PREPARING FOR THE NEXT SPACE RACE:
Legislation and Policy Recommendations for Space Colonies

by

Paul M. Gesl, Maj, USAF[1]
Juris Doctor

A Research Report Submitted to the Faculty
In Partial Fulfillment of the Graduation Requirements for the Degree of

MASTER OF OPERATIONAL ARTS AND SCIENCES

Advisor: Lt Col Peter A. Garretson

Maxwell Air Force Base, Alabama

April 2018

Disclaimer

The views expressed in this academic research paper are those of the author and do not reflect the official policy or position of the US government or the Department of Defense. In accordance with Air Force Instruction 51-303, it is not copyrighted, but is the property of the United States government.

Abstract

This paper discusses the ambitions of the commercial space industry to build habitats in order to colonize space. It also discusses why space colonization is important to humanity. It then turns to the current international law framework to study if space colonization is legal. Next it looks at what legislation and policy the United States should pursue to successfully allow for colonization. It makes specific recommendations regarding both a civil and criminal law framework to ensure that there is adequate governance of initial colonies in space, without hindering future development.

Introduction

"He's what passes for law in town. Okay, sure, every society needs laws and someone to enforce them. But Rudy tends to go the extra mile."[2] In his novel, *Artemis*, Andy Weir builds a world set in a city on the lunar surface in the near future. While not completely lawless, the city of Artemis lacks the legal framework present on Earth. Instead, the law is enforced by a single, zealous security chief.[3] Based on the current legal framework, both internationally and domestically, Weir's vision of the rule of law is likely accurate. As the United States and humanity expand away from the surface of the Earth, we must create a legal framework, or we will be left with frontier justice like the city of Artemis: "That's how justice works around here. We don't have jails or fines. If you commit a serious crime, we exile you to Earth. For everything else, there's Rudy."[4]

It is in the best interest of the United States to lead the effort to provide laws that govern space colonies. A gap exists in international law. This gap in the framework should be viewed as an opportunity, rather than a hindrance. The commercial sector is taking the lead in developing technologies that enable human beings to live and work in space. The United States has a responsibility under international law to supervise these activities when carried out by its citizens.[5] Instead of passive supervision, the United States should pursue laws and policies that both encourage and direct these activities. This paper will first look at why colonizing space is important. Next, it will discuss why the United States should address this issue now, rather than in the future. Then, it will break down the legal framework of space colonization, starting with how international law views the issue. Finally, it will analyze civil and criminal law issues that need to be addressed to prepare for space colonization. When page limitations allow for it, the

author will make specific policy and statutory recommendations to enable the United States to lead in the space domain as humanity expands our horizons.

Space Colonization is the Future of Humanity

The United States' space policies under the previous two Presidential administrations have not matched the ambition of the commercial sector. The author has criticized the National Space Policies of both President Obama and George W. Bush as being too "Earth-Centric."[6] Based on the current state of technologies, it is easy to dismiss space colonization as, at best, a problem to worry about tomorrow and, at worst, mere science fiction. This is irresponsible. Reaching space is difficult. Colonizing it will be even more difficult; however, we cannot overlook it as a likely possibility.

NASA viewed space colonization as an endeavor within humanity's reach in the 1970s.[7] Now it is beginning to take shape as a reality. In 2015 at the Pioneering Space National Summit, policy makers, industry leaders and advocates agreed that "The long term goal of the human spaceflight and exploration program of the *United States* is to expand permanent human presence beyond low-Earth orbit in a way that will enable human settlement and a thriving space economy. This will be best achieved through public-private partnerships and international collaboration (emphasis in original)."[8] Additionally, there have been several attempts in Congress to pursue space settlement.[9] Private industry appears to be taking the lead in this race. Elon Musk, the CEO of SpaceX intends to establish a colony of a million settlers on the surface of Mars.[10] SpaceX is targeting the first manned missions to make this a reality to launch in 2024.[11] Mr. Musk envisions the full colonization to take 40-100 years.[12] Even if this timeline misses its ambitious deadline by a decade, humanity will be a multi-planetary species in many readers' lifetimes. It is important to note that Mr. Musk recently stated that SpaceX is "building

the first Mars, or interplanetary ship, and I think we'll be able to do short trips, flights by first half of next year."[13] Even though he joked that the company might miss their timeline, his comments highlight that colonization is an issue that is fast approaching.[14] Another factor to consider is that a legal framework needs to be developed before a Martian colony is at its full capacity. Mr. Musk envisions using SpaceX's BFR to send approximately 100 people per flight to Mars.[15] Additionally, SpaceX appears to be planning for humans living on the lunar surface in their Moon Base Alpha.[16] SpaceX is not alone in their ambitions. United Launch Alliance (ULA) published their plans to expand the population of humans living and working in space. Their Cis-lunar 1,000 framework is a 30-year plan to develop the cis-lunar economy and grow the population of humans living and working in space from six to 1,000.[17]

Space colonization is more important to our species than the economic benefits of a space economy and the conquests of exploration. The current world population is 7.4 billion people.[18] According to the World Wildlife Foundation and the Global Footprint Network, "the equivalent of 1.7 planets would be needed to produce enough natural resources to match our consumption rates and a growing population."[19] The problem will likely grow worse as the population of the planet continues to grow. According to the United Nations, the Earth's population will grow to over 11 billion people by 2100.[20] Based partially on this, "Prof [Stephen] Hawking said it was only a matter of time before the Earth as we know it is destroyed by an asteroid strike, soaring temperatures or over-population."[21] Hawking further stated that, "When we have reached similar crisis in or (sic.) history there has usually been somewhere else to colonise (sic.). Columbus did it in 1492 when he discovered the new world. But now there is no new world. No Eutopia (sic.) around the corner. We are running out of space and the only places to go are other worlds."[22] The late Professor Hawking is not alone in his view, the National Space Society

observed the benefits of expanding into space. “Outer space holds virtually limitless amounts of energy and raw materials, which can be harvested for use both on Earth and in space. Quality of life can be improved directly by utilization of these resources and also indirectly moving hazardous and polluting industries and/or their waste products off planet Earth.”[23] These are just several of the many compelling reasons to colonize space advocated by groups such as the National Space Society and the Space Frontier Foundation.[24]

ULA appears to be taking steps to meet their ambitions for the future. ULA announced the first step towards making their Cis-lunar 1,000 vision a reality. In October 2017, they announced a partnership with Bigelow Aerospace to launch a habitat to low lunar orbit.[25] The launch is expected to be completed before the end 2022.[26] Some feel that colonization is going to happen, no matter what governments do.[27] If colonization is going to happen, then it is in the United States’ best interest to develop a legal framework that supports the efforts and protects our citizens who will travel to and live in these habitats. This is important for several reasons. First, private corporations appear to have an interest in colonizing space, so it is in humanity’s future whether the government is involved nor not. However, governments can take actions that will accelerate things.[28] Second, it is in the best interest of the United States’ economy to support commercial companies that are expanding into space. Third, if the United States does not create a favorable legal framework for space colonization, someone else will. Finally, as humanity expands away from the surface of the Earth, it is important to create a free society based on the principles of the Rule of Law rather than some other form of government, or an anarchistic company town.

Why the United States Needs to Think About Space Colonization Now

The commercialization of space has changed the dynamic of the domain. In the past, the government led all space efforts.[29] The International Space Station (ISS) enabled increased participation from the international community.[30] The United States government alone does not allocate enough resources to enable the future that the space community is advocating for.[31] Due to the growing population and limited resources of the Earth, a future with significantly more people living and working in space is an interest the United States government should pursue. However, rather than the United States government attempting to do this alone, it can partner with the commercial sector. A positive way to look at this is that the government should be a customer, investor, partner, and regulator to corporations that are looking to invest significant resources into space.[32]

Another reason that it is important for the United States to act early is that while there is a minimal framework for colonization, there are not currently any guidelines. If the United States is the first to pass laws, regulations, guidelines, and standards, it can establish the norms of behavior in the environment.[33] If the United States acts as a good steward and operator in this area, it will set the standards for how others should behave as well.[34] If another country, such as a near peer rival, acts first, the standards may not be favorable to the interests of the United States and other Western democracies.[35] Therefore, it is in the best interests of the United States to act now. Vice President Pence stated just that at the first meeting of the National Space Council, "But above all else, we choose to lead in space because we know that the rules and values of space, like every great frontier, will be written by those who get there first—and we owe it to mankind to bring American values to the boundless expanse of the heavens."[36]

Additionally, it is important to find the right balance between enabling commercial activity with supervision and oversight.[37]

Finally, the United States should take action now because it will provide investment security to our commercial partners. Space activities are expensive. It is important to encourage companies to innovate in space. However, companies take a risk when they do something that has not been done before that the activity will be blocked at the last minute.[38] If this were to happen, it could result in a large loss of financial resources.[39] Instead, it is best for commercial partners to "know the rules of the game ahead of time."[40] Taking action now will provide regulatory certainty to commercial partners to ensure that their large investments are protected.[41] It is also important to establish who is responsible for overseeing these activities.[42]

Existing Legal Framework for Space Colonies

In 1967, the *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies* (OST) entered into force.[43] This document, which is over 50 years old, was drafted when space issues were very different, yet it is still the primary binding international law on space activities. The OST places several limitations on potential colonization; however, it does not forbid the activity.

The first hurdle to a potential colony is Article II of 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."[44] One could argue that this would prevent any colonization. In fact, some do just that. Attorney Michael Listner, who founded Space Law and Policy Solutions, views this article as a non-starter for colonization efforts. "When a private citizen makes a claim to private, real property, basically, that's saying the United States is making a claim as well, because of that continuing jurisdiction, the U.S.

government always has."[45] The publication *theoutline.com*, relying on an interview with Listner, took this one step further, arguing that this means "any base or settlement on Mars would have to be free to use by anyone who can travel there. A person can't just set up a colony, claim independence, and create rules that restrict access to it."[46] However, Lister's interpretation is incorrect as it is too strict an interpretation of the language. *Theoutline.com* appears to take the interpretation to an untenable conclusion that is not supported by the evidence. Even though this position is not credible, it is important to discuss because as the United States moves towards colonization, it will face similar criticisms from opponents. Article II of the OST was not written to ban establishing a colony on a celestial body. Instead it was written to prevent a country from claiming a celestial body, such as the moon, as their own sovereign territory. This more permissive interpretation is supported by other provisions of the OST.

The OST contains language that supports establishing colonies. Article IV, while generally a prohibitive Article, states, "The use of any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies shall also not be prohibited."[47] If this leaves any doubt, Article XII likely clears up the confusion.

> All stations, installations, equipment and space vehicles on the Moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity. Such representatives shall give reasonable advance notice of a projected visit, in order that appropriate consultations may be held and that maximum precautions may be taken to assure safety and to avoid interference with normal operations in the facility to be visited.[48]

This Article establishes two important facts under the treaty. First, space colonization is acceptable under the OST. A colony easily fits within the definition of a station or installation. Quite simply, if the drafters of the OST intended to prevent States from establishing colonies, they would have most certainly done so in uncertain terms. Second, a State can establish a colony either unilaterally, or with a selected group of international partners. The visits discussed

in Article XII would not be necessary if every colony needed to be open to the international community. This also eviscerates claims like those cited by *theoutline.com*, discussed above. If any colony were open to any party that could reach it, the visits by representatives in Article XII would be nonsensical. Looking at these details in the language of the entire treaty is important, because without it, one could argue that Article I in the OST would prevent a State from establishing a colony. If a space colony established by a single State would deny other states free access to an area of a celestial body (namely the area where the colony is established), then facilities would be banned outright. However, Article XII directly undercuts this weak argument.

It is important to note that the OST equally applies to commercial entities. Private corporations are currently leading the way in planning for space colonization. A company that did not sign, or even exist when the OST was signed, is still bound by its provisions. Article VI establishes that these entities have to conform to the treaty, and more importantly that "the appropriate State Party to the Treaty" must both authorize and supervise these companies.[49] While not binding, the United Nations has spoken on the matter.

> Space activities should require authorization by a competent national authority; such authority or authorities, as well as the conditions and procedures for granting, modifying, suspending and revoking the authorization, should be set out clearly within the regulatory framework; States might employ specific procedures for the licensing and/or for the authorization of different kinds of space activities."[50]

These two citations together indicate that the United States must authorize and supervise the activities of commercial companies operating in space. If those activities include colonization, then legislation must appropriately supervise it.

The United States is bound by the OST, but if it becomes overly prohibitive to our ambitions, options are still available. In 2017, Senator Ted Cruz held hearings "to properly

determine our actual international obligations, decide if specific articles in the treaty are self-executing or not, and ensure that our domestic policy moving forward creates an environment that provides certainty for industry while protecting our national security."[51] Article XV of the OST establishes a process to amend the treaty.[52] Article XVI allows the United States to withdraw from the treaty with a one-year notice requirement.[53] However, withdrawing from the OST would likely carry significant risks. First, one could argue that if the United States withdrew from the OST, it would still constitute binding customary international law. This argument has its flaws since the treaty has a provision allowing countries to withdraw, but it still presents a real risk. A second risk is that competitors could withdraw as well. If competitors withdraw, the resulting international framework may not be as favorable to the United States. For the present, remaining party to the OST is in the best interest of the United States.

The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Treaty) also warrants brief discussion. This is important because the OST forbids a State from claiming a celestial body as sovereign territory, but the Moon Treaty attempted to take an even more restrictive stance on the subject.

> Neither the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person. The placement of personnel, space vehicles, equipment, facilities, stations and installations on or below the surface of the moon, including structures connected with its surface or subsurface, shall not create a right of ownership over the surface or the subsurface of the moon or any areas thereof."[54]

The Moon Treaty currently has 17 parties.[55] The United States is not a party to the treaty.[56] Therefore, the United States is not bound by conventional international law to follow its provisions. Conventional international law is defined as "the body of international legal principles contained in treaties."[57] The remaining question then is whether the Moon Treaty is

customary international law. Customary international law is defined as "international obligations arising from established state practice."[58] Quite simply, it "results from a general and consistent practice of states that they follow from a sense of legal obligation."[59] Gbenga Oduntan, a senior lecturer in International Law at the University of Kent in the United Kingdom claims that the Moon Treaty is customary international law in his criticism of the United States using domestic law to govern asteroid mining.[60] However, the position is untenable. Oduntan offers no evidence, or even an argument to support his conclusory claim. The facts are simple and not on Oduntan's side. No State that is a party to the treaty has ever successfully launched a human being into space.[61] In fact, many of the states that are a party to the treaty do not even have an active space program.[62] It is a significant logical leap to argue that this translates to a binding requirement under international law. If this were an accurate description of customary international law, then a small number of states could dictate the conduct of the rest of the world on any number of activities. This interpretation of international norms is not accurate. Therefore, there is no credible requirement for the United States to recognize the Moon Treaty as customary international law. The treaty is not binding on the United States. However, as other states may try to control a state's behavior through arguments similar to Oduntan's, the United States should be prepared to counter this position.

This argument also highlights why the United States must take the lead on this issue. The Moon Treaty signifies a sharp divide in the international community. It is an indicator that states that are less powerful in the domain will want to limit those that are more powerful.[63] This could limit the United States' ability to successfully negotiate a favorable treaty regarding space colonization. Because of this barrier, the United States must seek domestic legislation as another option. While the international community may criticize the United States pursuing domestic

legislation as opposed to a treaty, the action is justified under the OST. A simple response to criticism regarding domestic legislation on colonization is that the United States is fulfilling its responsibilities under the OST of authorizing and supervising commercial entities who choose to establish facilities on celestial bodies.

Commercial Space will be Competitive

The colonization of space will likely be a commercial venture, and the environment could be competitive. For example, asteroid mining is currently viewed as a lucrative space exploitation venture. Congress and President Obama reacted to this in 2015 by passing the U.S. Commercial Space Launch Competitiveness Act.[64] The law creates property rights in asteroid and space resources recovered by private entities.[65] However, international competition developed quickly, with Luxembourg passing their own law allowing for property rights to space resources.[66] While this is not directly related to colonization, there still is an important connection. If thousands of people are going to live and work in space, then there must be a monetary incentive to do so. Resource extraction could be that incentive. The author has previously written about a potential framework to establish an energy and propellant based economy in cis-lunar space.[67] Competition could emerge with the European Union and the People's Republic of China considering a "Moon Village."[68] As discussed above, it is important for the United States to take the lead on these issues to ensure that the environment is favorable to its interests. However, that does not necessarily mean that the United States should take unilateral action. As one expert observed, if commercial partners are working across the world, then there will be more money available for investment.[69] Scott Pace, the Executive Secretary for the National Space Council, echoed this when he stated that "prioritizing America's

interests means we will secure the benefits of space, not only for ourselves but for our friends and allies."[70]

The United States should influence the activities of commercial entities by how it spends money. For example, the United States invested $500 million in the Commercial Orbital Transportation Services (COTS) to supply the ISS, and received significant return on investment from two commercial partners.[71] One expert sees a similar model accelerating the colonization effort.[72] If the United States government is a customer of services, rather than the owner and operator, it can dictate what it sees as needs and buy, lease, or invest in the services that are available today.[73] If a service does not exist, then the government can form a partnership with a company to develop what is needed.[74]

This proposal is similar to the European Space Agency's vision for the Moon Village. Everyone would come together and bring their area of expertise to make the whole better than the sum of its parts.[75] For example, a company that specializes in solar power could provide the power to a habitat provided by Bigelow Aerospace, while another company provides the lunar lander that makes getting to the surface possible.[76] Dr. George Nield with the Federal Aviation Administration (FAA) coined the term Lunar Marketplace and Swap Shop (LMSS) to transform the current model of "I want to compete for this contract," to "what needs to happen and how can I contribute?"[77] Dr. Nield's idea can become a reality if the United States sets a vision, for example a colony on the lunar surface, and then makes a policy of purchasing different pieces of that colony from commercial partners. This framework could implement the vision of NASA's new administrator, Representative Jim Bridenstine. Representative Bridenstine believes "the U.S. government should play a part in developing the tools for lunar energy resource development, cis-lunar satellite servicing, and maintenance. The U.S. government must work to

retire risk, make the operations routine, and once again empower commercial companies."[78] A first step in this endeavor is to pursue laws and policies that meet its responsibility to authorize and supervise space activities and enable the settlement of space. When drafting these laws and policies, decision makers should be mindful of the Space Frontier Foundation's "Settlement Enabling Test" as a benchmark of effectiveness.[79] It also would enable the government to "incentivize private investment," which is advocated for by the Center for New American Security in their proposed Space Policy.[80]

Meeting the Responsibility to Authorize and Supervise Colonies

The OST places a responsibility on the United States to ensure that our commercial partners comply with the provisions of it. "States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in confirmative with the provisions set forth in the present treaty."[81] The OST requires that "authorization and continuing supervision."[82] The United States has already taken the first step towards meeting this responsibility. The Office of Commercial Space Transportation exists within the FAA. "The mission of the Office of Commercial Space Transportation is to ensure protection of the public, property, and the national security and foreign policy interests of the United States during commercial launch or reentry activities, and to encourage, facilitate, and promote U.S. commercial space transportation."[83] One potential solution to fulfill the United States' responsibilities under the OST is to convert the Office of Commercial Space Transportation to the Office of Commercial Space Activity to help regulate space colonization.

The United States does not have any laws or regulations authorizing or governing the establishment of commercial colonies. This is true, even though the FAA, Federal Communications Commission (FCC), and National Oceanic and Atmospheric Administration (NOAA) all license certain activities in space.[84] While the commercial sector has been pursuing the technology to enable colonization, no one has publicly proposed a framework. At this stage of development, it is difficult, if not impossible to cover every contingency. However, a simple, general framework would signal to commercial partners that the United States is going to support (and perhaps join them in) their aspirations. To do this, legislation should signal a lead agency, such as the Department of Transportation, to "encourage, facilitate, and promote commercial space habitats by the private sector." This language is borrowed from 51 USCS § 50903, which placed similar responsibilities on the Secretary of Transportation for Commercial Space Launches and reentry.[85] Furthermore, legislation should direct the Secretary of Transportation to promulgate necessary regulations to license the establishment and operations of commercial space habitats.

As the first commercial habitat set to launch within the next four years, a regulatory entity within the United States Government needs to consider basic rules. It appears as if the Department of Commerce is seeking a role in this.[86] However, the same article that discusses this suggests "the FAA would still likely oversee licensing for launch and spacecraft reentry."[87] While it does not directly discuss colonization, a similar distinction would be logical. The FAA should take the lead on regulating the technical aspects of a habitat, while the Department of Commerce would be responsible for everything else. If this plan is implemented, it is worth noting that the "budgets and personnel for both the FAA and [Department of] Commerce cannot handle this responsibility and would need significant overhaul."[88] If these agencies are involved,

the FAA should establish the minimum standards for what makes a habitat livable and what safety features are required, while the Department of Commerce handles other issues that may arise. This is a logical division, because based on the Cis-lunar 1,000 model, these habitats could be the hub for a large amount of goods and services such as propellant and resources from the lunar surface and asteroid mining. The initial steps of regulating commercial habitats may be accomplished with relative ease. However, it should be noted that if Congress agrees with this division of responsibility, the Department of Commerce will have to establish all of the processes for this role, because they do not currently have any.[89] Launch licenses today have both a policy and payload review.[90] When a commercial entity applies for a license, their plans are shared with the interagency community to see if any other agencies within the US government have concerns.[91] This same process could be applied to a colony or habitat. This would ensure that the United States is complying with its obligations under international law and assure companies that their investment will not be wasted.[92]

This framework should allow humanity to smoothly transition from the Earth's surface to having many people living and working in space. One expert believes that the framework should enhance the safety of space operations, meet our treaty obligations, and preserve the space environment.[93] This is of course in addition to ensuring that there is a system in place that handles all of the day to day tasks that a government provides for its citizens in a modern Western democracy.

Property Laws[94]

There is no legal framework in place to govern real estate on the surface of celestial bodies. As it was discussed above, the OST does not allow for claims of sovereignty; however, it does envision states occupying the surface of celestial bodies with facilities on the moon or

other celestial bodies. The OST does not establish how long a facility can be in place. The geography of the moon lends itself to some strategically valuable land. The "peaks of eternal light" at the North and South Poles of the Moon are ideal locations for initial colonies because of both the potential for those colonies to be powered by solar cells and their proximity to resources such as water on the lunar surface.[95] Seeking a different international framework is another option that is available. However, this option is untenable as it would likely be met with opposition from the parties to the Moon Treaty. Congress chose to seek a unilateral response to the gap in international law regarding property rights in space resources. As discussed above, another nation followed suit and passed comparable legislation.

The United States should adopt a similar, unilateral approach to space colonization. However, nuance is necessary. Since the United States cannot claim sovereignty over the moon, they cannot grant property rights to the land itself. However, the following language could accomplish a similar end: "A license granted to a U.S. citizen to construct a habitat on the surface of a celestial body shall be for the duration of the life of that facility, to include expansions. No domestic or international entity shall infringe on the exclusive operation of the facility. It is the sense of Congress that the United States does not, by enactment of this Act, assert sovereignty or sovereign or exclusive rights or jurisdiction over, or ownership of, any celestial body. However, Congress recognizes that the materials used to construct any such facility are the personal property of the U.S. Citizen engaged in the construction process, and as such the facility and its contents shall remain the personal property of that citizen."[96] This proposed legislation differs from the Space Pioneer Act proposed by Wayne White.[97] However, it accomplishes similar ends. This approach certainly has its risks. If other states enact similar legislation, then there could be a race to occupy the key real-estate on the lunar surface.

However, this would be no different than the status quo. Additionally, the international community may push back on such legislation. However, it can easily be argued that the United States is simply balancing its obligation to authorize and supervise space activities with its obligation to protect the significant economic investment in a habitat. While there may be opposition, this proposed legislation does not directly violate the OST. This is not drastically different to Dr. Athina Balta's empirical research presented to the United Nations Office of Outer Space Affairs suggesting that "initial recognition of space property rights should be made on the basis of a modified theory of first possession."[98] Dr. Balta's research also suggests that "at the initial stages of economic development celestial areas involving economic activities should be regulated by a licensing regime."[99] However, it is using domestic law to both ensure that this is accomplished in a manner favorable to the United States, and to properly authorize and supervise non-governmental activity. It is important to note that the United States is not alone in their aspirations to establish colonies.[100] If one of these aspiring nations were to oppose legislation of the United States, they would be hindering their own opportunities as well.

Other Civil Laws

Once a sizable number of people are living away from the surface of the Earth, there will be a need for a government. The OST complicates this as the United States likely cannot declare sovereignty over colonies established on a celestial body under Article II. This leaves a large potential gap in the law, similar to the civil law gap that exists on the seas. The American Bar Association highlighted the void in laws on the seas that are harmful to cruise passengers.[101] For example, an American family, sailing on a ship owned by a company based in Miami was forced to have their lawsuit heard in Italian courts under Italian laws, "because the cruise ship flies under the Italian flag, the trip began in Italy and, perhaps most important, the ticket stated that

any judicial matters would be heard in Italy."[102] Similarly, after the Deepwater Horizon oil spill, the *Seattle Times* reported, "The Deepwater Horizon oil rig that exploded in the Gulf of Mexico was built in South Korea. It was operated by a Swiss company under contract to a British oil firm. Primary responsibility for safety and other inspections rested not with the U.S. government but with the Republic of the Marshall Islands."[103] The article highlights how oil drillers forum shop when seeking a license.[104] As space colonization becomes a reality, laws must be established to ensure that US citizens and economic interests are protected. Rather than treating space as the new maritime legal domain, Congress should take more aggressive actions to prevent actors from forum shopping. A more aggressive approach will protect citizens that choose to live and work in space, and meet international law obligations under the OST.

The United States needs to find an appropriate balance. As the space economy grows, it is beneficial for that growth to flow into the American economy. However, at the same time it would be inappropriate to allow space habitats to be the wild west of the 21st century, just to ensure that corporations do not seek licenses in a country with less restrictions. Creativity can help in this regard. The United States is the economic leader in space. For example, in 2013, the United States had the largest space exploration budget in the world. The United States spent "over six times more than China" who came in second.[105] This is not even considering the United States' massive military budget in space. In 2014, this was an estimated additional $8 billion.[106] This economic power can be leveraged by tying space habitat licenses to civil and military space spending. If a company is in the space habitat business, then licensing their colonies through the United States is a requirement to obtain civil or military space contracts. For example, if a company involved in launch and colonization attempted to license their colony through a different country, then the United States would not purchase launch services from that

company. This would discourage States with small or non-existent space programs from enticing companies to license under their flag with promises of little to no regulation. The United States can also encourage seeking domestic licenses by making habitats serve dual purposes. If NASA wants to conduct research on the lunar surface, it would likely be more cost effective for the United States to partially fund a commercial habitat in exchange for use of the facilities.[107] Furthermore, habitats will have some level of dependence on the governments of Earth. The United States can leverage this need for support to make a license with the United States a sought-after commodity. The United States can provide supplies and support.[108] Smaller countries will not be able to compete with the level of economic investment that the United States makes in the space industry.

Additionally, existing law provides a framework that will further mitigate this risk. The Commercial Space Launch Act states "No United States citizen […] shall launch a launch vehicle or operate a launch site outside the United States, unless authorized by a license issued or transferred under this Act."[109] This also applies to launch sites outside of the United States and other foreign countries.[110] A citizen is defined as both people and business entities that are formed under the laws of the United States.[111] A similar law can be passed to ensure companies based in the United States do not attempt to get licensed by another country: No United States citizen shall operate a space-based habitat or colony, unless authorized by a license issued or transferred under this Act.

The United States not only needs to establish that its laws apply, but it also must establish civil laws for space colonies. If thousands of people become permanent or long-term residents on a space habitat, they must be governed. A large percentage of civil laws are handled at the state level. Two potential courses of actions are 1) adopting the civil laws of a state, or 2)

adopting new legislation that applies specifically to space colonies. The first course of action would likely be overly complicated. In addition to determining which state law applies to each habitat, it would also be necessary to determine if the state's law is even written in a way to extend its jurisdiction to space. Rather than hoping multiple state legislatures will adjust their laws, it is best to handle it once, at the federal level. However, there is a danger if the United States takes a condescending attitude towards the habitats and rules with too heavy of a hand.[112] The key is finding the appropriate balance between policies and legislation that make it an attractive partner in the space domain, while also protecting American lives and property in space.

The Federal Government already has experience at establishing law for an area that does not fall under any state's jurisdiction. In 1973, Congress passed the "District of Columbia Self Government and Governmental Reorganization Act."[113] It is important to note that the Constitution gives Congress the "ultimate legislative authority over" the District of Columbia.[114] However, it is fair to say that the framers did not contemplate governing habitats that were not on the surface of the Earth, consistent with the provisions of a treaty drafted almost 200 years after the Constitution was written. Even though the District of Columbia is not completely analogous to space habitats, it certainly can provide a sample in which to draft traditionally local and state level laws. For example, the statute includes "The District Charter," which establishes the local government of Washington DC.[115] The local government can make laws, subject to limitations by Congress.[116] Rather than adopting this as a model, legislators could view this as a sample.[117] The Act can be referenced to draft the basic framework, but then adjusted to meet the specific situation.

If Washington DC is used as a sample, legislation can be drafted to provide civil laws for those living in space. Washington DC is a good model not only because it is under the control of the Federal Government, but also because it is a populated city that requires many of the laws traditionally held at the state level. Following the framework of ULA and SpaceX, the number of people living in space will grow from a handful now to over a million in the future. As the number of residents grows, the legal needs will grow with it. It would not be feasible to the initial settlements to govern themselves. For example, if the first space habitats include only a handful of people each, the colonists would not have the experience or time to craft meaningful legislation. At the same time, it would be naïve to think that civil legal disputes would not arise. There is certainly a potential for contract dispute and tort cases as a bare minimum even with just a few dozen people living in commercial habitats in space. With such a small starting population, it would make the most sense to have significantly more congressional oversight when the colonies are in their infancy that would then transition to more self-governance as they grow.

Therefore, legislation should build in benchmarks. One suggestion is to have the level of independence based on "reasonable, common sense transitions," utilizing an "evolutionary step by step fashion."[118] The most logical way to do this would be based on population. Under this model, the initial lawmaking authority should rest with Congress to pass the day-to-day civil laws to govern all habitats and colonies licensed by the United States. The District of Columbia currently has 51 Titles in their official code.[119] Many, but not all of these would be useful to the day-to-day governance of a city. Therefore, Congress could use the District of Columbia Official Code as a guide in determining what kinds of laws need to be passed. They can be tailored as appropriate for the situation. Once a colony or group of affiliated colonies reaches a

population milestone, then the law should allow them to have a larger say in their governance. For example, once the colonies on the lunar surface reach a population of 50,000 residents, Congress will "delegate certain legislative powers to the local government."[120] This proposal is not entirely unique. Former Speaker of the House, Newt Ginrich, authored a bill that would have allowed a colony on the moon to apply to become a state once it passed the milestone of 13,000 residents.[121] While statehood would violate the OST, some form of governance is important. Even without the Constitutional requirement that exists in Washington DC, it is best for Congress to maintain some authority over the laws of colonies, to ensure that they do not become company ruled towns. It will also ensure that the United States is meeting its requirement under the OST to supervise its habitats. This model also recognizes that appropriate legislation may vary based on the community.

A colony or group of colonies on the lunar surface may have different legislative needs than a community on the surface of Mars. Bringing space colonies under the umbrella of Federal Law has an additional benefit. The United States has a robust court system for solving disputes. This will save the effort of establishing an entirely new court system. A criticism of this idea is that the federal court system already has a robust docket. In 2015, the *ABA Journal* reported federal courts had a civil case docket backlog of over 300,000 cases.[122] However, as the initial population of space colonies will likely be small, this will likely not have a meaningful effect on the number of cases being filed in federal court. As the population grows, the court system can grow with it. If the caseload grows enough, a new district can be established for space colonies. This is more cost effective than establishing a new court before the need truly exists. Therefore, Congress should pursue legislation that places space colonies and their potential legal issues within the jurisdiction of an existing federal district court. Centralizing these Courts has an

additional benefit. It is not difficult to imagine that unique legal issues will begin arising in space law disputes. Centralizing their cases in one district will allow for the judges to gain an expertise in the area that might not happen if these cases were scattered across the country.

Criminal Laws

As the number of people living and working in space grows, so does the likelihood that crimes will occur. Therefore, a legal framework must be developed to both deter crime, and to prosecute crimes that occur on space colonies. As the Outer Space Treaty does not allow the United States to claim sovereignty over a celestial body, another solution will be necessary. Congress has provided us a partial solution to the problem. The Special Maritime and Territorial Jurisdiction of the United States includes spacecraft.

> Any vehicle used or designed for flight or navigation in space and on the registry of the United States pursuant to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies and the Convention on Registration of Objects Launched into Outer Space, while that vehicle is in flight, which is from the moment when all external doors are closed on Earth following embarkation until the moment when one such door is opened on Earth for disembarkation or in the case of a forced landing, until the competent authorities take over the responsibility for the vehicle and for persons and property aboard.[123]

A close reading of the statute reveals a flaw as this relates to space colonization. A permanent or semi-permanent settlement would likely not qualify for protection as it is not a vehicle used or designed for flight or navigation in space. The law also covers "any place outside the jurisdiction of any nation with respect to an offense by or against a national of the United States."[124] Once again, this is a reasonable start; however, gaps exist. For example, a company based in the United States could establish a colony on the lunar surface with several thousand residents. Some of those residents may not be United States citizens. If that were the case,

federal law would provide a half measure of protection. If the perpetrator and victim of the crime were both foreign nationals, then the United States would not have jurisdiction to enforce our laws on the colony. This is a half measure because ensuring law and order on habitats licensed by the United States is important. If someone chooses to live in a habitat licensed by the United States, then the United States should have jurisdiction over how to handle misconduct committed by that person.

The United States has a more robust jurisdiction statute concerning civilians who are overseas with the military. The Military Extraterritorial Jurisdiction Act of 2000 (MEJA) created a more comprehensive jurisdiction law for the relatively large number of people that are living overseas due to their association with the armed forces. The relevant portion of the law states,

> Whoever engages in conduct outside the United States that would constitute an offense punishable by imprisonment for more than 1 year if the conduct had been engaged in within the special maritime and territorial jurisdiction of the United States--
>
> (1) while employed by or accompanying the Armed Forces outside the United States; or
> (2) while a member of the Armed Forces subject to … (the Uniform Code of Military Justice), shall be punished as provided for that offense.[125]

This law was created "to establish Federal jurisdiction over offenses committed outside the United States by persons employed by or accompanying the Armed Forces, or by members of the Armed Forces who are released or separated from active duty prior to being identified and prosecuted for the commission of such offenses, and for other purposes."[126] This law provides a good guideline, yet an incomplete framework for establishing jurisdiction in space colonies. Specifically, the law is written to only handle felony level crimes, based on the language that the offense must be punishable by imprisonment for more than one year. However, the law was written to ensure that the United States criminal code could be applied to civilians that are living or working overseas to accompany the armed forces (Department of Defense civilian employees,

contractors, and dependents). As such, it is a significant improvement over the standard Special Maritime and Territorial Jurisdiction of the United States. Furthermore, courts in the United States have viewed the law favorably. It was used to successfully prosecute a foreign national employed in Afghanistan.[127] A Federal Court also found that it complies with international law.[128] Therefore, with some adjustments, it can serve as a model for applying criminal jurisdiction to space colonies. Based on the language of MEJA, a recommended statute is:

> (a) Whoever engages in conduct within space colonies licensed by the United States that would constitute an offense if the conduct had been engaged in within the special maritime and territorial jurisdiction of the United States shall be punished for that offense.
> (b) A space colony is designed as a permanent or semi-permanent habitat that is located above the surface of the Earth. This includes, but is not limited to:
> (1) habitats in Earth orbit;
> (2) habitats in the orbit of the Moon, Mars, or any other celestial body; and
> (3) habitats on the surface of the Moon, Mars, or any other celestial body.
> (c) It is the sense of Congress that the United States does not, by enactment of this Act, assert sovereignty or sovereign or exclusive rights or jurisdiction over, or ownership of, any celestial body.

This proposed statute will accomplish two things. First, it will ensure that federal criminal law is applicable to any person who travels to a colony licensed by the United States. It does not limit the jurisdiction to felony level offenses, making it a more comprehensive statute. Additionally, it leaves room for expansion. A large volume of criminal law is handled at the state level. This is true in terms of both statutes and case volume. For example, the Manhattan County District Attorney's Office handled 80,000 cases in 2016.[129] This is staggering when compared to the fact that United States Federal District Courts only handled approximately 94,000 defendants, nationwide in 2012.[130] However, it highlights that a majority of criminal law cases are at the state level and involve violations of state law. As the population of people living in space grows, current federal criminal law may not be enough to adequately protect colonists. The solution to this problem was addressed earlier in this paper. If the United States chooses to

adopt a Washington DC model to governing space habitats, then criminal laws can be passed in a similar manner as civil laws. Once again, using an existing federal district court to handle cases involving these laws will provide uniformity to how the colonies are governed. This is certainly an easier solution than asking the colonies to self-govern in the early stages, which would likely be overburdening to the citizens.

Protecting Space Colonies

International Law limits the United States' options when it comes to protecting colonies on the surface of celestial bodies. As discussed above, military bases cannot be established on the surface of a celestial body. However, many of the missions that are necessary to protect a colony could be handled by an agency similar to the U.S. Coast Guard. It should be noted that the Coast Guard normally falls under the Department of Homeland Security, not the Department of Defense.[131] An agency in space conducting the Coast Guard's law enforcement mission would not violate the OST. As to the best way to establish a Space Force similar to the Coast Guard in space, two colleagues have written extensively on the subject.[132] However, this still warrants brief discussion.

A Coast Guard-like entity in space could also be leveraged to ensure that commercial companies will align their colonization efforts with the United States. Luxemburg's initiative in space mining legislation raises an interesting issue: countries that are not considered space powers may attempt to lure space-based companies to align their interests. It cannot be forgotten that private industry's interests will not always directly align with the United States. Furthermore, the United States can counter this risk by expanding on its current space power. If the United States expands its efforts in space to include a Coast Guard-like entity, it will be able to provide services that other countries simply do not have the economic capabilities to match.

Having the capability to conduct search and rescue operations and other missions to protect United States commercial interests if space becomes a more contested domain will likely make the United States a more attractive option than a small upstart space industry.

This organization would also be tasked with enforcing criminal laws on these colonies. Having a vigorous legal framework is meaningless without an enforcement mechanism. The U.S. Coast Guard has a law enforcement mission. Modeling a space force on the Coast Guard model could bring the law enforcement aspect with it.

Conclusion

Space colonization will be the next major human endeavor. The commercial sector in the United States is pushing to make large scale human space habitat a reality within a generation. However, domestic and international law are lagging behind the aspirations of corporate entities leaving an undefined gap. The OST establishes the most basic of frameworks for establishing colonies but leaves more questions than answers.

The United States has two options: pursue a more complete international law framework, or pursue domestic laws and policies to enable space colonization. The latter is the more preferable of the two options as it is the only way to guarantee that the United States' best interests are protected. If the United States pursues the international option, it may face opposition by proponents of policies like the Moon Treaty that will significantly hinder expansion into space.

Congress should pursue legislation and policy that strikes a balance between empowering commercial companies to push further into space, while protecting citizens and their property that decide to live and work in space. The best approach to this is by issuing licenses that establish the physical structure of the colony as the personal property of its owner. This will

allow for ownership of the colony without claiming sovereignty over the land that it sits on. Next, the United States should pursue civil and criminal laws that appropriate govern and protect anyone who chooses to live and work away from the surface of the Earth. The more proactive approach that the United States takes, the more favorable of an environment it will create for American interests, such as economic investment in space resources and the commerce that will result. Humans living and working in space is the future of mankind. It is in the best interest of the United States to take the lead in this endeavor.

---

[1] I would like to thank Ms. Christina Gesl, and Majors Dustin Grant and Matt Neil for their thoughtful comments and suggestions. All errors found herein are my own.
[2] Andy Weir, *Artemis* (New York, NY: Penguin Random House, 2017), 24.
[3] Ibid., 24-26.
[4] Ibid., 26.
[5] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, January 27, 1967, 610 U.N.T.S. 205, art. 6.
[6] Major Paul M. Gesl, "Cis-Lunar Exploitation: A New Assessment of the Ambitions of the United States and the People's Republic of China" (Research Report Submitted to the Faculty in Partial Fulfillment of the Graduation Requirements for the Degree of Master of Military Operational Arts and Sciences, 2017), 1.
[7] National Space Society, "Space Settlement Nexus," National Space Society, accessed 23 April 2018, http://www.nss.org/settlement/.
[8] National Aeronautics and Space Administration, "Pioneering Space National Summit 2015," National Aeronautics and Space Administration, accessed 23 April 2018, https://www.nasa.gov/content/pioneering-space-national-summit-2015/.
[9] Jeff Foust, "Proposed Legislation Would Make Space Settlement a National Goal," *Space News*, 1 May 2015, http://spacenews.com/proposed-legislation-would-make-space-settlement-a-national-goal/.
[10] Jeffrey Kluger, "Can Elon Musk Really Colonize Mars?" *Time*, 27 September 2016, http://time.com/4510613/elon-musk-mars-colonize/.
[11] Kate Samuelson, "Elon Musk Just Revealed More About His Plan to Colonize Mars," *Time*, 29 September 2017, http://time.com/4962416/elon-musk-plan-colonize-mars-2024/.
[12] Kluger, "Can Elon Musk Really Colonize Mars?"
[13] Michelle Castillo, "Elon Musk, speaking at SXSW, projects Mars spaceship will be ready for short trips by first half of 2019," *CNBC*, 11 March 2018, https://www.cnbc.com/2018/03/11/elon-musk-says-mars-spaceship-will-be-ready-for-short-trips-by-first-half-of-2019.html.
[14] Ibid.
[15] Elon Musk, "Making Life Multi-Planetary," *New Space* Vol. 6, No. 1 (2018), https://www.liebertpub.com/doi/10.1089/space.2018.29013.emu.
[16] Tariq Malik, "Elon Musk Teases Images of SpaceX 'Moon Base Alpha' and 'Mars City,'" *Space.com*, 28 September 2017, https://www.space.com/38310-elon-musk-moon-base-mars-city-images.html.
[17] United Launch Alliance, "Transportation Enabling a Robust Cislunar Space Economy," *ulalaunch.com*, 9 April 2016, http://www.ulalaunch.com/uploads/docs/Published_Papers/Commercial_Space/2016_Cislunar.pdf.
[18] "U.S. and World Population Clock," United States Census Bureau, accessed 10 January 2018, https://www.census.gov/popclock/.
[19] Rachel Revesv, "Earth Overshoot Day: Mankind has already consumed more natural resources than the planet can renew throughout 2017," *Independent*, 2 August 2017, http://www.independent.co.uk/news/science/earth-overshoot-day-2-august-2017-year-planet-natural-resources-clean-water-soil-air-pollution-wwf-a7872086.html.
[20] Malavika Vyawahare, "Can the Planet Support 11 Billion People?" *Scientific American*,

[21] Sarah Knapton, "Human race is doomed if we do not colonise the Moon and Mars, says Stephen Hawking," *Telegraph*, 20 June 2017, http://www.telegraph.co.uk/science/2017/06/20/human-race-doomed-do-not-colonise-moon-mars-says-stephen-hawking/.
[22] Ibid.
[23] National Space Society, "NSS Statement of Philosophy," National Space Society, accessed 23 April 2018, http://www.nss.org/about/philosophy.html.
[24] The Space Frontier Foundation, "Why Space Settlement," The Space Frontier Foundation, accessed 23 April 2018, http://archive.spacefrontier.org/Projects/SpaceSettlement/whyspacesettlement.html; National Space Society, "Space Settlement Nexus."
[25] United Launch Alliance, "Bigelow Aeorpsace and United Launch Alliance Announce Agreement to Place a B330 Habitat in Low Lunar Orbit,"*ulalaunch.com*, 17 October 2017, https://www.ulalaunch.com/about/news/2017/10/17/bigelow-aerospace-and-united-launch-alliance-announce-agreement-to-place-a-b330-habitat-in-low-lunar-orbit.
[26] Ibid.
[27] Dr. George Nield (Associate Administrator for Commercial Space Transportation, Federal Aviation Administration), discussion the author, 7 March 2018.
[28] Ibid.
[29] Ibid.
[30] Ibid.
[31] Ibid.
[32] Ibid.
[33] Ibid.
[34] Ibid.
[35] Based partially on Ibid.
[36] Vice President Mike Pence (remarks, National Space Council Meeting, Chantilly, VA, 5 October 2017).
[37] Ibid.
[38] Ibid.
[39] Ibid.
[40] Ibid.
[41] Ibid.
[42] Ibid.
[43] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, art. 6.
[44] Ibid., art. 2.
[45] Caroline Haskins, "The Legal Battle to Colonize Mars: International rules to protect outer space may not be enough to stop the United States," *theoutline.com*, 15 March 2018, https://theoutline.com/post/3739/mars-colony-settlement-spacex-elon-musk-trump?zd=1&zi=iwgahlwy.
[46] Ibid.
[47] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, art. 4.
[48] Ibid., art. 10.
[49] Ibid., art. 6.
[50] G.A. Res. 68/74, 68, U.N. Doc. A/RES/68/74 (December 16, 2013)
[51] Senator Ted Cruz, "Reopening the American Frontier: Exploring How the Outer Space Treaty Will Impact American Commerce and Settlement in Space," (opening remarks in Senate Hearing, Commerce, Science, and Transportation Subcommittee, Washington, D.C., 23 May 2017).
[52] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, art. 15.
[53] Ibid., art. 16.
[54] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, art. 11, paragraph 3, December 5, 1979, 1363 U.N.T.S. 21.
[55] "Agreement Governing the Activities of States on the Moon and Other Celestial Bodies: Status of the Treaty," United Nations Office for Disarmament Affairs, accessed 10 January 2018, http://disarmament.un.org/treaties/t/moon.
[56] Ibid.

[57] *Cornell Law School Legal Information Institute Wex*, s.v. "Conventional International Law," accessed 16 April 2018, https://www.law.cornell.edu/wex/conventional_international_law.
[58] *Cornell Law School Legal Information Institute Wex*, s.v. "Customary International Law," accessed 16 April 2018, https://www.law.cornell.edu/wex/Customary_international_law.
[59] Ibid.
[60] Gbenga Oduntan, "Who owns space? US asteroid-mining act is dangerous and potentially illegal," *The Conversation*, 25 November 2016, https://theconversation.com/who-owns-space-us-asteroid-mining-act-is-dangerous-and-potentially-illegal-51073.
[61] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies.
[62] Ibid.
[63] The idea to address this is based on an off the record conversation with an industry expert.
[64] U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90 (2015).
[65] Ibid.
[66] "Space Resources: Commercial Uses," The Government of the Grand Duchy of Luxembourg, 26 July 2017, http://www.spaceresources.public.lu/en/commercial-uses.html.
[67] Gesl, "Cis-Lunar Exploitation," 10-13.
[68] Matthew Brown, "A human outpost on the moon? China considering lunar base as launch pad for future missions," *Chicago Tribune*, 26 April 2017, http://www.chicagotribune.com/news/nationworld/science/ct-china-moon-outpost-20170426-story.html.
[69] Nield, discussion.
[70] Scott Pace, Executive Secretary, National Space Council, "Space Development, Law and Values," (Lunch Keynote, IISL Galloway Space Law Symposium, Washington, D.C., 13 December 2017).
[71] Ibid.
[72] Ibid.
[73] Ibid.
[74] Ibid.
[75] Ibid.
[76] Ibid.
[77] Ibid.
[78] Representative Jim Bridenstine, "This is Our Sputnik Moment & The Moon Will Ensure U.S. Preeminence in Space," (speech, Universitites Space Research Association, Columbia, MD, 7 November 2016).
[79] The Space Frontier Foundation, "Settlement Enabling Test," The Space Frontier Foundation, accessed 23 April 2018, https://spacefrontier.org/settlement-enabling-test/.
[80] Jerry Hendrix and Adam Routh, "A Space Policy for the Trump Administration," *Center for New American Security*, October 2017, https://s3.amazonaws.com/files.cnas.org/documents/CNASReport-SpacePolicy-Final5.pdf?mtime=20171023151800.
[81] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, art. 6.
[82] Ibid.
[83] United States Department of Transportation, "Office of Commercial Space Transportation," Federal Aviation Administration, accessed 7 February 2018, https://www.faa.gov/about/office_org/headquarters_offices/ast/.
[84] Nield, discussion.
[85] 51 USCS § 50903 (2010).
[86] Loren Grush, "How the Trump administration wants to make it easier for commercial space companies to do business," *The Verge*, 23 February 2018, https://www.theverge.com/2018/2/23/17035436/national-space-council-regulatory-reform-industry-mike-pence.
[87] Ibid.
[88] I would like to specifically thank Major Matt Neil for noting that both agencies would need to be overhauled to implement this plan.
[89] Nield, discussion.
[90] Ibid.
[91] Ibid.
[92] Ibid.
[93] Ibid.
[94] The idea to address this area of the law is based on an off the record conversation with an industry expert.

[95] Dennis Wingo, *Moonrush*: *Improving Life on Earth with the Moon's Resources*, (Burlington, ON: Apogee Books), 247-249.
[96] Modeled on the language of the Space Resource Exploration and Utilization Act of 2015.
[97] Wayne White, "The Space Pioneer Act," *The Space Review*, 27 October 2014, http://www.thespacereview.com/article/2627/1.
[98] Dr. Athina Balta, "Space Property Rights: The Winds of Change," (presentation to the UN Office of Outer Space Affairs High Level Forum, Dubai, United Arab Emirates, 2016).
[99] Ibid.
[100] Andrew Griffin, "China and Europe to build a base on the moon and launch other projects into space: If space is to be explored peacefully it will require 'international collaboration', a spokesperson for the European Space Agency said," *Independent*, 26 April 2017, https://www.independent.co.uk/news/science/moon-base-outpost-china-europe-chinese-space-agency-collaboration-together-a7702936.html#commentsDiv.
[101] Siobhan Morrissey, "For vacationers encountering trouble on cruise ships, U.S. laws may provide little help," *ABA Journal*, November 2013, http://www.abajournal.com/magazine/article/for_vacationers_encountering_trouble_on_cruise_ships_u.s._laws.
[102] Ibid.
[103] Tom Hamburger and Kim Geiger, "Offshore oil rigs are out of U.S. government's reach," *Seattle Times*, 15 June 2010, https://www.seattletimes.com/nation-world/offshore-oil-rigs-are-out-of-us-governments-reach/.
[104] Ibid.
[105] Emma Luxton, "These Countries Spend the Most on Exploring Outer Space," *Business Insider*, 11 January 2016, http://www.businessinsider.com/countries-that-spend-the-most-on-space-exploration-2016-1.
[106] Debra Werner, "US Military Space Spending Set at $8 Billion for 2014," *Space.com*, 17 April 2013, https://www.space.com/20702-united-states-military-space-budget-2014.html.
[107] Gesl, "Cis-Lunar Exploitation," 12.
[108] Nield, discussion.
[109] Commercial Space Launch Act, Pub. L. No. 98-575 § 6(a)(2) (1984).
[110] Ibid., § 6(a)(3).
[111] Ibid., § 4(11).
[112] Nield, discussion.
[113] District of Columbia Self-Government and Governmental Re-organization Act, Pub. L. No. 93-198, Title I § 101 (1973)
[114] Ibid., Title I, § 102.
[115] Ibid., Title IV.
[116] Ibid., Title III, § 302.
[117] I would like to specifically thank Major Dustin Grant for proposing this as a potential framework.
[118] Nield, discussion.
[119] District of Columbia Official Code.
[120] Pub. L. No. 93-198, Preamble.
[121] UPI.com, "Gingrich: Make the moon the 51st state," *UPI.com*, 26 January 2012, https://www.upi.com/Science_News/Technology/2012/01/26/Gingrich-Make-the-moon-the-51st-state/UPI-46191327620611/#ixzz1kgNGZV9P.
[122] Martha Neil, "US Courts: Federal litigants face record civil-case backlog due to shortage of judges," *ABA Journal*, 6 April 2015, http://www.abajournal.com/news/article/us_courts_federal_litigants_face_record_civil_case_backlog_due_to_shortage.
[123] Special Maritime and Territorial Jurisdiction of the United States Defined, 18 U.S.C. § 7(6) (2001).
[124] 18 U.S.C. § 7(7).
[125] Criminal Offenses Committed by Certain Members of the Armed Forces and by persons Employed by or Accompanying the Armed Forces Outside the United States, 18 USCS § 3261(a) (2000).
[126] Military and Extraterritorial Jurisdiction Act of 1999, Pub. L. No. 106-523 (2000).
[127] *See United States v. Brehm*, 691 F.3d 547 (4th Cir., 2012).
[128] *See United States v. Williams*, 722 F. Supp. 2d 1313 (M.D. GA, Valdosta Davison, 2010).
[129] Office of New York County District Attorney, Cyrus R. Vance, Jr., 2016 Annual Report, (New York, NY: Office of New York County District Attorney), https://www.manhattanda.org/wp-content/uploads/2018/02/2016-Annual-Report.pdf, 5.

[130] United States Courts, "U.S. District Courts-Judicial Business 2012," *USCourts.gov*, http://www.uscourts.gov/statistics-reports/us-district-courts-judicial-business-2012.
[131] Homeland Security Act of 2002, Pub. L. No. 107-296, § 888 (2002).
[132] Majors Dustin Grant and Matthew Neil, "The Case For Space: A Legislative Framework for an Independent United States Space Force, (Research Report Submitted to the Faculty in Partial Fulfillment of the Graduation Requirements for the Degree of Master of Military Operational Arts and Sciences, 2018).