



Notes from the CEO

This issue is quite late in coming out. In fact, we changed its designation from “Spring/Summer” to “Winter.” The delay resulted for a number of reasons, partly due to the change in the editor of this newsletter. While I was designated as the temporary person to helm this issue, Dr. Michael Dodge – who was to take over permanently starting in the following issue – has agreed to assume the editor position for this issue as well. Thus, our two newest ARI officers, Dr. Michael Dodge (editor) and Mr. Vidmar Matjaz (associate editor), have taken over the publication of this issue. I have also joined as a second associate editor. Despite the long delay, I am happy to state that the quality of this issue is as impressive as always in terms of its contents as well as the authors who submitted articles.

Space law and space policy existed before the founding of astrosociology, of course. However, the astrosociological perspective offers a significant expansion of input from social scientists, humanists, and artists. This expanded orientation provides a deeper understanding of legal and policy issues that has largely remained absent throughout the space age and the advent of the NewSpace period now characterized by an increasing rise of commercialization in the space sector. This newest trend characterized by commercialization has both legal and policy ramifications regarding spaceflight safety for space tourists and those venturing beyond the Earth’s gravitational field. Moreover, these laws and policies also affect those who live on Earth because issues related to the influence of space-based forces are becoming increasingly omnipresent and impactful in societies, and therefore legal norms need to be codified in order to cope with these ever-evolving socio-legal changes.

Furthermore, the expressed intention of some corporations (e.g., SpaceX and Mars One) to send humans to Mars, the Moon, and elsewhere currently takes place without enough attention paid to astrosocial phenomena; that is, the social, cultural, and behavioral patterns related to outer space. The overly heavy reliance on STEM-based issues is not conducive to successful human space exploration, space-based mining, and settlement. Legal and policy considerations just to get off the ground are important, of course, but we must also prepare for the future. At some point, Earth-based authority will lose its direct control over those in extraterrestrial ecosystems. At that point, laws and policies must also exist to regulate behavior once humans safely escape the bounds of Earth’s gravity well and begin to view themselves as separate from Earth’s legal regime. Because social problems including various forms of deviance are inevitable, criminal justice systems will become increasingly complex as a settlement’s population grows. Laws to deal with these types of behavior will become necessary.

Several questions exist as we speculate about the future of space exploration, resource mining, and settlement. For example, how will these actors interpret the 1967 Outer Space Treaty (in effect for over fifty years) and the Moon Treaty (effective for some States since 1984)? How will they act with regard to their interpretations of these treaties in conjunction with their corporate and personal best interests? How have national laws and policies since the ratification of these treaties affected how these treaties are interpreted and how binding they are to various parties? How will conflicting interpretations among space attorneys be resolved? Will terrestrial laws, policies, and international agreements hold their influence over those who travel to, and especially over those who decide to stay at, extraterrestrial locations? It is important to think about the movement of history as laws and policies are formulated because near-term concerns often fall away to more distant and unforeseeable solutions to new problems and social conditions due to ongoing

Exploring Space Law and Policy



Jim Pass, PhD

Chief Executive Officer

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social change that can either present itself as overall progress for terrestrial nations and space settlements or a source of conflict among them. Laws and policies must not only be applied to technological and (hard) scientific developments, but also applied to social-scientific and humanistic changes that have always proven inevitable and often overlooked to the detriment of those individuals and various social structures with the greatest control over the course of human history. And, of course, these developments affect those with little or no power, which must also receive its due attention....

Many of these concerns are covered in this issue along with several others. One thing is certain. It is a valuable exercise to seriously ponder future trends and possibilities. Space law will evolve in ways currently unimaginable and will differ among various settlements and space societies. Each one will develop its own unique culture (and thus its own unique values and norms to protect them). Each will determine what is most valued for itself often regardless of Earthly laws and policies. How will terrestrial governments and corporations handle this change in their power relationships? Whether this results in cooperation or conflict is indeterminable though open to speculation at this point in history. Interplanetary relations will someday expand legal regimes beyond Earth in new and both fascinating and perhaps terrifying ways. Realistically, then, Earth-based laws and policies will serve terrestrial interests and try to expand them beyond to other human ecosystems, though how long this can continue is an intriguing process to monitor. The entire area of space law and policy is really in its infancy and therefore it must receive greater attention from every relevant scientific discipline and field, including astrosociology.

Enjoy this issue of *Astrosociological Insights* and provide us with feedback, including possible themes for future issues.

Regards,

Jim

CEO, Astrosociology Research Institute



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Notes from the Editor



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Firstly, I want to express to the astrosociology community about how excited I am to come on board at ARI, and to be working on the *Astrosociological Insights* newsletter. I have been an editor of other publications before, but this topic has presented a unique challenge for me, and one I have thus far found welcome and stimulating. As noted by Dr. Pass, I took up this role in the Fall of 2017, and have been working on learning the editing software, communicating with submitters, and editing their pieces since that time. Insofar as this has made the issue come out significantly later than the norm, I do apologize. The good news is that with these early experiences, the next edition should proceed much more smoothly.

I am an attorney by education, so this issue, focusing on matters of law and governance in outer space, is near and dear to my interests as an academic writing and researching in the field. Some of the articles you will read here are from others trained in law, and some are not. I inherited these submissions when I came on to the project in the Fall, and I can honestly say I have been impressed by the thoughtfulness and work put into the various mini-papers we received. Even as someone who spends his days teaching about space law, I feel I learned a thing or two from our contributors, and I can only hope you have the same experience.

I was wary, at first, of an issue that concerns itself with legal matters, if for no other reason than I could not see how it would be possible to write about such complex matters in so short a space. In reading through them, I found my concern was misplaced—one needn't wax on for ten-thousand words to describe any particular pertinent or upcoming space law and governance matter. Indeed, much of what you see below are notes from authors who wish people to simply be aware that there are many challenges ahead for all of humanity's operations in space. You will read about commercial space matters, criminality in space, shifting space governance structure in various States, interpretation of extant legislation and international law, and legal concerns associated with the space treaties.

That brings me to the Outer Space Treaty (OST), and its progeny. Last year, the Grand Space Treaty, as I like to call it, reached its 50th birthday. Indeed, part of the intention of publishing this issue of *Insights* was to ensure people were aware of this momentous occasion. And yes, I do mean to heap a bit of praise here on the OST. As you will see from reading some of the authors below, some of whom do an excellent job of explaining early space law history, the Outer Space Treaty has had a substantial impact on what nations can and cannot do in outer space. Perhaps most surprisingly of all, for the most part, it seems to have worked beautifully at recognizing States' interests in space, and in maintaining peaceful relations there. These points can, have, and will continue to be debated, of course (see the article below on militarizing space), but in the 50 years since its inception, no State has waged an active war in space, even if many of them may be silently figuring out ways to do so should the need arise.

The Treaty's primary purpose is in enabling all States, regardless of their technological sophistication, to peacefully use and explore outer space. That is why it works to establish active rights (exploration, use, scientific study, etc.), and to prohibit actions that could impede the exercise of those rights (e.g., the prohibition on sovereign territorial acquisition in space). It also sets forth standards related to

non-governmental actors being in space (Article VI), liability (Article VII), environmental protection of both the Earth and outer space (Article IX), as well as for other subjects. The OST has also inspired decades of research and publications from lawyers and policy-makers interested in the disposition of space and space technology. This trend is far from slowing down; indeed, with more and more nations and increasing numbers of corporate and private interests entering into the space arena, more discussion is needed now than ever before about the future of our species in space, and on Earth.

Indeed, the Outer Space Treaty is not a perfect document. In many ways, it is vague, confused, ill-defined, and arguably over-permissive. All these are points of debate, but they have each been raised as reasons for revisiting the Outer Space Treaty. Some would see the Treaty amended, as there is a provision for doing so written into its text. Others would see it altogether scrapped, in favor of “soft-law” agreements between States, or would simply have it drift into non-relevance in an ever changing world of space. Yet others would say that it is functioning just fine, and is not in need of adjustment. However, there has been a great deal of consternation of late (primarily among scholars, I would note, but not exclusively so) over the matter of extra-terrestrial mining operations, and whether the OST permits these activities. There are companies whose *raison d’être* is to extract resources from the Moon, asteroids, and other celestial bodies, but who have yet to engage in significant space-based operations. In some instances, they are waiting for permission from lawmakers and regulators, and in others, they are still working on developing technology. The United States, among a small handful of other States, has worked to encourage such activities, arguing they are permitted by the Outer Space Treaty, which does say States are free to “use” space. Opponents of this philosophy argue that such activities would be in violation of Article II of the Treaty, which forbids sovereign and, by extension, territorial control over outer space and its celestial bodies. The issue remains unsettled, but it is undeniably an interesting time to be alive in the age where answers will soon be discovered.

Of course, there are many, many other issues that require the attention of law in space. Dr. Pass noted these in his piece above. I am particularly interested to see what will eventually come of proposals to create space-based traffic management, and to suss out which agencies or international bodies, may become involved in authorizing future activities in space-proper. I hope to see some progress on these issues in the coming years. I am also hopeful that when lawmakers begin to settle new rules and regulations, they are aware of the great import of figuring out the cultural and sociological issues that will attend a larger and more sustained human presence in outer space.

With that, I would like to conclude my opening thoughts. I want to thank the numerous contributors to this issue, and express my appreciation for your thoughts on space law. I’d also like to thank Dr. Pass, and the rest of the astrosociology group, for their patience as I learned the ropes, and got started here on the editing process. Finally, I’d like to thank my colleagues here at the Department of Space Studies, at the University of North Dakota, for their support of the work I do in editing matters related to space journals and newsletters. They, along with my stellar research assistant, Ms. Sophie Orr, have made this an educational and pleasurable experience. I hope you enjoy the issue, and please let us know how you felt about this issue of *Astrosociological Insights*.

- Michael S. Dodge

Want to know more about astrosociology or the Astrosociology Research Institute? Interested in submitting an article to this newsletter or our peer-reviewed *Journal of Astrosociology*?

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A Brief History of the Outer Space Treaty and the Moon Agreement

The end of the Second World War marked the beginning of a new era in human history where direct combat was substituted with pledges for maintenance of world peace and advancement of international cooperation under the supervision of the newly created United Nations (UN). However, the two big winners of the war - the United States of America and the Soviet Union - were political enemies, the former being the centre of world capitalism and the latter controlled by a centralised communist government. So, instead of engaging in another devastating armed conflict, both superpowers began a scientific and technological competition that resulted in some of the biggest achievements of humanity.

On 4th of October 1957, Sputnik-I was successfully launched into Earth's orbit by the Soviets[1] to become the first human-made object to go beyond the atmosphere. The launch of the satellite caught the USA by surprise as they were planning on launching a similar satellite only a year later in 1958.[2] Until that moment, space was an uncharted territory only explored by the minds of science fiction writers. The tiny satellite unleashed 'The Space Race' - the peak of the US-USSR rivalry that led to the realisation of human spaceflight and the legendary Apollo missions that successfully sent humans to the Moon several times.[3]

As more and more progress was made by the scientists, additional questions were raised. How to protect space from becoming a war zone? Who has the right to explore and use space? Who, if anybody at all, owned space?[4]

It was not long after the launch of Sputnik-I that the policy makers recognised the need to address these issues and find balance between the conflicting ideologies and political approaches across the globe. There was consensus that the regulation of space activities was an absolute necessity if global peace, both on Earth and beyond it, was to be preserved. During the International Geophysical Year of 1957, various debates concerning the problem took place, and a collective understanding of the nature and goals of a potential set of rules was developed among scholars and practitioners.[5]

In 1963, the American and the Soviet governments concluded a treaty banning the deployment of nuclear weapons and weapons of mass destruction in outer space, called the Partial Test Ban Treaty[6], which was a decision welcomed by the global community and adopted by the United Nations just a week after its entry into force.[7]

Development of Space Law

The ratification of the Partial Test Ban Treaty laid the first stone of what was to become a whole new area of law. A juridical set of rules was established governing the exploration and use of outer space, including the objects found in it. Today, we call this "space law."

The United Nations General Assembly (UNGA) was quick to elaborate further on ways to safeguard the peaceful uses of outer space, and adopted the Declaration of Legal Principles Governing the Activities of

States in the Exploration and Use of Outer Space.[8] This non-binding document contained provisions that remained largely unchanged until today. The Declaration established some of the fundamental principles of space law - exploration and use to be carried out for the benefit and interest of all mankind, in accordance with international law and equality, and the stipulation that neither outer space nor celestial bodies are subject to national appropriation.[9]

Outer Space Treaty

The doctrines mentioned above are contained in the main body of rules that governs space activities on international level today - the Outer Space Treaty (OST). The full name of the agreement is the ‘Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies.’ It was signed on 27th of January 1967. It went on to become the most important multilateral agreement in the space sector with 126 signatories as of 1st of January 2017.[10] The wording of the Treaty expanded and advanced the principles contained in the Declaration adopted by the General Assembly four years earlier. It contains an important provision on the freedom of use and exploration by all states without discrimination based on economic or scientific development and declares outer space to be “province of all mankind”.[11] It goes further to declare that outer space and celestial bodies are not subject to national appropriation “by claim of sovereignty, by means of use or occupation, or by any other means”.[12] Conservation of peace and compliance with international law as well as affirmation of the status of outer space as a disarmament zone were also confirmed within the Treaty.[13] Furthermore, the OST proclaims astronauts to be ‘envoys of all mankind’[14] and vests international responsibility in states for national activities in space and on the Moon and other celestial bodies.[15]

Regardless of its great achievements, the OST remains somewhat uncertain. It consists only of 17 articles and no definitions to specific terms that are included in the wording. There have been various interpretations of its provisions and some conflicting theories about its meaning. The need for further elaboration on the rules governing the use and exploration of outer space and celestial bodies became more evident with time, and in 1979 the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement or MA) was opened for signature.

Moon Agreement

The Moon Agreement was conceived as a complimentary piece of legislation to the OST, seeking to clarify and expand the meaning of its provisions while considering the progress in exploration technologies.[16] The MA is slightly larger, with 21 articles in length, and it contains almost the same provisions as the OST with a slight difference.

The key doctrine established in the Agreement, and its most controversial feature, was a departure of the “province of mankind” wording in the OST and instead the MA declared the Moon and its natural resources to be part of the “common heritage of mankind.”[17] Similarly to the OST, no clear definition of the term is presented. However, the language used in the text is a direct reflection of the terminology adopted in a much more elaborate instrument of public international law, namely the UN Convention on the Law of the Sea (UNCLOS). In the document, spanning across hundreds of articles, the term “common heritage of mankind” is mentioned five times in relation to different provisions regarding the deep seabed, natural resources, and international obligations of states.[18] Within the meaning of UNCLOS, the common heritage of mankind was argued to implement the protection of developing states’ interests and to limit potential claims of national jurisdiction and sovereignty.[19] However, the MA fails to establish a

regime similar to the one in UNCLOS and to provide definition of what exactly was meant by these particular words.

Ostensibly, the MA created more problems than it resolved. It contributed further to the confusion surrounding the interpretation of the Outer Space Treaty, and contrastingly, as of 1st of January 2017, it has only 17 state parties. None of the spacefaring nations, including the USA and Russia, had signed it.[20] Despite the lack of success of the Agreement, it must be considered as an integral part of the general space law doctrine as it is currently in the centre of multiple debates regarding its meaning and purpose.

The OST and the MA are the two multilateral covenants of the biggest importance in contemporary space law. In 2017, the world celebrated fifty years since the OST was adopted and now its provisions are more controversial than ever before. When the two treaties were signed, the geopolitical and scientific environments were entirely different, the tensions between the two global superpowers - the USA and the USSR - were stimulating technological advancement through competition; but at the same time, this advancement was restricted by the lack of cooperation on the international level. In the 21st century, spaceflight and space exploration entered a new era. Therefore, some commentators consider the OST and the MA to be obsolete and not able to support the new incentives for space exploration and exploitation.[21]

The more private companies get involved in the space industry, there will inevitably be more need for elaborate and precise legislation both on a national and international level. At this point, the main shortcoming of the OST and MA is that they are concerned with state responsibilities under international law rather than directly regulating all players in the field. Both treaties were conceived in an era dominated by power politics and conflicting ideologies and this, to a certain extent, has limited their potential to harmonize and balance interests in space exploration. The intention to keep outer space as a neutral zone is indeed a plausible one, however we must consider the market economy within which the newest private enterprises act and conduct their business. It is reasonable to believe the treaties would need to be amended to accommodate the raise in private capital in the sector or ultimately, to be abolished and re-written completely while taking into consideration core values such as peace, cooperation and mutual benefit.

[1] National Aeronautics and Space Administration, "Sputnik I." Nasa.gov, October 4, 2011. Accessed July 31, 2017 https://www.nasa.gov/multimedia/imagegallery/image_feature_924.html

[2] Scheffer, James *The Race: The Uncensored Story of how America Beat Russia to the Moon* New York: Anchor, 1999, 3-5

[3] National Aeronautics and Space Administration, "The Apollo Missions." Nasa.gov, July 31, 2015. Accessed August 21, 2017 https://www.nasa.gov/mission_pages/apollo/missions/index.html

[4] Meyers Binzer, Mildred "Laws for Outer Space" 46 *Women Law Journal* (1960), 13

[5] Jankowitsch, Peter "The Background and History of Space Law" in *Handbook of Space Law* edited by Frans von der Dunk and Fabio Tronchetti, 2 – 28, Cheltenham: Elgar, 2015

[6] Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water (signed 5 August 1963, entry into force 10 October 1963); 480 UNTS 43; TIAS No. 5433; 14 UST 1313; UKTS 1964 No. 3; ATS 1963 No. 26.

[7] United Nations General Assembly Resolution 1884(XVIII) Question of General and Complete Disarmament, 17 October 1963; UN Doc. A/RES/18/1884

[8] United Nations General Assembly Resolution 1962(XVIII) Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, 13

December 1963; UN Doc. A/AC.105/572/Rev.1

[9] *Ibid.*, art.1, art. 2, art.3, art. 4

[10] United Nations Committee on the Peaceful Uses of Outer Space, " Status of International Agreements relating to activities in outer space as at 1 January 2017" (56th Session of the Legal Subcommittee, 23 March 2017), United Nations Office for Outer Space Affairs, Accessed August 15, 2017

http://www.unoosa.org/documents/pdf/spacelaw/treatystatus/AC105_C2_2017_CRP07E.pdf

[11] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted on 19 December 1966, entry into force on 10 October 1967) (hereinafter Outer Space Treaty) art. I

[12] *Ibid.*, art. II

[13] *Ibid.*, art. III, art. IV

[14] *Ibid.*, art. V

[15] *Ibid.*, art. VI

[16] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (opened for signature 18 December 1979, entry into force 11 July 1984), Preamble

[17] *Ibid.*, art. 11

[18] United Nations Convention on the Law of the Sea (signed 10 December 1982, entry into force 16 November 1994) art 136, art. 150, art.155, art.310, Preamble

[19] See generally Heim, Barbara Ellen, "Exploring the Last Frontiers for Mineral Resources: A Comparison of International Law Regarding the Deep Seabed, Outer Space, and Antarctica" *Vanderbilt Journal of Transnational Law* 23 820 (1991)

[20] United Nations Office for Disarmament Affairs, "Status of the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies", United Nations Office for Disarmament Affairs, Accessed August 15, 2017 <http://disarmament.un.org/treaties/t/moon>

[21] See Fountain, Lynn "Creating Momentum in Space: Ending the Paralysis Produced by the 'Common Heritage of Mankind' Doctrine" *Connecticut Law Review* 35 1753 (2003), Meyers, Ross "The Doctrine of Appropriation and Asteroid Mining: Incentivizing the Private Exploration and Development of Outer Space" *Oregon Review of International Law* 17 183 (2015)

Opportunities of First Impression and the Outer Space Treaty

In addition to looking back over the Outer Space Treaty's[1] half-century mark, we must also look forward, and we must do so in the knowledge that the interpretation and implementation of much of the Treaty raises many questions of first impression. This means that all the scholarly articles, all the different position statements from federal agencies, all the wishes of space pioneers, have not been put through the crucible of litigation, and no judge has rendered a decision as to the accuracy of those interpretations.

What is the significance of this? Because a question of first impression is one where no binding legal authority controls the answer,[2] we may interpret the Treaty so that it does not unduly burden private activities in outer space. There are three controversial provisions of the Treaty where the three different branches of the U.S. government could interpret ambiguities in favor of

commercial operators. It is my own view that such interpretations are the right ones. They include Article II's prohibition on national appropriation of outer space, including[3] the Moon and other celestial bodies,[4] Article VI's call for the authorization and continuing supervision of non-governmental entities in outer space,[5] and Article IX's requirement that States Parties pursue their studies and exploration of outer space so as to avoid harmful contamination to outer space and adverse changes in Earth's environment resulting from the introduction of extraterrestrial matter[6]. Advocates from academic and governmental institutions have argued that these provisions bar commercial ownership of property in outer space[7], require governmental authorization and supervision of all private activities in outer space,[8] or prohibit private U.S. activity without that authorization and supervision[9], and that the harmful contamination provisions apply to private actors. These interpretations are burdensome, unnecessary, and incorrect.

A. Authorization and Continuing Supervision.

Article V states that, "The activities of non-governmental entities in outer space, ... shall require authorization and continuing supervision by the appropriate State Party to the Treaty." Article VI does not state that either all activities or any particular activity must be authorized, leaving decisions regarding what activities require regulation to the member states. Additionally, Article VI is not, under U.S. law, self-executing, which means that it does not create an obligation or a prohibition on the private sector unless and until Congress says it does.

Article VI says neither that all or any particular activity shall require authorization and continuing



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supervision. One country might, for example, impose price controls on platinum group minerals returned to Earth from an asteroid. Another might not. Article VI grants the States Parties to the treaty the same latitude in deciding what activities require authorization and continuing supervision. Asteroid mining itself might require no regulation because it would harm no one. In contrast to mining on Earth, where safety and environmental concerns provide a need for independent oversight, robotic mining of rocks in space far from any human habitation may not require regulation because no one lives on the rock, it has no visitors, and no one will get hurt by it.

The previous administration interpreted Article VI to require the authorization of any and all non-governmental activities in outer space[10]. Additionally, the Federal Aviation Administration has indicated that it may deny a private entity access to space because of Article VI.[11] In the United States, the FAA's position ignores Supreme Court law regarding non-self-executing treaties. Although the Constitution describes treaties as the supreme law of the land, they must be self-executing in order to be enforceable federal law without implementing legislation from Congress. As the Supreme Court has noted, "not all international law obligations automatically constitute binding federal law enforceable in United States courts." [12] In the case of *Medellin v Texas*, the Supreme Court held that not even the President could execute a non-self-executing treaty provision.[13] The regulatory agencies should thus not claim the power to use Article VI, which is non-self-executing, to deny a non-governmental entity access to space.

B. Private Conformity with the Treaty.

Some claim that Article VI's provision that States Parties to the treaty assure "that national activities are carried out in conformity with the provisions set forth in the present Treaty" means that commercial actors must abide today, even absent legislation, by each provision in the treaty, even the provisions that only apply to governments. This approach ignores the plain language of the treaty and would create unnecessary burdens in the context of property rights and harmful contamination.

Conforming to the treaty should not mean that what is forbidden to States Parties must be forbidden to private entities as well. The treaty does not state that. It only states that private entities must conform. First, when Article VI calls for private conformity to the provisions of the treaty, it leaves unsaid which provisions apply. A review of the treaty shows that most of it applies to "States Parties." When the treaty's drafters meant a provision to apply to non-governmental entities they stated so, such as in the non-interference provision of Article IX. Accordingly, when we determine to which provisions a private entity must conform, we see that very few apply to private actors.

1. Private property.

Clear and recognized freely transferable property rights lie at the heart of Western prosperity.[14] "Absent legally recognized rights to buy, own, and sell titled property, it is difficult, if not impossible, to get a loan to purchase said property, improve it, mine it, drill for minerals on it, or sell the proceeds from any of those activities. Property rights are a sine qua non of wealth creation ..."[15]

Accordingly, when we look to interpret Article II's bar on national appropriation, we see that it does not ban private appropriation. Although the U.S. State Department once claimed that "private ownership of an asteroid is precluded by Article II,"[16] the U.S. Congress has since exercised its legislative authority to override and disagree at least in part when it passed the Space Resource Exploration and Utilization Act of 2015. That new law recognized the rights of private entities in resources they may extract from outer space.[17]

Article II's bar on national appropriation may mean a number of different things, some of which are less burdensome for the private sector than a ban on recognizing private property rights. Given that Article II

itself applies to national appropriation, it, on its face, does not implicate private appropriation. Indeed, to the extent that Article VI calls for conformity by private actors, a less burdensome interpretation would be that it did not intend private actors to serve as a conduit for national appropriation. Accordingly, state owned enterprises would not be able to appropriate outer space, but private entities could.

2. Harmful Contamination.

The treaty offers another question of first impression in the form of Article IX's admonition that States Parties to the treaty avoid harmful contamination of outer space and adverse changes in the environment of Earth. The question at issue here is whether or not the admonition even applies to non-governmental entities at all.

The first reason to question the applicability of the so-called "planetary protection" provision is that the treaty itself limits this requirement, like many others, to "States Parties." States Parties are governments. As noted above, when the drafters of the treaty intended a particular provision to apply to non-governmental entities, they said so.

Secondly, even if it applied, Article IX's planetary protection provision is not self-executing. It requires the legislative branch to make numerous policy judgments, such as whether the goals of space science or space settlement should preempt one another or may be pursued together. NASA's "planetary protection" policy^[18] is the term "given to the practice of protecting solar system bodies (i.e., planets, moons, comets, and asteroids) from contamination by Earth life, and protecting Earth from possible life forms that may be returned from other solar system bodies." NASA is being a good steward with this approach, but the approach is not conducive to human settlement of outer space.

If Congress were to legislate regarding Article IX's goal of avoiding harmful contamination, Congress should make it clear that human beings are not a contaminant. If Congress made that determination, anything with equivalent or less biological baggage than a human being should not be required to undergo the expensive sterilization protocols now employed for government missions. We must keep in mind, however, that the United States did not agree to apply the harmful contamination provision to commercial operators.

In sum, the treaty may be interpreted to allow recognition of private property rights, regulation only when sufficient hazards exist to warrant the expenditure of government resources, and that the harmful contamination provisions only apply to States Parties, not to private operators.

[1] 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"), Jan. 27, 1967, 610 U.N.T.S. 205 (adopted by the General Assembly in its resolution 2222 (XXI) and entered into force on 10 October 1967.

[2] "First Impression," Legal Information Inst., Cornell Law School https://www.law.cornell.edu/wex/first_impression. (Last visited Sept. 3, 2017).

[3] In the interests of brevity, the reader may assume that, unless otherwise indicated, references to "outer space" always include the Moon and other celestial bodies.

[4] Outer Space Treaty, Art. II.

[5] Outer Space Treaty, Art. VI.

[6] Outer Space Treaty, Art. IX.

[7] See e.g., Gbenga Oduntan, Who Owns Space? U.S. Asteroid Mining Act is Dangerous and Potentially Illegal, *The Conversation*, Nov. 25, 2015 <https://theconversation.com/who-owns-space-us-asteroid-mining-act-is-dangerous-and-potentially-illegal-51073> (Last visited Sept. 3, 2017) (contesting the international legality of the U.S. recognition of private property rights in resources extracted from outer space as contrary to "settled principles of space law," which include "the prevention of unilateral and unbridled commercial exploitation of outer-space resources" under the Outer Space Treaty and the Moon Agreement of 1979.).

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[11] *Supra* at ix.

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Legal Manoeuvres: Overcoming the Non-Appropriation Principle

The 21st century marks a new space era in which mankind is not only eager to go into space, but also to use space resources for future development. The most recent issue demanding a solution is a determination of what we can bring from space back to Earth and who will own these resources. The topicality of discussing the non-appropriation principle is that according to estimations, near-Earth asteroids are the source of water, ferrous metals, semiconductors, and platinum group metals, all of which have a variety of applications both in space and on return to Earth [1, pp.15-16].

This article concerns the possibility of overcoming the non-appropriation principle in order to lawfully appropriate removed resources. Most of the common proposals and arguments for avoiding the non-appropriation principle will be examined. Then, interpretations of the terms “appropriation” and “resources” in space law will be considered. Finally, the author’s model of *lex specialis* allowing appropriation will be given.

The non-appropriation principle stems from Article II of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (further — the OST): “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.” The current wording of the principle is considered to be an obstacle for commercial exploitation of space [2, p.2], as it prevents possible investments in development of space mining technologies.

How can one deal with the existing wording and legitimate space resources appropriation? Firstly, being a treaty norm, the non-appropriation principle can be changed by an amendment of the treaty. However, fifty years without amendments to Article II of the OST leaves little hope for such a way of changing it. Secondly, the non-appropriation principle as the basis of the current space law system may be considered as *jus cogens* norm, which makes the situation more complicated — such norms can be superseded only by other *jus cogens* norms. However, this nature of the norm is under discussion. For example, F. Tronchetti considers that the non-appropriation principle is not qualified to be *jus cogens* [2, p.4]. Thirdly, even if the non-appropriation principle possesses customary nature, the content of the custom is extremely close to the wording of Article II of the OST. Moreover, it is suggested that the non-appropriation principle became legally binding by Article II [2, p.5], rather than by customary rule before or after the OST’s adoption. With this the circle is closed, coming to the origin of the non-appropriation principle as a treaty norm. In this situation the present way of overcoming the prohibition of appropriation resources in outer space is an interpretation of Article II of the OST.

Arguments for prohibition of appropriation in outer space begin from a historical point, specifically Belgium



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and French interpretations of the principle during the OST elaboration [2, p.3]. Secondly, appropriation results from a State's sovereignty over territory, which in space is directly prohibited by Article II of the OST; indeed, even if appropriation is allowed, it cannot occur in the interest of the sole user, as it would be contrary to Article I of the OST [3, p.169]. The argument for possibility of appropriation is that the OST is a treaty between States: therefore, omission of private entities in Article II logically implies the possibility of appropriation by private actors [4, p.351].

The more interesting approach is to consider space as *res communis*, which means that it belongs to the international community as a whole; consequently States are free to adopt *lex specialis* to govern activities in such sensitive areas. The analogy of similar *lex specialis* coming to mind is freedom of fishing in high seas. This example proves the possibility of extraction resources from a "global commons" [3, pp.171-172] on condition that limits of appropriation and measures on conservation of resources are established (Art. 116-119 of the United Nations Convention on the Law of the Sea; having 168 state parties [5]). Additionally, it shows that both States and private entities are actors eligible for extraction. In the field of space, it should be emphasized that the basic aim of space exploration is to bring benefit to all humankind. Thus, the view exists that despite the fact that resources may be obtained by different actors, they must belong to one entity representing the whole of humankind; for example, the United Nations [4, p.351]. Nevertheless, such an interpretation of the owner's personality as one single actor does not correspond to the aim of overcoming the non-appropriation principle — giving an impetus for space exploration. The role of the United Nations, as the most representative and impartial international organization, should rather be a procedural one: to evaluate resources contained in celestial bodies, clarifying areas for mining and setting limits of appropriation per actor in order to establish fair distribution of natural resources while preserving the interests of all nations.

I fully support the position that outer space, celestial bodies, and resources inside are not subject to any permanent property claims on behalf of states or private entities. My position is that contemporary situations and development of technologies need some "security provision" for protection of those actors who put their efforts in space exploration. Permission to appropriate some (determined by quantity and quality) natural resources from some celestial bodies is a step to guarantee that technologies will go further and space exploration will not end due to economic reasons. It is reasonable to suppose that governments and private actors are not likely to spend money on space exploration projects, if the question "who is the owner" of the results is unsettled.

Therefore, the next question is what resources can be appropriated. The first point of view is that orbits, celestial bodies, and outer space itself are space resources [6, p.46; Constitution of the International Telecommunication Union, Art. 44(2); 3, p.169]. The lack of distinction between outer space and resources inside implies that the prohibition of appropriation applies to extracted resources [6, p.54]. The second point of view is stated by K.Pritzsche who proposes the following classification of resources in space: *stricto sensu* resources in outer space (orbits), minerals, and celestial bodies and, lastly, solar energy and natural resources removed from celestial bodies; the last category falls out of the scope of Article II of the OST and thus may be appropriated [6, p.54]. Additionally, the Moon Agreement is also silent about extracted resources, prohibiting only appropriation of "natural resources in place" (Art. 11.3) [7, p.275]. Therefore, the legal manoeuvre is that as long as a resource stays in place, it cannot be appropriated, but resources removed from celestial bodies may be appropriated. This conclusion is supported by practice of Apollo missions: while the flag of the United States of America was planted on the Moon, it was not appropriated by the USA; and at the same time, moon rocks returned back to the Earth are property of the USA [3, p.182].

Suggested *lex specialis* demands also answers "where" and "how much" — the determination of territory in which mining can occur and the amount of resources allowed to be removed. In terms of territory, it may be allowance for mining only at the place of craft's landing or additionally within an area settled around the

place of crafting (but not expanding to all territory of the body). Speaking about the amount of resources allowed for removal, it should be either all or a portion of resources within an approved mining territory. That is reasonable, as some natural resources in celestial bodies can be extremely valuable, and thus should not be appropriated by one actor. However, for the purpose of decreasing economic expenditures for mining, mining can be performed by one actor on the condition that before mining, the agreement between that actor and the other actor(s) is concluded on division of such valuable resources in fair proportions (not fictitious ones).

Conclusions of the present article are that outer space, celestial bodies, and resources inside should be considered as *res communis* in order to preserve the basic aim of space exploration — bringing benefit to humankind. At the same time, the contemporary situation demands “security provisions” to guarantee that efforts and resources put into development of space technologies and space exploration will end with a benefit to the explorer himself or herself, what undoubtedly will contribute to the intensification and further development of space related activities. Creating *lex specialis* governing appropriation of space resources does not contradict the non-appropriation principle stated in Article II of the OST; which is an analogy with the existing regime of using common resources in the high seas. Proposed *lex specialis* must clarify the scope of actors eligible for appropriation (both states and private entities), the territory of celestial bodies for mining, and amounts of resources being appropriated by one actor. The functioning of this system needs an impartial body responsible for evaluation of resources contained in celestial bodies, and the determination of territory and amounts of resources for mining. Such a body must preserve the interests of the whole international community and preferably should be the United Nations.

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Legality of Utilizing Space Resources in 3-D Printers

In 2014, a ratchet wrench was manufactured on the International Space Station using a 3-D printer.[1] In 2015, the United States of America passed the Commercial Space Launch Competitiveness Act, which allows private ownership of resources that are extracted from celestial bodies.[2] Considering how these legal developments could enable the utilisation of space resources for manufacturing space objects using these printers, the following questions beckon:

1. How do 3-D Printers work?

A 3-D printer uses the additive manufacturing process and creates a physical object from a digital design.[3] In other words, successive layers of material are laid down upon each other to construct a physical object using a digital design. Recent technological demonstrations have shown that materials originating from celestial bodies could also be used for manufacturing in 3-D printers.[4]

2. Can resources be used for manufacturing in Outer Space?

The utilisation of resources in outer space is governed by Article I and Article II of the Outer Space Treaty (OST). Article I states that Outer Space is free for use and exploration to all States and Article II outlaws the establishment of sovereignty over any part of outer space and celestial bodies.[5] Proponents of the idea that space resources can be used for manufacture argue that the freedom of ‘use’ of outer space permits them to do so. Critics of the idea argue that any form of exploitation that involves the establishment of sovereignty over a space resource contravenes Article II of the OST. A detailed understanding of the competing claims is presented below.

3. Proponents of the use of Space Resources

Proponents argue that Space is *res communis omnium*, i.e, property of all[6] and is therefore free for use by all States and private entities[7]. They further argue that commercial use of outer space resources is in consonance with the non-appropriation principle (Article II) as the non-appropriation principle outlaws establishing sovereignty over areas of celestial bodies and permits the appropriation of resources[8]. This distinction between space resources and areas of celestial bodies is made on the premise that once a material is separated from a celestial body, it has a ‘separate legal destiny’[9].

To illustrate this, analogies are drawn to the high seas. While the law of the high seas prohibits the establishment of sovereignty over parts of the high seas, fish that are caught in the high seas are the exclusively the property of the party that has caught them, thereby reaffirming that resources separated from a global common attain a separate legal destiny.[10]

4. Opponents of the use of Space Resources

The opponents of the idea that space resources can be used for additive manufacturing deny the distinction between space resources and areas of celestial bodies. Relying on the principle established in the Dispute Regarding Navigational and Related Rights between Costa Rica and Nicaragua, which states that a

reference to a generic term includes all its constituent elements[11], opponents argue that what is applicable to ‘outer space’ is also applicable to resources occurring in space and celestial bodies.[12] Further, the 2016 UNCOPOUS reaffirms that the exploitation of resources is governed by Article II of the Outer Space Treaty[13]. The 2017 UNCOPOUS denied the analogy regarding the high seas and fish on the grounds that fish are a renewable resource and celestial resources are not[14]. Therefore, the exploitation of resources and establishment of ownership over them by one State amounts to the denial of use of the said resources by another State, which is in contravention to Article I and Article II of the OST[15].

Relying on the phrasing of Article II, which prohibits the establishment of sovereignty by any means whatsoever, opponents argue that by converting a space resource into a space object, the State registering the space object will in effect exercise sovereignty over the space resources. This is because Article VIII of the OST confers exclusive jurisdiction over a space object to the State of registration.[16]

With regard to additive manufacturing (3-D printing), opponents specifically argue that ownership cannot be exercised by the method of accession. Take the case of a potter, for example, who makes a pot by changing the form of unformed clay into a pot. He is now the exclusive owner of the pot and, by extension, the clay that was used to make the pot. In essence, 3-D printers perform a similar function of moulding raw material into a specific shape. Opponents argue that ownership through accession is in contravention to Article II, as it prohibits the establishment of sovereignty by any means whatsoever.[17]

5. Conclusion

Technological advances bring us closer to the possibility of utilising space resources for the manufacture of space objects in Outer Space using 3-D printers. However, the legality of such utilisation remains a gray area. While the UNCOPOUS has reaffirmed that such exploitation is strictly prohibited, the domestic legislation passed by the United States of America and other such legislations proposed by Luxemburg and the United Arab Emirates raises certain questions regarding the position of law on this subject. In this light, a conclusive determination on the rights and liabilities of States with regard to space resources and their ownership is required according to which, States can conduct their future activities. A regime similar to the ITU, which governs the geostationary orbits could provide some guidance in this matter in order to ensure that there is an equitable opportunity for each State to utilise and benefit from space resources.

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The New Beginnings of Commercial Space Policy and Law in Post-Soviet Nations

Abstract. The commercialization of space activities has recently come to the fore in the countries of the former USSR. The states of the post-soviet era have enacted their own space policies as a result of the development of the global space market. Here, the concentration is mostly on the political and regulatory factors for a new space industry in the fifteen countries. In terms of that goal, the article's first section is focused on the states' historical space activities as a part of the Soviet Union, their legal issues, and response measures taken. Subsequently, we touch on each individual country's domestic policy and laws with enlightening details. Additionally, the applicable laws for the new space activities will be analyzed by giving more attention to comparative research on the existing commercial laws of other nations with developed space industries.

Keywords: post-soviet, national space laws, developed countries, commercial space.

Introduction

Commercial space policy has emerged in the former soviet republics after the fall of the USSR. Contextual analysis requires that the history of the commercial space activities of the post-soviet countries should be divided into two periods: the soviet and post-soviet eras. Prior to the fall of the Soviet Union, each member republic had some participation in the soviet space program. These states were not independent in creating, performing, and developing their local space industries. The republics of Russia, Ukraine, and Kazakhstan had dominant roles in the public space activities: telecommunications, broadcasting, and launch vehicle activities. Kazakhstan, for example, was the space site of the Baikonur launch facility. Latvia provided the USSR program with special materials. Russia and Ukraine housed the research, training, and some of the manufacturing facilities. Commercial space activities have been conducted regularly during the current century in the post-soviet era. Nations such as Azerbaijan, Kyrgyzstan, Uzbekistan, Moldova, and Belarus declared their commercial space policies after ratifying the Outer Space Treaty and joining the United Nations. Currently, seven out of the fifteen former soviet republics have ratified the OST.

Space Policy

At present, several nations within the post-soviet region implement their space activities as members of the European Space Agency.[1] This developed through the formulation of their own independent space



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policies. They contribute to the ESA budget and participate in international space programs.

The nations with the least developed space policies are dependent of Russia's space program. Kyrgyzstan Tajikistan, Uzbekistan, and Armenia could be an example for that. Since the first decade of the XXIst century, several countries have started to create their commercial satellite activities apart from the Russian Federation's involvement. The Republic of Azerbaijan, together with the company of French origin, launched its first national satellite Azerspace 1 in 2010 to operate for 15 years. Turkmenistan, together with the commercial space company SpaceX, launched its first ever satellite into outer space in 2015.[2]

New Space Entities

Due to incomplete national budgets, these states are not able to implement their national space programs with new technologies by their own. That makes them dependent on the developed countries in the field. For example, the Republic of Azerbaijan borrowed some 230 million dollars[3] from France in order to launch its first commercial satellite.

Legal Regime of the Commercial Space Activities

The Russian Federation started its State Program for National Space Activities on 30 March, 2000 with the aim of a 2001–2005 period. Ukraine launched the same program after 2002, but the main targets have been decided since 1996. The post-soviet countries did not have their own national laws concerning main space activities even if they were involved in those activities with the USSR.

The rest of the Soviet countries are hesitant to regulate the commercial space activities with their national laws. To note here, those states work in collaboration with the Central European Countries and they have bilateral agreements for commercial launch activities. The license agreements form the greatest part in those agreements.

To compare the commercial laws of the post-soviet nations, it is obligatory to analyze the laws of the launching state, the law of the registered vehicle, and the law of the business performance center. Those regimes are part of the national civil codes or the commercial laws of the states.

The new beginnings of space policy are the result of the demand for new technology, such as route navigation for cars, international broadcasting for TV channels, and GNSS for natural resources. There are some countries that have no space industry, but they have adopted laws about the licensing for special activities.[4] The standard TV broadcasting, audiovisual production, tourism, and transportation of the passengers and goods by air may be considered as potential commercial space activities for those states.

The subject of space activities was restricted to enterprises, institutions, and organizations, whether domestic or international.

Conclusion

To sum up, the post-soviet countries are not yet subject to any conflict concerning commercial space activities. However, development in this area is still taking place. Belarus is an example of a former soviet republic independently forming its own space program and commercial space system. The core reason for slow or nonexistent development is the lack of regular space activities and strained national budgets.

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Crime, Punishment, and the Space Environment

The recent announcement of plans for SpaceX to begin the first phase of human settlement of Mars has captured the attention of the world's media with space activity recapturing the imagination of the public[1]. Coupled with that are ongoing discussions on the evolution of space-mining[2] and an increasing awareness of the potential harm that human space activity can have upon delicate extraterrestrial environments[3]. Yet such debates tend to either emphasise the technical accomplishments necessary and overlook regulation completely or operate on a macro-level, concentrating on interactions and governance arrangements between states and corporations. With all of the focus on these grandiose projects, there has been little said on the individual regulation of behaviour and subsequent criminality that will undoubtedly travel out into space as human exploration of space involves more participants[4].

This discussion will seek to highlight some of the initial difficulties that will need to be addressed when considering the regulation of human behaviour on long duration, crewed missions away from Earth and subsequent settlements on other planets. Whilst I have engaged in academic analysis of the nature of criminality in space previously[5], this discussion will take something of a step back and, rather than examining the systems and rules, instead look at the foundational steps that need to be undertaken in order to establish the basis for creating an operational criminal justice system to govern individual behaviour within space activity. It will be argued that two competing value systems will form the basis of normative behaviour. This will in turn form the resultant framework for criminality in space. It is proposed to identify and critique the difficulties and limitations of such approaches.

Defining 'Space Crime'

When considering about the role of criminal justice in regulating individual space activity, a necessary first step is to identify the underlying purpose to be served by such corpus juris. Space law, as it stands at the moment, operates largely within the sphere of international law[6]. Criminal law, however tends to be

determined by national laws with a significant variation in proscribed behaviour and (crucially) punishments for infractions[7]. There have been many treatises written as to the theoretical nature of criminal law and criminal justice and this is not the place to regurgitate such doctrine[8]. Generally, however, criminal theorists have identified that crimes can be ‘distinguished from other acts or omissions which may give rise to legal proceedings, by the prospect of state punishment’[9], and that this punishment is engaged when the ‘wrongful’ conduct has such a deleterious impact that intervention by the state is necessary to prevent, punish, and deter[10].

The corollary of this is that criminal justice systems exist to deter individuals within a group from wrongdoing and norm-violation by applying punitive and undesirable sanctions to proscribed behaviour. Such systems also help to instill respect for norms and make wrongdoing socially unacceptable[11]. Where human activity occurs, there also exists the potential for criminal activity[12] and altruistic and progressive motives associated with space exploration should not blind us to this in respect of space activity. The lack of a set of normative values underpinning human conduct in space conduct is a void that needs to be filled before meaningful discussion of substantive offences can be undertaken. It is necessary for those engaged upon human exploration of space to decide upon and accept core values that will underpin space exploration. Such fundamental values are essential if a coherent criminal justice system for individuals traveling in outer space is to be established. The first element of this discussion will provide a brief overview of the current arrangements for managing criminality within space activity before moving on to discuss how less anthropocentric considerations must be addressed in order to shape future criminal codes in outer space.

Current Arrangements for Managing Criminality

The existing international framework for governing space activity, The Outer Space Treaty,[13] mandates that jurisdiction and control of a space object shall be accorded to the state of registry of that space object[14]. As Chatzipanagotis identifies, this includes criminal jurisdiction and command authority[15]. Furthermore, it has emerged through individual national legislation that the commander of the spacecraft is endowed with wide ranging powers to maintain discipline and ensure the safety of the craft and crew. Both U.S. and Russian national space laws embed this into their legal systems[16]. Such an approach is very much ingrained in the history of maritime and aviation law, (following such instruments as the Tokyo Convention of 1963, which endow pilots with significant powers to act to preserve the safety of the aircraft[17]).

The multinational nature of the International Space Station (ISS) means that the regulation of behaviour on board the ISS is slightly different. It adopts an ‘active nationality’ approach[18], assigning criminality on the basis of the individual astronaut who is accused of committing the crime rather than following the OST and giving jurisdiction to the state of registration of the particular module[19]. Sitting alongside these provisions of the IGA is a code of conduct (CCoC) for which the crew of the space station sign up and are covered from the moment they start their training. As with the normative position under the OST, the CCoC gives the ISS commander responsibility for safety, security and crew rescue[20]. It also gives the Commander responsibility to ensure the harmony and safe working practices of the crew all whilst maintaining respect for the diversity inherent in a multicultural ISS crew[21].

The current solutions for dealing with criminality in space, therefore, have a very familiar feel to them echoing, as they do, maritime traditions of autonomous ship's captains with a considerable amount of discretionary power. The understanding is that, in times of crisis, it is better to have one experienced voice making decisions rather than having to refer back to a central authority. If one is looking to transpose this into a broader, underpinning series of values, then it is suggested that this represents a ‘safety first’ value system. The safety of the crew and the success of the mission are placed as paramount considerations. Criminal liability is imposed on individuals who risked this safety either through deliberate malevolence or through a level of negligence so threatening that those involved deemed to be worthy of criminal sanction.

Adoption of the ‘safety first’ value system would have the advantage of familiarity and also of comports with current legal framework. This approach, however, is not without difficulties. Whilst satisfactory for missions in Earth orbit and possibly for lunar missions, the complexity of interplanetary journeys presents a significant challenge to the administration of criminal justice. Such missions would see humans many months travel time away from Earth and referral back to Earth authorities may not be straightforward. With the commander of the mission charged with the overall safety of the mission, it is suggested that they would be far from the ideal person to deal with the administration of justice. Imagine, for example, a commander faced with the punishment of a crew member who was critical to the success of the mission.

Perhaps more significantly, such a traditional approach to criminal justice does not point towards a progressive future and traps humanity within the current boundaries of state jurisdiction and the resultant conflicts. The notion of traditional state-norms dictating humanity’s multi-planetary journey may not be the best value base from which to evolve. It is suggested that the focus could turn instead to place space and the new environments at the heart of the mission rather than adopting a safety-first approach. This discussion will now attempt to examine what such a value system might encompass.

An Ecological Value System?

The identification and (perhaps more crucially) broad acceptance of a series of underpinning values that shape a future spacefaring society has been identified as a prerequisite foundation upon which a code of behaviour for humans in space can be built. I have previously suggested that the core value should be a respect for the delicate extraterrestrial environmental and, therefore, should be ecological in its outlook[22]. An examination of the existing legal framework, and specifically the Outer Space Treaty, indicates that there is a significant oversight in environmental protection that needs addressing as human activity in space starts to have a profound, deleterious effect on the delicate orbital environment[23].

This oversight in the governance framework is largely due to the primary goal of architects when drafting the treaty being peacekeeping rather than environmental protection[24]. Nonetheless, the debris situation in low Earth orbit indicates the dangers of human space activity being unfettered and predicated entirely upon commercial imperatives[25]. It is suggested that as space activity becomes motivated by profit and the search for mineral resources, there needs to be a counter-balance. Instead of having environmental considerations as a consideration within mission planning, it is suggested that this should be actively promoted as a core value of human space exploration to both preserve the value of space as an area for scientific research and also to ensure humanity does not export the harmful behaviours that have come to affect our home planet.

The contours of an ecologically based value system would have sustainability of activity and respect for extraterrestrial environments at its heart. Without a legally binding framework based on harmonized practices and built on an international consensus, actors (be they states, corporations or, at some time in the future, individuals) will pursue their own agenda, forsaking environmental considerations for either profit, personal aggrandisement, or national interest[26]. The ecological approach would see an underlying value system proscribing behaviour that risked serious, harmful interference to the fragile environment by environmentally insensitive exploitation. This would look to prevent the harm of interference with scientific study[27] and also harmful impediment to future activity. Any resultant criminal code would impose liability for individuals who engaged in wasteful or environmentally harmful activity. It would embed respect for the non-terrestrial environments as a principal consideration from initial development through to mission execution[28].

Despite the manifest advantages, in terms of the sustainability of future activity, the omens for an underlying ecological value system are not good. The contemporary geopolitical situation, whilst no less parlous than

the Cold War era, is certainly more multifaceted with issues of sustainability and environmental degradation of Earth a prominent aspect of international discourse[29]. Yet there is still a significant divergence on the means by which these terrestrial ecological threats can be addressed[30]. This lack of progress on environmental issues affecting Earth does not bode well for a potential ecological ethic underpinning all space activity. The same arguments for lack of terrestrial progress would impact upon the garnering of necessary support in respect of space activity. The need for prioritising environmental considerations over economic ones, the sacrifice of political and military supremacy and with the damage caused by human activity in space being largely undetectable for the vast majority of people, the impetus for such a collective agreement may be lacking.

Conclusion

Without the formulation of a clear set of coherent values that cover every space mission, criminal law in space will undoubtedly fragment along national lines with criminality being determined on a mission-by-mission or even craft-by-craft basis (where there are multiple nations collaborating). Whilst this is understandable, and possibly even desirable when missions occur within Earth and possibly lunar orbit, it is suggested that this lacks the progressive vision for a society looking out into the solar system and beyond. It is not realistic to suggest that nations and corporations will immediately switch to adopt an ecologically focused value based system to underpin all activity. It is also beyond doubt that the current high-profile granted to space activity is due, in no small part, to the commercial opportunities and potential resources offered by space exploration. It is contended, however, that such unfettered mercantilism poses a threat to delicate environments as yet untouched by humanity. Corporations can be persuaded to act responsibly when it is in their best interests, and arguments regarding the sustainability of future ventures and resultant profits should not be discounted as an effective way to incentivise spacefaring companies into adopting more altruistic values.

The eventual technological breakthroughs to enable humans to move beyond Earth presents humanity with a clear opportunity; to move away from the state-based boundaries of our planet and set aside conflicts of the past. As stated above, where human activity is undertaken, the potential for criminality exists. Such behaviour will need to be regulated by reference to a consistent and predictable set of fundamental values. Inevitably, the safety of humans in outer space will need to underpin the regulation of behaviour. Yet simply adopting a safety-first value set, with reference to terrestrial laws as a means of shaping our response to regulating crew behaviour would seem to be a missed opportunity. Infusing that value base with a respect for these new, extraterrestrial environments has the potential to move humans away from a terrestrial perspective and pave the way for us as a true interplanetary species.

[1] See, for example, <https://www.theguardian.com/technology/2017/sep/29/elon-musk-spacex-can-colonise-mars-and-build-base-on-oon>

[2] For a long list of literature see the seminal work by John S. Lewis, *Mining the sky*, (Addison-Wesley Pub. Co.1996). For discussions of the legal issues see inter alia Fabio Tronchetti, *The exploitation of natural resources of the moon and other celestial bodies* (Martinus Nijhoff Publishers 2008) and also Ricky Lee, *Law and Regulation of Commercial Mining of Minerals in Outer Space* (Springer 2012)

[3] W.R. Kramer “Extra-terrestrial environmental impact assessments – A foreseeable prerequisite for wise decisions regarding outer space exploration, research and development.” *Space Policy* (30) 2014 215-222

[4] Michael Chatzipanagotis, “Criminal Issues in International Space Law”, *European Journal of Law Reform* [2016] 105-119,

[5] Newman, C, “Star Cops or Judge Dread? Exploring the problems of criminal justice in space” *ROOM. The Space Journal*, August 2016 87-91

[6] Bin Cheng, *Studies in International Space Law* (Clarendon Press 1998)

[7] Chatzipanagotis (n4 106)

[8] See, for example, William Wilson, *Criminal Law*, (5th Ed Pearson 2014), AP Simester, JR Spencer, GR Sullivan and GJ Virgo, *Simester and Sullivan’s Criminal Law: Theory & Doctrine* (6th Ed Hart Publishing 2016)

[9] Wilson (n8 2)

[10] *ibid*

[11] John Gardiner, *Offences and Defences: Selected Essays in the Philosophy of Criminal Law* (OUP 2000) 201

[12] Chatzipanagotis (n4 106)

[13] The Treaty on Principles governing the activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies was adopted by the General Assembly of the UN on 19 December 1966 by virtue of Resolution 2222 (XXI). It opened for signature on 27 January 1967 and entered into force on 10 October 1967

[14] Article VIII of the OST 1967 provides that 'A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body' (emphasis added).

[15] Chatzipanagotis (n4 107)

[16] In respect of US law, the operative provision for the Space Shuttle was 14 CFR 1214.7. In respect of Russian law, the Russian Law on Space Activity Art 20(3) is the appropriate provision. Cited in Chatzipanagotis (n4 108)

[17] Newman (n5 89)

[18] See Ian Brownlie, *Principles of Public International Law*, (OUP 2008) 302

[19] See Article 22(1) Intergovernmental Agreement concerning cooperation on the civil International Space Station, signed in Washington, 1998 and being in force from 27 March 2001.

[20] Newman (n5 89)

[21] Chatzipanagotis (n4 113)

[22] See for example Newman, C., "Establishing an ecological ethical paradigm for space activity" ROOM, *The Space Journal*, No. 2 (4), June 2015a room.eu.com and Newman, C. "Protecting Space: In search of a new Ethical paradigm for Space Activities" in Lawton et al, *Companion on Public Sector Ethics* (Routledge 2015b)

[23] See also, Lotta Viikari, *The environmental element in space law*. (Martinus Nijhoff 2008) 60

[24] See, for example, Joanne Gabrynowicz, "Space law: Its Cold War origins and challenges in the era of globalization." (2004) *Suffolk UL Rev.*, 37, 1041

[25] For ongoing discussion on this area see Slann P. *Space Debris and the need for space traffic control*. *Space Policy* 30 (2014) 40-42

[26] See Newman (2015a, n22)

[27] For full discussion on the dangers of false positives and the possibility of mistakenly transplanting microbial life from Earth to another planet see J Butler (2006). "Unearthly Microbes and the Laws Designed to Resist Them." *Georgia Law Review*, 41, pp.1355-1394

[28] See, inter alia, Viikari (n23)

[29] See <http://www.unep.org/> for the perspective of the United Nations on the environmental challenges facing the international community.

[30] See <http://www.bbc.co.uk/news/world-us-canada-40829987> for details on the US Government withdrawal from the 2015 Paris Climate Agreement.

Re-Thinking Law for a Spacefaring Civilization

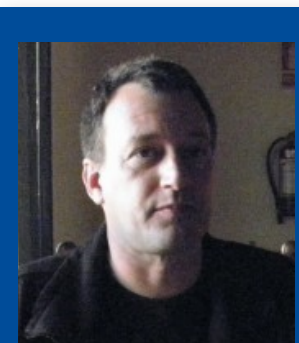
Law as a social institution is intrinsically biased toward the past: “The idea of law is notoriously a conservative one.” [1] If we think of the common law tradition, in which there is no constitutional basis but only a history of case law, precedent must play a central role. A ruling in the past establishes a convention that is followed in later rulings and preserves the past into the present. The establishment of a constitution or formal statutes is a “re-setting” of precedent. Laws and constitutions are not written in a vacuum, and the legal history that precedes such an effort must loom large in the minds of those so occupied.

Legal bias toward the past served past civilizations well—all of them agricultural civilizations that changed little over time—but it is at least arguable that our greatest challenge in the present is not to preserve past institutions unchanged and intact into the future, but to shape legal institutions open to revision so that we can accommodate the radical socioeconomic changes thrust upon us by industrialization and its technological disruption of the perennial patterns of human life. Our civilization continually revolutionizes itself from within, as scientific discovery, technological innovation, and engineering applications change the most basic structures of society. These changes must be accommodated by the law: “...the launching of rockets and now man (and woman) into outer space demonstrates that way in which the idea of law will be called upon to develop and adapt itself to realms beyond the imagination of previous generations.” [2]

Roscoe Pound once wrote of, “...the transition from the law of a city to a law of the world,” [3] and what we now face is the transition from the law of a world to a law of the cosmos. In this transition, as in the previous transition, we will face, “The perennial problem of preserving stability and admitting of change.” [4] Among the radical changes to human society we can foresee will be those that follow from the extension of human civilization into space. All human civilizations to date have been terrestrial civilizations, so that the establishment of a human exocivilization would be ipso facto unprecedented in the history of our species.

The idea of a human civilization in space seems to provoke two diametrically opposite responses to the challenge of providing a legal framework for this civilization. One of these responses is the idea that we have a moral duty to make of human exocivilization a fresh start in which we will have learned the lessons of the past and apply them to a human civilization in space as to a tabula rasa. This utopian response to the law of spacefaring societies falls victim to all the familiar weaknesses of utopian theories, which, in the wake of the French Revolution being transformed into The Terror, were powerfully criticized by Edmund Burke and reactionary thinkers like Joseph de Maistre, who wrote, “...the most plausible theory is almost always found contradicted and brought to nothing by experience.” [5]

The other response to the prospect of human exocivilization is that it represents nothing new at all, in accord with Ecclesiastes: “The thing that hath been, it is that which shall be; and that which is done is that which shall be done: and there is no new thing under the sun.” The earliest visions of spacefaring civilization—think of the Golden Age of science fiction—are, at least implicitly, a negation of the idea of human exocivilization as a tabula rasa, since nothing has essentially changed as a result of humanity expanding into space. Under this model, we would preemptively legislate a way of life that does not yet exist as though we knew, before the fact, that it could not constitute anything new.



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The idea of a spacefaring future as being nothing new under the sun does not fare any better than the same as a tabula rasa. If we tried, as a thought experiment, to construct a civilization in space that had absolutely nothing new about it, being a direct extension of existing technologies and institutions into space, hence of existing civilization into space, this unmodified extension of human civilization into space would still be unprecedented, involving novelties in every detail of life.

How, then, are we to extend legal institutions into space without falling victim to the dangers of utopian theorizing, or a denial of the novelty of living and working in space, both of which perspectives fail to take into account the actual experience of human beings in space? We could approach this methodologically (based on a framework of legal positivism) or substantively (based on a framework of natural law). In other words, we could ask, “Are these laws for human exocivilization parallel to the laws of terrestrial society?” Or we could ask, “Are these laws for human exocivilization just? Do they serve justice?”

The methodological approach to space law would be to systematically extend existing institutions of positive law into space, adapting this law as necessary, but not more than necessary, making it applicable to spacefaring experience. Thus, we might formulate an admiralty law for spacecraft that is parallel to admiralty law for ships at sea (like private international law, but in space), and a law of space parallel to the law of the sea (like public international law, but in space).

We would expect that spacecraft would be ruled by some adaptation of admiralty law, spacecraft being analogous to maritime vessels, but it would not be clear how large artificial habitats would be governed. Should they be understood as a territory coequal with a planetary surface, or as entirely artificial constructions like spacecraft ought they also to fall under admiralty law? And, if artificial habitats with hundreds or thousands of residents are administered according to admiralty law, will their residents be content to be ruled in this fashion?

The problems do not end here. Will other planetary surfaces—the moon, Mars, asteroids—be accounted as intrinsically territorial in the way that the surface of Earth is presently administered according to the territorial principle in law, or will already existing laws forbid staking territorial claims—forbidding also the legal framework that comes with territorial claims? All of these questions are intrinsically unprecedented because of the unique conditions that extraterrestrial human activity will pose; but, while unprecedented, they are not without parallel, and that is the power of the methodological approach.

The substantive approach would impose a significantly greater burden on those formulating the laws, who would probably take a methodological approach initially, and then take the additional step of determining whether a straightforward extension of terrestrial law to extraterrestrial contexts is likely to contribute to the formation of a just society in space. This would be a high bar to clear, but the high bar may be necessary. In many cases, extraterrestrial human activity will force us back to first principles in attempting to find an adequate legal framework for a spacefaring civilization.

The role of principle is fundamental in law. Judges typically, in reviewing law, look for a principle and resist a patchwork of ad hoc legislative acts with no real legal principle involved in them. Sometimes we are forced to accept a patchwork of laws and regulations and ruling, but this is rarely satisfying and we are likely to seek some comprehensive formulation that better exemplifies our legal intuitions.

The methodological and substantive approaches are, of course, ultimately interrelated. The questions posed above overlap in subtle ways, if, when we ask, “Are these laws for human exocivilization parallel to the laws of terrestrial society?”, we are really asking “Do the laws parallel the standards of terrestrial justice?” Or if, when we ask, “Are these laws for human exocivilization just?”, we are really asking, “Do these laws function the same as terrestrial laws?” It would require an exceptionally fine parsing of legal intuitions to distinguish

these two in every case.

We are, then, likely to bring the tension between positive law and natural law with us into space, as it has been with us on Earth. Law is not written, nor judgments rendered, in a vacuum; we will take our legal institutions with us. We will also take with us the dual traditions of Roman law and common law. Because of the mature condition of terrestrial legal institutions, the likelihood is that some attempt will be made to bring Roman law into space, rather than waiting for a body of common law to emerge from the accumulated cases and rulings of a particular spacefaring civilization. However, the scale and diversity of eventual human exocivilization is also likely to result in a considerable body of case law growing out of spacefaring experience, and some future jurists will no doubt feel the need to systematize this body of law, as with the great work of synthesis represented by the *Corpus Iuris Civilis*, assembled by Tribonianus under the reign of Justinian.

[1] Lloyd, Dennis, *The Idea of Law*, Baltimore: Penguin, 1964, p. 327.

[2] Lloyd, *Op. cit.*, p. 337.

[3] Pound, Roscoe, *An Introduction to the Philosophy of Law*, New Haven: Yale University Press, 1954, p. 9.

[4] *Loc. cit.*

[5] de Maistre, Joseph, *On God and Society*, South Bend: Gateway Editions, 1959, p. XXiv.

We Mustn't Allow History and Humanity to Fall through the Gaps Between Space Conventions

Between 1957 and 1975, the international community dedicated a tremendous amount of time and effort to negotiating a set of treaties and conventions that would, it was hoped, prevent the militarization of space and ensure freedom of access and exploration for all nations. At the time, preservation of cultural heritage in outer space was not a paramount concern. As such, it is not surprising in the least that the quartet of widely ratified treaties colloquially known as: The Outer Space Treaty, the Liability Convention, the Registration Convention, and the Rescue and Return Agreement are silent with respect to the preservation and protection of human cultural heritage. Now, a scant (in archaeological terms anyway) forty-two years after the last treaty was ratified, this silence is perilous.

On July 20, 1969, Neil Armstrong placed humanity's first off-world footprint in the jagged and sharp dust that covers the surface of Earth's moon. It was an achievement unparalleled in history, and one built on the backs of centuries of science and engineering pioneers from all corners of the world. It was also a step made for all (hu)mankind, accompanied by messages of peace from the leaders of seventy-four nations. Six Apollo missions followed this pioneering feat, five of which successfully landed on the Moon. Each enjoys its own "firsts." The first precise landing; first color video; first human-driven vehicles; first landing in the highlands; and, Apollo 17, which not only was the longest and final Moon landing, but also included the first scientist-astronaut.

The crewed landing sites, as well as the many important landing sites that preceded and followed Apollo, are an archaeologist's dream. They extend and confirm humans as "an exploratory, migratory animal." [1] They are the first archaeological sites with human activity that are not on Earth, and they bear witness to some of the most important technological developments in human history. [2] Moreover, they are – unlike any terrestrial archaeological site – frozen in time, [3] undisturbed by natural elements and untouched by any other human – or any living organism. They are a treasure trove for archaeologists, historians, sociologists and scientists. Dr. Alice Gorman recently articulated just some of the questions that could be answered by a proper study of the sites. What material culture was brought to each site? What was discarded and why? Do the sites "demonstrate an evolution of the understanding of the lunar environment?" What impact does the "space environment have on human behavior and use of space?" And how are space exploration sites different from sites that bear witness to terrestrial exploration? [4] To fully address these questions and truly appreciate the sacrifices made by all the men and women who have contributed to humanity's quest to explore space, we need to preserve the history and heritage found in those first Moon landing sites.

While a working human outpost on the Moon may be decades away, a number of private companies, fueled in part by the promise of reward by the now defunct Google Lunar XPRIZE, have plans to send robots to the Moon within the next two years. [5] Crewed missions are also planned, with China, Russia, Japan, and the European Union developing projects that will put humans back on the Moon before 2030. [6] While it is



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not to be suggested that any of these private companies or nations would intentionally desecrate the Apollo lunar landing or other historic sites on the Moon, we cannot afford to ignore the fact that no enforceable laws exist to prevent, or even inhibit, defilement or vandalism. Even the most well-intended visitors may be unaware of the damage they are doing while roaming around a site. What's worse are those who would take a "piece of history" for themselves or on behalf of a private collector. And worse still are those who would plunder human heritage for profit. We must seize this opportunity to protect these sites before humans – or human-directed rovers – return to Moon.

Unfortunately, the path to preservation is complicated. Pursuant to Article VIII of the Outer Space Treaty, items left on the Moon – everything from the Lunar Roving Vehicles, to cameras, to the photo left by astronaut Charles Duke of his family – remain under the jurisdiction, ownership, and control of the nation that was responsible for putting them there. Article IX of that treaty requires all activities in outer space be conducted with "due regard to the corresponding interests of all other States Parties," which, arguably, suggests that other States should not interfere with, or otherwise despoil, the objects of another State. And, indeed, Article V of the Return and Rescue Agreement makes it clear that any such object removed from the Moon, must be returned to the State of origin. However, the research value of the landing sites requires that the objects strewn within their bounds be observed and scrutinized in situ, which raises a whole different slew of issues, as leaving the objects in situ essentially results in perpetual occupation of the surface upon which they rest. This runs afoul of the principle of non-appropriation encapsulated in Article II of the Outer Space Treaty. Leaving the Apollo lunar landing sites, or any of the robotic landing sites, untouched gives rise to the appearance that those sites belong to the United States, Russia, or China, as the case may be.

They do not. They are the common heritage of all humankind and should be celebrated and preserved accordingly.

The international community must work to address the void left by the current space law regime in respect of human and cultural heritage in space. Our exploration of outer space must be anchored by the recognition and affirmation that we are together one species, with a shared goal, too often obscured, of preservation, peace, and goodwill. If we cannot achieve peace on Earth, certainly we can work together to preserve peace in the heavens. And conserving Apollo (and other) landing sites, by international convention or United Nations decree, as "human" rather than "national" accomplishments, is a first step toward sustaining the universality of our shared posterity under a unified regime. Today, this may feel like an overly symbolic gesture, as the days of potential site desecration seem a distant horizon. But however symbolic it may currently seem, it will assure that the base of a new generation of competitive space exploration will be founded in our shared humanity. And it may even awaken a new spirit of international cooperation and collaboration in space under the umbrella of the United Nations.

Just as the Apollo project was built on the foundation of centuries of science and discovery from around the world, our newest explorations of space are built upon the legacy and lessons of those Moon landings. We must preserve this history to preserve our future.

Only by protecting our first tentative steps on the Moon and garnering from those sites the invaluable lessons of our forebears, will we be able to help our spacefaring descendants continue our migration into space with purpose, peace, cooperation, and humanity.

[1] B.R. Finney, *From Sea to Space*, Palmerston North, New Zealand: Massey University Press 1992, 105.

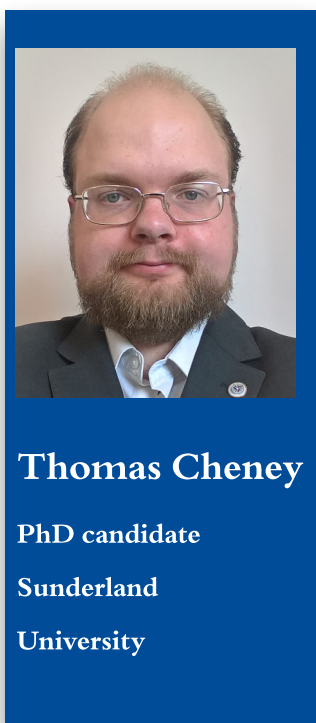
[2] Lisa Westwood, "Historic Preservation on the Fringe: A Human Lunar Exploration Heritage Cultural Landscape," in Beth O'Leary & P.J. Capelotti, eds., *Archaeology and Heritage of the Human Movement into Space*, Switzerland: Springer International Publishing 2015 [O'Leary & Capelotti], 144.

[3] Joseph Reynolds, "Legal Implications of Protecting Historic Sites in Space," in O'Leary & Capelotte, 112.

[4] Alice Gorman, "Culture on the Moon: Bodies in Time and Space," in *Archaeologies: Journal of the World Archaeological Congress*, 110, 117 (2016).

[5] Darrell Etherington, "Google's Lunar Xprize Competition Tweaks Victory Deadline, Adds Prizes," *techcrunch.com* (16 August 2017) online: <https://techcrunch.com/2017/08/16/googles-lunar-xprize-competition-tweaks-victory-deadline-adds-prizes/>

[6] See Ben Blanchard, "China Prepares First Manned Mission to the Moon," *independent.co.uk* (7 June 2017) online: <http://www.independent.co.uk/news/world/asia/china-moon-landing-manned-mission-space-exploration-programme-lunar-programme-a7776566.html>; Ben Wescott & Junko Ogura, "Japan Wants to Put a Man on the Moon, Accelerating Asian Space Race," *cnn.com* (29 June 2017) online: <http://www.cnn.com/2017/06/29/asia/japan-moon-landing-jaxa/index.html>; Mariella Moon, "Russia's Space Agency Preps for its First Manned Moon Landing," *engadget.com* (15 March 2017) online: <https://www.engadget.com/2017/03/15/roscosmos-first-manned-moon-landing/>; Andrew Griffin, "China and Europe to Build a Base on the Moon and Launch Other Projects in Space," *independent.co.uk* (26 April 2017) online: <http://www.independent.co.uk/news/science/moon-base-outpost-china-europe-chinese-space-agency-collaboration-together-a7702936.html>; Alan Boyle, "Trump's Choice for NASA Chief, Rep. Jim Bridenstine, is Likely to Boost Moonshots," *geekwire.com* (2 September 2017) online: <https://www.geekwire.com/2017/trumps-choice-nasa-chief-rep-jim-bridenstine-likely-boost-moonshots/>



The Outer Space Treaty at 50: Space Commerce and the Space Law Regime

The Outer Space Treaty[1] (OST), often described as ‘the Magna Carta’, the ‘constitution,’ or cornerstone of space law[2], celebrates its fiftieth anniversary in 2017. The OST has now been ratified by 104 States and signed by a further 25. It is the most widely accepted of the five major space treaties[3] (i.e., the Outer Space Treaty, the Rescue Agreement[4], the Liability Convention[5], the Registration Convention[6], and the Moon Agreement[7]). While a product of the Cold War and originally primarily viewed as an arms control treaty[8], it continues to serve as the bedrock for the space law regime that has worked well for fifty-plus years and provided the stability and security that has enabled the commercial space sector to develop and flourish. This article will briefly explore the provisions of the Outer Space Treaty that impact the commercial space sector and consider the future of the space law regime as well as the suitability of the existing framework.

It is important to consider the provisions of the Outer Space Treaty, Articles I, II, and VI specifically, especially when considering the impact of the Outer Space Treaty for the commercial space sector. Articles I and II of the Outer Space Treaty set the tone of the treaty, and are arguably the most important. Article I establishes the freedom to access and use space for all states, and Article II prohibits national appropriation of outer space, the Moon, and other celestial bodies by any means. Together, these articles establish space as a ‘global commons,’ analogous (although not exactly) to the oceans and Antarctica. Therefore, outer space is *res communis*, not *res nullius*.

While the Outer Space Treaty directly addresses States, Article VI of the Outer Space Treaty makes States responsible for “national activities in outer space...” and requires “authorization and continuing supervision” of activities of non-governmental organizations in space. This means that States are responsible for governing the activities of their commercial space entities. Commercial space activities are directly regulated by national legislation, not international law. In the UK, for example, this national legislation is the Outer Space Act[9], which requires that operators of British nationality or those operating from the UK obtain a licence from the UK government, among other things. Most States active in the space industry have similar legislation, New Zealand being the most recent State to pass a national space law.[10] There are additional

commercially relevant articles of the Outer Space Treaty that deal with liability for damage caused by space objects (Article VII), registration and jurisdiction (Article VIII), which are further developed by the Registration and Liability Conventions. However, again, the treaty itself is concerned with State-to-State obligations, while the specific implementation for commercial entities (or any non-governmental entity for that matter) is dealt with by national legislation.

Far from hindering the development of space commerce, as some claim[11], the existing body of space law has created a stable legal environment in which space commerce has flourished. Indeed, this is demonstrated by the fact that millions of people utilize commercial space assets every day, most prominently via satellite enabled television and global satellite navigation systems. The stability and security provided by the existing body of space law is generally supported by the space industry, as the US space industry told US Senator Ted Cruz recently when he held a hearing on ‘updating’, amending or withdrawing from the Outer Space Treaty.[12] Furthermore, the space mining legislation passed by the United States[13] and Luxembourg[14] not only conforms with the existing space treaties[15], but also demonstrates that there is sufficient flexibility in the existing regime to permit novel activities that were not envisioned by the drafters of the Outer Space Treaty in 1967.

This flexibility is due in part to the fact that international law is generally a permissive system, essentially meaning that if States are not specifically prohibited from action, then they are permitted to do it.[16] This freedom combined with the general provisions of the Outer Space Treaty leaves plenty of scope for the development of space law in the future, as has been recently demonstrated with the above mentioned space mining legislation. There is not a pressing need for a new treaty, as customary international law and ‘soft law’ will help fill in the gaps of space law; and given the flexible nature of these methods, they can potentially do it better than ‘hard law’ options. There are certainly issues that are in need of attention. The space debris issue is a pressing concern and is part of the cause for the need for a development of an effective space traffic management system. Additionally, mega constellations and on-orbit servicing will require changes to the way insurance and liability regimes work as well as tweaks to the management of the radio spectrum (which is also being challenged by growing terrestrial demands). Furthermore, the embryonic, yet growing, space mining sector could be a further potential issue, especially if divergent regulatory and legislative regimes emerge. A lack of coordination between states could cause unwanted and unnecessary complications.

These issues can be addressed without recourse to a new space treaty. Discussion, cooperation, and coordination among the various actors in space, be they State or otherwise, is the best way forward. Various incarnations of ‘soft law’ can work wonders, as has been argued by Setsuko Aoki, professor of international law at Keio University in Japan. Given the multinational, collaborative, and increasingly commercial nature of space activities, ‘soft law’ approaches will prove to be the best ways to deal with the gaps in the existing body of space law.[17] The international community already has forums for discussing space governance, most notably the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and the International Telecommunications Union (ITU). Additionally, ad hoc bodies such as The Hague Space Resources Governance Working Group can help to establish guidelines for how best to tackle new and emerging issues.

The Outer Space Treaty is now over fifty years old. It is right to take stock and evaluate the future of the space law regime, especially given the development in the commercial space sector over the most recent decades. However, the Outer Space Treaty and the space governance regime that has grown out of it is robust, adaptable, and provides a stable and secure regulatory environment that has, and will, continue to enable the growth of the space industry. Furthermore, it is one that has achieved global acceptance and legitimacy. That does not mean that space law should remain static or unchanged, but the fundamental principles, freedom of access, and use of space for all States, and the non-appropriation principle specifically,

should be preserved and protected.

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"Our Policy is to Have No Policy"?: Risks and Rewards of Being Stuck Between Fiction and Fraction

Overall, the past couple of years have been great for space exploration activities. Recovering from a quite spectacular rocket failure in September[1] of 2016, SpaceX was out to impress all by unveiling their private plans to start colonising Mars by 2022[2], and more recently, unveiling their view of the future use of space technology for travel on Earth[3] as well as a successful first step in making these plans a reality with their Falcon Heavy launch[4]. Space probe Juno has made it to the gaseous atmosphere of Jupiter[5], Cassini executed a controlled descent into Saturn after a successful extended mission[6], ESA's Rosetta mission came to a controlled crashing end[7], and the first stage of another of ESA's project, the ExoMars mission, has arrived to its destination[8].

However, in the midst of all of this excitement, little time has been given to understanding the bigger picture – why success and failure have been so abundant recently and whether the individual objectives and the collective vision for space exploration are being met. Of particular interest are two related streams of development. First is the recent almost fictional optimism of both private and governmental space sector players and the somewhat obvious shortcomings of their plans. Second, adding to this is the fact that though the two groups seem to be talking to each other, the messages pass by without being received.

Hence, let's take some time for reflection and take those two issues in turn.

Potemkin's Village on Mars

As said, Elon Musk of SpaceX announced their plans for Interplanetary Transport System for taking humans to Mars, which includes 200 "seats" per vehicle at potentially \$200k per ticket[9]. However, as these plans are examined, there are many questions that remain to be answered[10] and some doubts about parts of the project were already expressed[11], in particular on safety grounds[12], in addition to concerns about the validity of the business model, in particular, the availability of funding.

The excitement of this announcement reminded me of the initial excitement surrounding Mars One project[13], another colonization ambition with a commercial interest. Similar doubts were expressed then as well[14], though after the initial enthusiasm died down, targets were revisited, and though the mission remains nominally on track, it no longer occupies the centre-stage in the planning of the future of space



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Concept art of a Dragon 2 spaceship landing on Mars © SpaceX via Wikimedia

Jack of All Trades, Master of Luck?

Whilst no one could accuse the European Space Agency (ESA) of lowering the standards for acceptable risk in human spaceflight, the recent ExoMars mission's Schiaparelli lander failure[17] is perhaps exposing another of the space sectors' vices – its narrow-minded competitiveness.

ExoMars' two part mission was to insert an orbiter to study methane gas in Martian atmosphere and put a lander on the ground. The mission is still painted as 96% success[18]; which makes one wonder if only 4% had to do with landing, why bothering to land anything at all? Perhaps, given that Schiaparelli lander was a technology demonstrator for future landing technology, its mission should be treated as 100% success – it demonstrated the current ESA landing system does not work. This demonstration, however, is hardly needed. Beagle 2 (whose problem might not be crash-landing or damage from it)[19] notwithstanding; luck, if anything, was a key element in ESA's most successful recent mission – Rosetta – managing to land the Philae lander on the 67P comet[20]. Harpoons not firing could easily have meant a fatal bounce-off the surface, but luckily the comet was a bit larger than expected, and it had a stronger gravitational field, which resulted “only” in a 1km high jump for the probe.

Yes, engineering played a significant part, too (for instance in reducing the jump by shock absorbers), and yes, most missions go wrong in one aspect or another and luck regularly “saves the day,” and another yes: the Philae descent was truly inspirational – but the fact remains that ESA's “new norm” of combined missions (orbiter + lander) often hang on a cliff edge (or land underneath[21]), due to technological problems, which were seemingly overcome by their counterparts.

For example, in a stark contrast to Beagle 2 and Schiaparelli lander failure, NASA has recently had four successful landings on Mars. The last one, Curiosity rover, was delivered via an automated rocket-powered sky-crane[22]. In light of these developments, has anyone wondered why space agencies around the world, who cooperate on many joined projects, still prefer to develop their own parallel technology for practically every element of space exploration missions (ISS notwithstanding)?

The answer is probably – to show they can! And, it has perhaps less to do with technology development and scientific advancement as such and more with proving geopolitical points. Whilst the International Space Station truly leads the way in multi-faceted international collaboration, there were still times when its founding partners were at loggerheads politically on Earth[23] (though perhaps the attitude towards China in this matter is very much out of sync with the economic and political reality[24]), many “less challenging” programmes still seem to be deeply divisive, which might be precisely the element making them less successful than they could have been.

Hence, perhaps it is time to pause and reflect on what kind of overall (global) policy we want for the future of space exploration. The current reliance on ambiguity, supposed public-private competition, and the contradiction between general international cooperation and simultaneously aggressive patriotism might soon be seriously hampering the development of vital programmes and solutions. And perhaps we should look again at the concepts of risk, safety, and international collaboration – let's face it, in all of the excitement, we might have got them somewhat wrong.

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A Cruise Around the Moon

In the hundreds of thousands of years we have been on earth, only 559 human beings[1] have gone past the Kármán line into what many consider outer space. As of next year, that number could begin to exponentially increase with the emergence of “space tourism.” These expanding boundaries of human leisure mean that it is time to revisit the laws and policies currently governing space exploration and prevent any major disagreements or issues as a result of legal shortcomings.

Becoming an astronaut used to require years of in-depth training, as it was (and still predominantly is) a career. But the common understanding of the word ‘astronaut’ is slowly shifting from the notion of a professional space explorer who is capable of manning complex spacecraft to a more general definition including a mere passenger on that same spacecraft. Unlike NASA-hired astronauts, these new space explorers do not need a Bachelor’s degree in a STEM field, three years of related professional experience, or a

thousand hours of experience flying jet aircraft[2], but they do need a sated bank account.

Virgin Galactic, one of the companies at the forefront of space tourism, has already started selling tickets for membership to its “Future Astronaut community,” expecting to launch its first flight sometime in the next year. The price to join? \$250,000[3]. But competition in the market is already exploding, despite the lack of actual product. Elon Musk’s SpaceX plans to send two tourists on a cruise around the moon in 2018[4] and Russian company Kosmokurs recently announced that it would begin transporting tourists into space by 2020[5]. If these prove successful, it is likely that other companies will begin to emerge and ticket prices will become more accessible to less wealthy individuals seeking a holiday that is truly out of this world.

For now, however, we must address the issues that arise as a result of new realities. When planes started being commercialized, nations came together in 1929 to create the Warsaw Convention for the “Unification of certain rules relating to international carriage by air” to deal with potential liability issues[6]. Similarly, the 1967 Outer Space Treaty was a way of preventing conflicts over space exploration activities by setting seventeen base rules. These became the foundation of contemporary international space law, from which further treaties and agreements have come into existence. Articles such as those encouraging the freedom of scientific investigation[7] or forbidding the installation of weapons anywhere in space[8] form the legal basis of space exploration and the peaceful use of space. Though the articles deal with astronauts as well, providing that States must render “all possible assistance” to astronauts in distress[9], with the expanding nature of the term ‘astronaut,’ it is possible that they may need revision.

Presently, all activities in outer space are to be carried out in accordance with international law, as outlined in the 1984 Moon Treaty – which, it should be noted, has not been ratified by major countries with space programs such as the United States, Russia, Japan, or the People’s Republic of China. In addition, the term “astronaut” has never been explicitly defined under international law; thus, it is time that we create a new treaty within international law that deals specifically with space tourism and leisure exploration that perhaps will more easily be signed by countries with such tourist missions.

Such a treaty could combine aspects of aviation law – to deal with liability and flight issues; space law – as a solid backbone for laws pertaining to activities on the outside of the spacecraft; and international law – for

maintaining the relations between various nations' companies involved in space tourism. Both companies and customers require legal precedents in the unhappy event of an accident or problem. An industry in such a new and emerging field, based on an activity that is not without risk, needs to have established rules and regulations to protect and manage everyone involved.

In nearly sixty years of space exploration, not even 600 people have had the chance to leave our atmosphere. Soon, that may be how many people see it in a year, a month, or maybe even a day. With such drastic advancements right around the corner, policymakers must lay a framework for a cooperative working environment and provide a mechanism for resolving disagreements or penalizing transgressions should they in fact occur.

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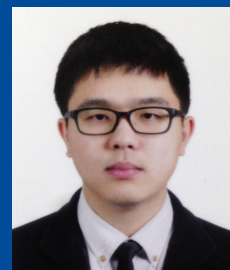
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The New Space Race - An insight on Sino-US Relations

The increasingly sophisticated economic and technological capabilities of nations in outer space have contributed to heightened tensions in Sino-US relations, and the emergence of a new space race in the 21st century. Comparable to international waters, outer space has consistently been a key area of strategic importance for States to project military and economic power. In 1957, the launch of the world's first artificial satellite, Sputnik 1 by the Soviet Union, whose orbital path over the United States initiated public alarm over the loss of the strategic high ground, initiated the space race between the Cold War superpowers[1]. Technological developments in space have played a pivotal and overlooked role in international affairs given its relevance to a State's soft/hard power capabilities; pertaining to military and intelligence (i.e. GPS, Corona spy satellites), WMD capabilities (i.e., ballistic missile and aircraft delivery systems), and wider technical capabilities (i.e., cybersecurity). China's rise as an emerging economic, military, and cultural superpower presents a direct challenge to the established US hegemonic world order; as China seeks to reinforce its standing and control within East Asia and in outer space. In analysing the proposed emergence of a new space race between the US and China, it is necessary to contrast and scrutinize the background of each State, consider implications of shifting inter-State relations, and consider options to foster the peaceful



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development of outer space.

Sino-US relations has been characterized by misunderstandings, misconceptions, and strategic distrust between both sides. The root of such misunderstandings originates from misconceptions over each other's foreign policy, and fundamental differences in ideological identities, which reflect upon each State's conflicting foreign policy objectives. American identity is characterized by its liberal, democratic, capitalist, and Christian character. The US is a nation-state that embodies the idea of "One nation, one system," and is multi-racial and diverse[2][3]. Conversely, China is an eastern, authoritarian, atheist, communist State that governs under the one-party dictatorship of the Chinese Communist Party (CCP). China is a civilization State, with unity and maintenance of the nation state considered paramount[4].

These differing ideological characteristics have resulted in differing conceptions of the ideal world order. The US has traditionally maintained dominance through a liberal international order; openness and rule-based relations enshrined within institutions such as the UN, and norms such as multilateralism[5]. This is opposed by China's preponderance for authoritarianism and a less open/rule-based international order, in preference of an array of State-to-State ties[6]. China thus seeks to challenge the US maintenance of the existing institutional order governing outer space; a circumstance that will result in further confrontations as the new space race unfolds.

Given parallels, the outer space policies of each State must be analyzed under the background of naval power, and its geopolitical hard-power role. Alfred Thayer Mahan's commentary on the role of sea power describes control of the sea by maritime commerce and naval supremacy as equating to predominant global influence[7]. This is given its capacity to act as a staging-ground for nations to forge hard and soft power capabilities based upon geographical position, physical conformation, extent of territory, size of population, character of people, and character of government[8]. While the US has maintained its access to the global maritime commons through its hegemonic power[9], China and India have taken heed in their naval expansionism; with China having developed aircraft carriers and A2/AD weapons capabilities[10][11]. This circumstance is becoming increasingly reflected in outer space, as the US realizes the concerns posed by the intensified economic and military interests of China in outer space to its strategic high ground.

The implications of the emerging Sino-US space race present a dynamic challenge to global peace and security. The implications of this anticipated space race will involve increasingly frequent contraventions of internationally settled principles and the 1967 Outer Space Treaty (OST)[12]; an international treaty that governs parties' actions in space. Article IV of the OST details such prohibitions as forbidding the establishment of military bases, weapons testing, and military maneuvers on celestial bodies, and that the Moon and other celestial bodies shall be used exclusively for peaceful purposes. Consequently, the treaty does not wholly prohibit the deployment of weapons in space. While it disallows WMDs, it implicitly allows deployment of conventional weaponry[13.] Accordingly, this exception is what facilitates the testing of intercontinental ballistic missiles; enabling North Korea to legitimately test its ballistic missiles under international law[14][15].

As its space program progressed, China has sought to increasingly militarize space, particularly through its development/testing of anti-satellite weapons (ASATs). This was illustrated in China's destruction of a redundant weather satellite in January 2007 using an ASAT missile; creating 3,000 pieces of orbital debris that have since continuously posed a threat to other nations' access to space[16]. This decision incised the US to respond with an ASAT test in 2008, thus demonstrating the competence of its own military space capabilities[17]. The US has focused its efforts on refining observational and early-warning system satellites [18] and the development of space planes[19]. While the US is developing military technologies to build upon its existing space infrastructure and maintain space superiority by safeguarding its freedom from attack and freedom to maneuver[20], China and Russia are expanding upon inexpensive abilities to deny access in

a conflict[21]; an allusion to AD/A2 in the South China Sea.

Indeed, it appears that where one State breaks internationally settled principles; other States quickly follow suit and capitalize on the opportunity to establish new principles. While Article II of the OST states that the Moon and other celestial bodies are not subject to national appropriation, States have exploited its loopholes. The Space Act of 2015 saw the US government recognize the rights of US private entities to the extraction/possession/sale of natural resources from celestial bodies[22]. Given the intensification of commercial US space companies (e.g., SpaceX), the US is leveraging its advantages/expertise in space to redefine the international legal order through an assault upon its settled principles; including States' rights to scientific exploration in outer-space and the prevention of unilateral commercial exploitation of space resources[23]. While this is not explicitly prohibited under the OST, the US has opened the floodgates, threatening to devolve the international legal framework of outer space into anarchy[24]. Luxembourg has similarly passed its own domestic legislation giving companies the rights to space resources extracted from celestial bodies[25]. China has remained silent on the topic, a possible indication of its confidence in its capabilities to catch-up with the US[26]; given China's propensity for unscrupulous technology transfer actions as a means of eliminating competition and rapidly accelerating technological development[27][28]. Moreover, China is focused upon the development of Space-Based Solar Power, lunar and asteroid mining, and in establishing an independent space station[29].

The question remains: what measures will alleviate Sino-US tensions and ensure the peaceful exploration and use of outer space? Precedence was established during the 1975 Apollo-Soyuz Test Project (ASTP), which involved US-Soviet cooperation as the first spaceflight to include two nations working together with their own national spacecraft[30]. The ATSP concluded the first space race and resulted in further cooperative initiatives: the Mir-Shuttle program and International Space Station[31]. China has invested effort into establishing and sustaining bilateral, cooperative ventures (e.g., development and launch of satellites, training of space scientists/engineers, and providing economic assistance to other nations' space programs)[32] through cooperative space agreements with Britain, Canada, France, Pakistan, Russia, and Brazil[33]. While the opportunity exists for the US to improve relations and constrain China within the existing international framework by engaging in low-level, multilateral cooperation, this is complicated by China's ASAT development, the prohibitive cost of collaboration, the ineffectiveness of diplomacy-in-orbit upon terrestrial relations, China's technology transfer practices, and the Chinese exclusion policy of NASA [34]. Unconditional cooperation in space would force an unacceptable public moral compromise on the US, given China's appalling human rights record and differing ideological character and it would result in an unacceptable lack of public transparency, given China's propensity to obfuscate its space program[35]. Even cooperation on a private level may be met with resistance, as US private operations may carry their own reservations regarding technology and cooperation in space given the CCPs proclivity of involvement in private enterprises[36][37].

The implications of the Sino-US space race will increasingly result in the militarization and exploitation of outer space and an increasingly anarchic international order, to the detriment of less developed nations. The conclusion may be made that, while cooperative missions have proven effective in the past, they are ineffective in reducing terrestrial Sino-US tensions, given the various hurdles to meaningful cooperation and differing strategic interests. An improvement in relations may only arise when both States are on a more equal footing, and when all nations agree upon concrete international principals that recognize the exploration and use of celestial bodies as the common heritage of humankind[38].

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Militarization of Space: An International Conundrum

Background

The events of World War I (WWI) and World War II (WWII) are significant in ordering and re-ordering the international system. The wars have infused scientific innovations in the defense technologies that played an important role in shaping the strategies of warring states, and they also played a significant role in shaping relations of States in the post-WWII international politics. The emergence of a bipolar world order/disorder led by the United States of America (USA) and the Union of Soviet Socialist Republics (USSR) that was oriented towards promoting their ideologies and safeguarding their sovereignty resulted in a 'security dilemma'[1]. This dilemma envisaged the need for expanding their capabilities such as in the domain of defense as well as other political and economic aspects. Further, the dilemma and the need for enhancing each others' capabilities led to the situation commonly referred to as the Cold War. In this context, the realization that outer space had geopolitical significance became the bone of contention leading to the militarization of space and identification of various related issues, as well as

policy responses at the global level, which make it necessary to address the problem of militarization of space.

One-Upmanship

The Dawn of the space age began on 4th October 1957 with the launch of first artificial satellite - Sputnik 1 - by the Soviet Union. Post-WWII politics gave impetus to the space race competition between USSR and the US. The US reacted to the first artificial satellite launch by USSR by landing a man on the moon in July 1969. It was followed by additional missions by the USSR and counter missions by the US. The ensuing space race was the expression of national pride and security issues as well as efforts to protect the sovereignty of each of these States. With the launch of first Intercontinental Ballistic Missile (ICBM) by the USSR and the counter launch of Multiple Re-entry targetable reentry Vehicle (MIRV) ICBM by the USA, thus began the era of the militarizing of outer space. The Strategic Defense Initiative (SDI) program of the US to protect its territory from external threats further exasperated the militarization process and the media labeled this initiative as "Star Wars."

The end of the Cold War that resulted with the disintegration of the USSR did not end space militarization. The Persian Gulf War is considered as the beginning of the first space war, where the US targeted Iraq with an array of space technologies. The use of the Global Positioning System (GPS) by the US has strengthened its military capability further. The George H. W. Bush Administration in the United States made it clear that the US wished to expand its military capabilities and have weapons in space, and therefore also be dominant in this fourth military arena.

In this context of one-upsmanship played by the two-power blocks in the exploration of space during the Cold War time and its impact on global international peace and security led to the evolution of an international regime that led to the Moon Treaty, Outer Space Treaty, Return and Rescue Agreement, liability convention, registration convention, as well as organizations like the United Nations. This brings to the fore two very important and related questions. Why do States so frequently use international organizations (IOG's) as vehicles of cooperation? What attributes account for their use, and how do these characteristics set formal organizations apart from alternative arrangements, such as decentralized cooperation, informal consultation, and treaty rules?[2]. Here, the United Nations played an important role in addressing the dilemma that began at the beginning of the Cold War.

Policy Problem

Since the Westphalian agreement in 1648, States have been a focal point in international politics. The epistemological understanding of the role of international regime amidst dominant States has been discussed and debated in myriad ways by the scholars of international relations, security experts, and policy makers. The challenges and existing measures adopted by the international regime on space has to be understood to provide a policy solution to emerging problems.

Space exploration is a challenging endeavor, which is capital and technology intensive. For this very reason, for many decades the powerful states like US and USSR could dominate the space frontier while the developing and least developing countries have reaped the benefits of space exploration only through expressing their subordination to the dominant states. Recently, developing countries have begun to invest in the manufacturing of satellites and launching systems, and there has been a significant development in the use of space for military and civilian purposes; especially from the states like China and India.

The United Nations (UN) has frequently had to meet the dynamic challenges of space exploration. The global policy response to this was to bring about a compromise between the military and civilian/commercial use of space. As an example taken from remote sensing technology, the UN made it clear that the State that was sensed and had concerns about the foreign satellites should have the right to information on the areas so sensed and get access to the data collected. But today, this right stands diluted for three reasons. First, such information may be denied using excuses such as cloud cover, malfunctioning of a camera, poor resolution, and so on. Second, commercialization of remote sensing has put a price on such data and its interpretation and it could thus be exchanged at exorbitant costs. As a result, some developing or under-developed countries can ill-afford to attain it. Third, such information could also be clandestinely used for commercial intelligence of natural resources, insurance purposes, or to cause exploitation.

The militarization of space could lead to the tilting of the balance of power in international relations. During the Cold War, the competition between the two power blocks balanced equations in global politics. Historically, with the decline of USSR, the US has dominated the space race, which has tilted the balance of power in favor of the US. This rise of US in space arena is being challenged by China, which is picking up the pace in militarizing the space, but it is currently far behind in actually overtaking US in this field.

The basic legal regime of outer space is enshrined in the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies, popularly called the Outer Space Treaty of 1967. A subsequent treaty, the Moon Treaty, endeavors to prevent the Moon from becoming an arena of international conflict and declares that all States-parties shall use it exclusively for peaceful purposes[3].

The existing corpus of space laws grants some special permissions and leaves certain gray areas that are exposed to promiscuous interpretation or lend themselves to ambiguous meaning. Despite a specific and

strict ban on certain military uses of space, and emplacement of weapons of mass destruction in outer space, countries have exploited the gray areas in the law for military purpose.

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Crime on the International Space Station: The Canadian Legal Perspective

The current human population in space at any one time can still be counted on one hand, rarely two hands, but when people begin to inhabit space in greater numbers, we can expect a corresponding increase in the amount of interpersonal conflict and crime.

The only current permanent residence in space is the International Space Station. What would be the legal response if a crime was committed on the station that involved a Canadian astronaut or Canadian property? The answer is found in part in the Criminal Code of Canada[1]. (The other statute that addresses potential criminal activity in space is the Civil International Space Station Agreement Implementation Act)[2]. Section 7(2.34) of the Criminal Code defines the Space Station as:

the civil international Space Station that is a multi-use facility in low-earth orbit, with flight elements and dedicated ground elements provided by, or on behalf of, the Partner States.

Section 7(2.3) of the Code says:

Space Station — Canadian crew members

(2.3) Despite anything in this Act or any other Act, a Canadian crew member who, during a space flight, commits an act or omission outside Canada that if committed in Canada would constitute an indictable offence is deemed to have committed that act or omission in Canada, if that act or omission is committed

(a) on, or in relation to, a flight element of the Space Station; or

(b) on any means of transportation to or from the Space Station.

This section essentially means that a Canadian astronaut who commits a crime in space is deemed to have committed that crime in Canada. Murder in space by a Canadian astronaut is treated like murder in Canada for the purposes of jurisdiction. There are some qualifications, however.



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First, the section only mentions indictable offences. Indictable offences are the more serious category of crimes, as opposed to summary offenses that are relatively minor. This is akin to the distinction in the United States between felonies and misdemeanours. The Criminal Code is silent on the effect of summary offences committed in space.

Next, the section applies to acts committed on “space flights.” This has a simple definition that includes the period of time beginning with launch, continuing with orbit on the station, and ending with landing back on earth.

This section also applies if the act is committed “on, or in relation to, a flight element of the Space Station” or “on any means of transportation to or from the Space Station.” What is a “flight element of the Space Station”? Section 7(2.34) of the Code defines it as:

a Space Station element provided by Canada or by a Partner State under the Agreement and under any memorandum of understanding or other implementing arrangement entered into to carry out the Agreement.

(“Agreement” refers to the agreement between Canada, the US, Russia, and other countries concerning cooperation on the International Space Station.)

The reference to “elements” comes from the fact that the Space Station is a joint endeavour in which different countries contribute various physical components. There is no single jurisdiction and no country “owns” the station. Generally, each Partner State owns the elements that it provides. NASA explains this on its website.[3]

Elements launched from different countries and continents are not mated together until they reach orbit, and some elements that have been launched later in the assembly sequence were not yet built when the first elements were placed in orbit.

The Criminal Code also covers certain crimes committed by non-Canadian astronauts. Section 7(2.31) states that an astronaut of a Partner State who commits a crime is deemed to have committed that crime in Canada if the act:

- (a) threatens the life or security of a Canadian crew member; or
- (b) is committed on or in relation to, or damages, a flight element provided by Canada.

The other Canadian statute that addresses criminal activity is the Civil International Space Station Agreement Implementation Act, whose purpose is to fulfill Canada’s obligations under the intergovernmental Space Station Agreement.

Article 22, section 1 of the Space Station Agreement allows Canada to exercise criminal jurisdiction over Canadian astronauts or Canadian flight elements.

Article 22, section 4 requires each Partner State to cooperate with the others in connection with “alleged misconduct on orbit.”

Article 22, section 2 deals with cases involving misconduct on orbit that affects the life or safety of another country’s astronaut or flight element. It states that the country of the accused astronaut must consult with the country of the victim “concerning their respective prosecutorial interests.” For example, if an American astronaut were to threaten the life of a Canadian astronaut (or intentionally damage the Canadarm2), the

two countries would be required to consult on prosecution at Canada's request. Canada would be entitled to claim criminal jurisdiction if the United States either (a) agreed to let Canada do so, or (b) failed to provide assurances that it would prosecute the case itself.

All of the above only affects crimes committed on, or in transit to or from, the International Space Station. If a Canadian astronaut were in space in another capacity, the Criminal Code would not cover it. During the Parliamentary debate over the Civil International Space Station Agreement Implementation Act, Member of Parliament John Bryden spoke to the historic importance of the bill[4]. Bryden noted that the bill was a reflection of cooperation between countries with "competing interests," including Canada, the United States, and their former Cold War adversary Russia. He attempted to place it in historical context, describing the importance of law to democracy from Greek times. He concluded:

"I think we have to appreciate that wherever mankind does go in the millennium ahead of us conflict will follow."

Whether this legislation will form a template for future shared criminal laws in space is yet to be seen. To date, these specific laws have obviously not been tested. They may never be tested, depending on the lifespan of the Space Station. During the Parliamentary debate, there was no reference made to the likelihood or practicalities of applying the Criminal Code to space activity. Nevertheless, these laws are historically significant in that they represent among the first application of Canadian law outside of Earth.

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Sovereign in Space?



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There is some rumor of the wealthy Russian businessman who is funding Asgardia, a space station project that will orbit the Earth, in low orbit (LEO), that he intends to pursue (and get) UN membership for Asgardia.

The short answer is that Asgardia would likely be under the sole jurisdiction of Russia and therefore not a sovereign nation. However, if they gave up their Russian citizenship and declared themselves an independent sovereign nation, they could apply for membership; but getting past the application stage would be unlikely. Here is the longer answer:

(1) Space Law

First, under the Outer Space Treaty, the launching State has jurisdiction over its space object, forever, in terms of liability (Art. VII). Second, looking at the current ISS as a model for legal frameworks is our next analysis. Under the Outer Space Treaty, an intergovernmental agreement (IGA), was signed by the participating nations on the International Space Station. This is not a precedent or binding on future ISSs, but could be argued that it is customary law under international law, and thus binding. Article 5 of this IGA holds that “each partner shall retain jurisdiction and control over the elements it registers and over personnel in or on the Space Station who are its nationals.” That is, the citizenship of the person in the space object is subject to the jurisdiction

of his or her own country, so forming a sovereign nation on this space station would be an act of insurrection, e.g., a declaration of independence. If each member gave up their Russian citizenship (assuming everyone is a Russian citizen), that might also put them in a better position to be independent. Historically, Russia has not been passive about declarations of independence from “satellite” nations. No pun intended. So this is a major hurdle.

(2) The United Nations

The UN Charter’s purpose is “To maintain international peace and security, . . .” (Art. 1(1)) and as explained in the Preamble “to save succeeding generations from the scourge of war.”

The UN Charter “is based on the principle of the sovereign equality of all its Members.” (Art. 2(1)) and is intended to provide a forum for resolving disputes. (Art. 1(1))

Chapter 2 of the UN Charter deals with membership, which is “open to . . . peace-loving states which accept the obligations contained in the . . . Charter and, in the judgment of the Organization, are able and willing to carry out these obligations” (Art. 4).

The process is that a member proposes its membership to the Secretary of the UN who decides whether it meets the requirements and then puts it before the General Assembly for a vote.

The UN, on its website a few years ago, describes the obligations of membership:

“When States become Members of the United Nations, they agree to accept the obligations of the UN Charter, an international treaty that sets out basic principles of international relations. According to the

Charter, the UN has four purposes:

- to maintain international peace and security;
- to develop friendly relations among nations;
- to cooperate in solving international problems and in promoting respect for human rights;
- and to be a centre for harmonizing the actions of nations."

Now, before the UN would take up consideration of membership of a space station, they would likely have objections from all those in observer status, like the Holy See, for example. There are about 54 small nations that are "dependencies," not members of the UN who would also likely object.

The definition of what is a sovereign state could be a real obstacle for the space station, given that Palestine has been trying to get recognition as a sovereign state for decades, but has been repeatedly delayed in consideration. For example, when Palestine was allowed to be a member of the organ of the UN that protects world heritage sites, known as UNESCO, the U.S. withdrew from participating in UNESCO (at least for a time).

There is a mechanism whereby smaller sovereign states are represented by a larger state. New Zealand represents several small Pacific island dependencies in the UN, and they do not have full membership. (Presumptively, it is not cost effective for them to maintain a presence at the UN, and New Zealand shares their interests.) This seems to be the most likely route for the new space station "nation," which would most likely come under the sponsorship of Russia. Whether Russia would recognize any dependency in this space station would be left to Russia. Another possibility for Asgardia to have some independence from Russia would be as a recognized "Special Administrative Region" of Russia, like Hong Kong is to China. Again, even this recognition for Asgardia is politically unlikely.

What is likely, is that this question is almost certain to need resolution in the near future.

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