Does it matter where it is? How is it to be enforced? There are many such questions. While there have been considerable, and important developments, as outlined in this primer, there is still considerable work that needs to be done in order to ensure the safe and sustainable conduct of space resource activities, wherever and whenever they may occur.

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