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### Advantage 1: Space Debris

#### Increasing space debris levels inevitably set off a chain of collisions.

Chelsea MuñOz-Patchen, 19 - ("Regulating the Space Commons: Treating Space Debris as Abandoned Property in Violation of the Outer Space Treaty," University of Chicago, 2019, 12-6-2021, https://cjil.uchicago.edu/publication/regulating-space-commons-treating-space-debris-abandoned-property-violation-outer-space)//AW

Debris poses a threat to functioning space objects and astronauts in space, and may cause damage to the earth’s surface upon re-entry.29 Much of the small debris cannot be tracked due to its size and the velocity at which it travels, making it impossible to anticipate and maneuver to avoid collisions.30 To remain in orbit, debris must travel at speeds of up to 17,500 miles per hour.31 At this speed even very small pieces of debris can cause serious damage, threatening a spacecraft and causing expensive damage.32 There are millions of these very small pieces, and thousands of larger ones.33 The small-to-medium pieces of debris “continuously shed fragments like lens caps, booster upper stages, nuts, bolts, paint chips, motor sprays of aluminum particles, glass splinters, waste water, and bits of foil,” and may stay in orbit for decades or even centuries, posing an ongoing risk.34 Debris ten centimeters or larger in diameter creates the likelihood of complete destruction for any functioning satellite with which it collides.35 Large nonfunctional objects remaining in orbit are a collision threat, capable of creating huge amounts of space debris and taking up otherwise useful orbit space.36 This issue is of growing importance as more nations and companies gain the ability to launch satellites and other objects into space.37 From February 2009 through the end of 2010, more than thirty-two collision-avoidance maneuvers were reportedly used to avoid debris by various space agencies and satellite companies, and as of March 2012, the crew of the International Space Station (ISS) had to take shelter three times due to close calls with passing debris.38 These maneuvers require costly fuel usage and place a strain on astronauts.39 Furthermore, the launches of some spacecraft have “been delayed because of the presence of space debris in the planned flight paths.”40 In 2011, Euroconsult, a satellite consultant, projected that there would be “a 51% increase in satellites launched in the next decade over the number launched in the past decade.”41 In addition to satellites, the rise of commercial space tourism will also increase the number of objects launched into space and thus the amount of debris.42 The more objects are sent into space, and the more collisions create cascades of debris, the greater the risk of damage to vital satellites and other devices relied on for “weather forecasting, telecommunications, commerce, and national security.”43 The Space Debris Mitigation Guidelines44 were created by UNCOPUOS with input from the IADC and adopted in 2007.45 The guidelines were developed to address the problem of space debris and were intended to “increase mutual understanding on acceptable activities in space.”46 These guidelines are nonbinding but suggest best practices to implement at the national level when planning for a launch. Many nations have adopted the guidelines to some degree, and some have gone beyond what the guidelines suggest.47 While the guidelines do not address existing debris, they do much to prevent the creation of new debris. The Kessler Syndrome is the biggest concern with space debris. The Kessler Syndrome is a cascade created when debris hits a space object, creating new debris and setting off a chain reaction of collisions that eventually closes off entire orbits.48 The concern is that this cascade will occur when a tipping point is reached at which the natural removal rate cannot keep up with the amount of new debris added.49 At this point a collision could set off a cascade destroying all space objects within the orbit.50 In 2011, The National Research Council predicted that the Kessler Syndrome could happen within ten to twenty years.51 Donald J. Kessler, the astrophysicist and NASA scientist who theorized the Kessler Syndrome in 1978, believes this cascade may be a century away, meaning that there is still time to develop a solution.52

#### Space debris is appropriation – permanently occupies and precludes free use. Requires regulation.

De Man 19 [Philip De Man, *Exclusive Use in an Inclusive Environment: The Meaning of the Non-Appropriation Principle for Space Resource Exploitatio*n, Springer (2019)] CT

It is only when a state refuses to remove a space object whose non-functional status is objectively established, that the exercise of the freedom to use outer space by other states is denied on the basis of an act or negligence that originates from a discretionary exercise of positive authority by a single state not grounded in the actual exercise of its own freedom to explore or use outer space. From this perspective, it is rather diffi cult, if not impossible, to distinguish the refusal to remove nonfunctional satellites at the end of their life from an infringement of Article II OST . Every activity in space entails an exclusion of others. 387 Only when this exclusion is enforced in the absence of justification by the enjoyment of the freedom to explore and use outer space does the denial of the correlative freedom of others amount to an unlawful form of appropriation. For, without use, the justifi cation of exclusivity can only be found in the primordial authority as arrogated by the owner to himself, on this same basis. Though they constitute a minority, a number of authors have construed the refusal to remove inactive satellites as a violation of the principles of the UN space treaties as well. As such, Williams has noted that it is to be wondered whether inactive satellites are complying with the requirements of Article I of the 1967 Space Treaty, particularly the « benefi t and interest of all countries» and «freedom of scientifi c investigation». It is submitted that, on these grounds, inactive satellites using up orbital positions, particularly in the GEO, are open to question. 388 While the author primarily analyses the problem from the perspective of Article I OST , Sterns and Tennen rightly contend that the refusal to remove a derelict craft from orbit is the functional equivalent of appropriation of outer space, prohibited by Article II of the Outer Space Treaty. […] Similarly, a nonfunctioning satellite remaining in orbit for an extended period of time could be considered as equivalent to a place-saving object. 389 Combining the fi nality of Articles I and II OST , Fernández-Brital suggests that the placement of non-functional artificial objects in space constitutes a form of appropriation, as it occupies a position that would otherwise be free for the use of others. Though the language is wanting for linguistic accuracy, the author’s observation demonstrates considerable legal perspicacity: [a]s it is a physical truth that two objects [cannot occupy] the same place at the same [time,] when somebody leaves a debris [ sic ] in outer space, [he] is performing the appropriation of the place occupied by the same [, which is] an [action] forbidden by the [Outer Space] Treaty as it is [known]. […] The Treaty allows the «use» of outer space. Placing or leaving rubbish in outer space is not using it in accordance with the Treaty, it is against the rules. 390 Considering the unlawful nature of the act of keeping a non-functional satellite in space to be established, Christol then proposes that due consideration would have to be given to the situation where a non-functional space object was occupying an orbital position of great value for telecommunication or factgathering purposes. The presence of such a space object in orbit does not serve the interests of anyone. Thus, legal and practical means must be devised imposing a legal duty on the launching authority to remove or have removed, if it does not have the capabilities, such an object from orbit. The station-keeping procedures which allow it to remain in a preferred orbital position must be employed to put it into a non-utilitarian [ sic ] and non-interfering orbit. 391 Such a legal obligation already exists, however. As such, a number of authors have argued that, if Article VIII OST should not yield to the powers of other states to remove the disused space object , the failure to remove such an object or to disown it should be construed as a fault or negligent action, or should at least trigger a presumption to this effect. 392 As to the international obligation that has been violated, it has been suggested that the failure to respect the UN space debris guidelines may serve as a point of reference to determine whether a state has exercised due diligence in launching and operating a space object in the sense of Article IX OST . 393 As the statements of the authors cited above have made clear, however, there is no need to rely on indirect indications derived from a set of unenforceable guidelines to suggest a violation of a binding principle of the Outer Space Treaty. For, by virtue of the failure to fulfi l the conditions of the ITU regulations to acquire the protected use of a particular orbital position, the active refusal to remove a disused space object from its occupied position, considering the conditionality of the right not to be interfered upon actual operation, constitutes a violation of the letter and spirit of the legal system established by Article II jo. Article I OST .

#### Collisions make orbit unusable, causing nuclear war, mass starvation, and economic destruction.

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Whatever the initial cause, the result may be the same. A satellite destroyed in orbit will break apart into thousands of pieces, each traveling at over 8 km/sec. This virtual shotgun blast, with pellets traveling 20 times faster than a bullet, will quickly spread out, with each pellet now following its own orbit around the Earth. With over 300,000 other pieces of junk already there, the tipping point is crossed and a runaway series of collisions begins. A few orbits later, two of the new debris pieces strike other satellites, causing them to explode into thousands more pieces of debris. The rate of collisions increases, now with more spacecraft being destroyed. Called the "Kessler Effect", after the NASA scientist who first warned of its dangers, these debris objects, now numbering in the millions, cascade around the Earth, destroying every satellite in low Earth orbit. Without an atmosphere to slow them down, thus allowing debris pieces to bum up, most debris (perhaps numbering in the millions) will remain in space for hundreds or thousands of years. Any new satellite will be threatened by destruction as soon as it enters space, effectively rendering many Earth orbits unusable. But what about us on the ground? How will this affect us? Imagine a world that suddenly loses all of its space technology. If you are like most people, then you would probably have a few fleeting thoughts about the Apollo-era missions to the Moon, perhaps a vision of the Space Shuttle launching astronauts into space for a visit to the International Space Station (ISS), or you might fondly recall the "wow" images taken by the orbiting Hubble Space Telescope. In short, you would know that things important to science would be lost, but you would likely not assume that their loss would have any impact on your daily life. Now imagine a world that suddenly loses network and cable television, accurate weather forecasts, Global Positioning System (GPS) navigation, some cellular phone networks, on-time delivery of food and medical supplies via truck and train to stores and hospitals in virtually every community in America, as well as science useful in monitoring such things as climate change and agricultural sustainability. Add to this the [disabling] ~~crippling~~ of the US military who now depend upon spy satellites, space-based communications systems, and GPS to know where their troops and supplies are located at all times and anywhere in the world. The result is a nightmarish world, one step away from nuclear war, economic disaster, and potential mass starvation. This is the world in which we are now perilously close to living. Space satellites now touch our lives in many ways. And, unfortunately, these satellites are extremely vulnerable to risks arising from a half-century of carelessness regarding protecting the space environment around the Earth as well as from potential adversaries such as China, North Korea, and Iran. No government policy has put us at risk. It has not been the result of a conspiracy. No, we are dependent upon them simply because they offer capabilities that are simply unavailable any other way. Individuals, corporations, and governments found ways to use the unique environment of space to provide services, make money, and better defend the country. In fact, only a few space visionaries and futurists could have foreseen where the advent of rocketry and space technology would take us a mere 50 years since those first satellites orbited the Earth. It was the slow progression of capability followed by dependence that puts us at risk. The exploration and use of space began in 1957 with the launch of Sputnik 1 by the Soviet Union. The United States soon followed with Explorer 1. Since then, the nations of the world have launched over 8,000 spacecraft. Of these, several hundred are still providing information and services to the global economy and the world's governments. Over time, nations, corporations, and individuals have grown accustomed to the services these spacecraft provide and many are dependent upon them. Commercial aviation, shipping, emergency services, vehicle fleet tracking, financial transactions, and agriculture are areas of the economy that are increasingly reliant on space. Telestar 1, launched into space in the year of my birth, 1962, relayed the world's first live transatlantic news feed and showed that space satellites can be used to relay television signals, telephone calls, and data. The modern telecommunications age was born. We've come a long way since Telstar; most television networks now distribute most, if not ali, of their programming via satellite. Cable television signals are received by local providers from satellite relays before being sent to our homes and businesses using cables. With 65% of US households relying on cable television and a growing percentage using satellite dishes to receive signals from direct-to-home satellite television providers, a large number of people would be cut off from vital information in an emergency should these satellites be destroyed. And communications satellites relay more than television signals. They serve as hosts to corporate video conferences and convey business, banking, and other commercial information to and from all areas of the planet. The first successful weather satellite was TIROS. Launched in 1960, TIROS operated for only 78 days but it served as the precursor for today's much more long-lived weather satellites, which provide continuous monitoring of weather conditions around the world. Without them, providing accurate weather forecasts for virtually any place on the globe more than a day in advance would be nearly impossible. Figure !.1 shows a satellite image of Hurricane Ivan approaching the Alabama Gulf coast in 2004. Without this type of information, evacuation warnings would have to be given more generally, resulting in needless evacuations and lost economic activity (from areas that avoid landfall) and potentially increasing loss of life in areas that may be unexpectedly hit. The formerly top-secret Corona spy satellites began operation in 1959 and provided critical information about the Soviet Union's military and industrial capabilities to a nervous West in a time of unprecedented paranoia and nuclear risk. With these satellites, US military planners were able to understand and assess the real military threat posed by the Soviet Union. They used information provided by spy satellites to help avert potential military confrontations on numerous occasions. Conversely, the Soviet Union's spy satellites were able to observe the United States and its allies, with similar results. It is nearly impossible to move an army and hide it from multiple eyes in the sky. Satellite information is critical to all aspects of US intelligence and military planning. Spy satellites are used to monitor compliance with international arms treaties and to assess the military activities of countries such as China, Russia, Iran, and North Korea. Figure 1.2 shows the capability of modem unclassified space-based imaging. The capability of the classified systems is presumed to be significantly better, providing much more detail. Losing these satellites would place global militaries on high alert and have them operating, literally, in the blind. Our military would suddenly become vulnerable in other areas as well. GPS, a network of 24-32 satellites in medium-Earth orbit, was developed to provide precise position information to the military, and it is now in common use by individuals and industry. The network, which became fully operational in 1993, allows our armed forces to know their exact locations anywhere in the world. It is used to guide bombs to their targets with unprecedented accuracy, requiring that only one bomb be used to destroy a target that would have previously required perhaps hundreds of bombs to destroy in the pre-GPS world (which, incidentally, has resulted in us reducing our stockpile of non-GPS-guided munitions dramatically). It allows soldiers to navigate in the dark or in adverse weather or sandstorms. Without GPS, our military advantage over potential adversaries would be dramatically reduced or eliminated.

### Advantage 2: Conflict

#### Private appropriation guts the prohibition on national appropriation since states are obligated to authorize and supervise their own citizens in space, which is the exercise of sovereignty. AND, if states don’t actively restrict private appropriation national appropriation is inevitable, triggering interstate conflict – legal precedent, responsibility to supervise, and economic incentives. Counterplans don’t solve.

Ferreira-Snyman 21 [Anél Ferreira-Snyman, "Challenges to the Prohibition on Sovereignty in Outer Space - A New Frontier for Space Governance" PER / PELJ 2021(24) – DOIhttp://dx.doi.org/10. 17159/17273781/2021/v24i0a8685] CT

The role of the state in the establishment of private property rights in space cannot be ignored, however. Article VI of the Outer Space Treaty determines that states parties to the Treaty shall bear international responsibility for national activities in outer space including when such activities are carried on by non-governmental entities. The activities of nongovernmental entities in outer space, including on the moon and other celestial bodies, must also be authorised and continuously supervised by the appropriate state. Both the American and Luxembourg legislation on space resource extraction confirm this role of the state. Thus, since the state exerts control over the private company, the latter's activities may be attributed to the state.182 In this sense, the lines between private ownership and state sovereignty become blurred, as both require control over the space object to the exclusion of others. Therefore, de facto appropriation by private companies could arguably become legal once states start to recognise such rights,183 as already illustrated by the American and Luxembourg laws’ recognition of at least private appropriation of space resources. In this regard, Pershing submits that the acceptance of resource appropriation may lay the foundation for a "second shift" 184 in customary international law's interpretation of the non-appropriation principle:185

Should States buckle to private commercial pressure or independently recognize the economic benefits of domestic companies obtaining private property in celestial territory, States would have a newfound interest in recognizing and protecting in situ rights. The legal justifications for de jure or de facto cooperation in non-recognition would likely become subordinate to economic incentives – spurring the adoption of new legal arguments to support shifting State interests.

It therefore seems inevitable that once a private company has de facto control over a space object such as the moon or an asteroid, such control may become legal once the majority of states recognises or at least does not object to such appropriation. Arguably, this may open the door for a state to assert sovereignty (at least over time) over the space objects occupied by the private companies that are authorised and supervised186 by the particular state. In other words, the state could thus achieve "extraterrestrial sovereignty through its citizen's actions."187 In this regard Durkee188 argues that "private companies are themselves developing the international law of outer space." She explains this "attributed lawmaking" as follows:189

When a corporation whose activity is attributed to the state publically asserts a legal rule and acts on it and a nation does nothing, the nation implicitly accepts the corporate rule. In the absence of direct evidence if a nation's acts and assertions in support of a customary rule, the actions of private companies – which are attributed to the nation – become the best evidence of a nation's embrace of a particular interpretation of the Outer Space Treaty. The result … is that private companies may be forcing development of an international legal rule that is permissive to appropriation of space resources.

It has been suggested by some that the rule of first possession would inevitably be applied in outer space, analogous to the "first in time, first in right" property principle that was applied on Earth for centuries.190 In this regard Gruner even submits191 that the existing outer space treaty regime lacks legal certainty pertaining to property issues since it "overturns centuries of international law by rejecting the longstanding principle of national sovereignty."192 He therefore proposes applying the first possession rule in outer space by implementing a new concept of property where the discovering nation declares the particular space object res nullius humanitatus

meaning that it is a place where people can still have individual property rights and be rewarded for their labor based on first possession, but where settlers will act on behalf of the interests of humanity rather than a single terrestrial nation. In this manner, res nullius humanitatus would guarantee all humans equal access to the rewards offered by outer space, rather than a de facto equal share in the rewards reaped from such exploration and exploitation simply because they are human.193

The above suggestion thus still adheres to the principle of the common heritage of humankind, but argues for a wider interpretation of the principle, allowing for individual property rights.194 It remains to be seen, however, whether the major space-faring nations would be willing to consider such a suggestion, especially since the United States' executive order on space resources specifically states that the USA does not consider outer space to be a global commons.

Although the rule of first possession have been criticised for promoting a space race, colonialism and the possibility of an "unmitigated land rush", 195 it is agreed with arguments that this principle, if properly regulated, might provide the basis for establishing a property rights regime in outer space. As MacWhorter proposes:196

To avoid the conflicts inherent between rivalrous nations, though, acknowledging only limited rights in property through first possession is the appropriate first step. By ensuring that private property will be enforced once a mining venture has brought space material back to Earth, many of the practical consequences of total first possession incorporation may be avoided.

To circumvent the non-appropriation principle, a number of other alternatives to create some kind of sui generis right of ownership have been suggested 197 that could make the commercial development of outer space possible and viable for developers. These suggestions include certain "property-like rights" not constituting ownership, such as "concessions, mining licences, prospecting rights, and certain contractual rights"; 198 a "credit-swap" system;199 the leasing of outer space to nations and private companies;200 the creation of a public trust to manage property in outer space; 201 a hybrid property regime; 202 stewardship’ 203 lotteries; tradable credits; 204 and tenders.205 None of these proposals is without criticism and all of them require some involvement of the state, opening the door once again for the establishment of sovereignty through the activities of private entities under the control of the state. Nevertheless, suggestions like these are at least indicative of the dire need to start re-evaluating property rights in outer space law.

3 The way forward for space governance?

In response to the adoption of the United States Commercial Space Launch Competitiveness Act, the Board of Directors of the International Institute of Space Law stated as follows:206

Whether the United States interpretation of Art. II of the Outer Space Treaty is followed by other states will be central to the future understanding and development of the non-appropriation principle. It can be a starting point for the development of international rules to be evaluated by means of an international dialogue in order to coordinate the free exploitation and use of outer space, including resource extraction, for the benefit and in the interest of all countries.

Different suggestions have been made by commentators on the way international legal rules pertaining to the use and development of outer space should be developed. These vary from adapting or amending the current Outer Space Treaty207 and/or Moon Agreement208 to developing a completely new legal framework209 to address specific issues.

The urgency of the need to clarify and develop legal rules relating to the exploitation of outer space, including the establishment of property rights, is vividly illustrated by the USA's recent unilateral release of the Artemis Accords.210 The Accords – named after NASA's Artemis programme, which aims to send the first women and the next man to the moon by 2024 - is a set of standards for the exploration of the moon211 and is intended to create a framework agreed on by the United States and its partners212 in the Artemis programme by clarifying some of the lacunae in the Outer Space Treaty. 213 The idea is to create an agreement without utilising the often cumbersome and long treaty-making process in the United Nations.214 Instead, the USA aims to reach agreement with "like-minded" nations since, according to American officials, working with non-space faring states would be unproductive.215 The unilateral creation of the Artemis Accords, however, has already been sharply criticised by Russia as an attempt by the United States to side-line the United Nations and to invade the moon in a manner similar to that in which it invaded Iraq and Afghanistan.216 It is also to be expected that China will not react favourably to the Accords,217 which are perceived by some academic commentators as expressing an "ambition for space hegemony" 218 by the United States. In addition, the deliberate exclusion of non-space-faring states from the creation of the legal framework is another clear confirmation of the United States' stance that outer space is not a global commons.

At first glance, the guiding principles of the Artemis Accords merely confirm the current outer space treaties, for example by determining that space activities must be conducted for peaceful purposes, that assistance must be provided to astronauts in distress and that space objects must be registered. The most controversial issues provided for in the Accords are the extraction and use of space resources219 and the intended establishment of so-called "safety zones" 220 around lunar landing sites.

Although the Artemis Accords do not mention property rights explicitly, they confirm the United States' interpretation of the Outer Space Treaty as expressed in its domestic legislation and subsequent executive order on the exploitation of space resources by determining that "space resource extraction and utilization can and will be conducted under the auspices of the Outer Space Treaty." 221 Therefore, by signing the Accords partners agree with this interpretation made by the United States. Should this interpretation be generally accepted by space-faring nations through bilateral and multilateral agreements, these rules for space mining and property rights may eventually become customary international law. This remains to be seen, however, since Russia has already indicated that any attempts to privatise space would be unacceptable.222

To avoid harmful interference with space activities, the Artemis Accords make provision for the establishment of safety zones around lunar bases. Although American officials have indicated that these zones do not technically amount to a territorial claim over the affected areas,223 it may be argued that such zones at least display some characteristics of territorial sovereignty by exerting control over a particular area on the moon to the exclusion of others. As Weaver points out, "'commercial' appropriation is much more subtle than outright legal appropriation" since the claimant does not make any (explicit) proclamation of sovereign control to the international community.224 Nevertheless, the outcome is in essence the same, since the benefits are gathered to the exclusion of others. The establishment of lunar safety zones seems to be similar to the rule of first possession, which strengthens the earlier argument that the principle of "first in time, first in right" might provide the basis for establishing property rights in space. According to American officials, a state nearing another state's operations in a safety zone has to consult the latter state first to prevent damage or interference.225 Although the Artemis Accords confirm that outer space must be used for peaceful purposes, one might expect that the United States' Space Force226 would play some role in the protection of American safety zones. This has obvious implications for the prohibition on the (active) militarisation and, even more seriously, weaponisation of outer space.227 One may also expect that states would want first to stake their claims to those lunar areas that are the richest in resources, a tendency which may create conflict between competing states.

The practical implications of the Artemis Accords remain to be seen. However, in order to prevent that outer space "turns into the Wild West of the twenty-first century", 228 legal rules for the exploitation of outer space bodies have to be developed under the auspices of an international institution and not left to individual states or, for that matter, selected private companies. This would not only result in the fragmentation of outer space governance, which could create more legal uncertainty,229 but might also encourage "forum-shopping" by commercial operators to find domestic systems with minimum regulation of their activities.230

Given that time is of the essence, it is suggested that the UNCOPUOUS as an established body that has been specifically created to address issues relating to outer space is best suited to addressing this task. Although it may be argued that the UNCOPUOS's decision-making processes, which are based on the rule of consensus, are too slow, it is currently the only multilateral forum for the discussion of outer space matters.231 The creation of a completely new international law-making body to address urgent space issues is simply not realistic and would take even longer. Once the rules have been established, a permanent regulatory body, perhaps similar to the International Seabed Authority, could be created to oversee their implementation,232 also by means of states' national legislation, and to protect the rights of developing states.

After the conclusion of the core UN space treaties in the 1960s and 1970s it became apparent that states were no longer willing to adopt further binding obligations regulating space activities and that international space law could therefore be developed only by adopting "soft law" instruments.233 Because of their non-mandatory character, these instruments are generally more easily negotiated by states than is the case with treaties.234 Thus, soft law235 documents are currently the main instruments for further developing and defining the norms of outer space.236 It is therefore to be expected that the rules for exploiting outer space bodies would also (initially at least) be in the form of soft law. Nevertheless, soft law guidelines have a legal value237 as they impact on the international law-making process by providing the premises from which customary international law might develop, and might eventually lead to the conclusion of a treaty.238 The work of the Hague International Space Resources Governance Working Group239 could play an important role in this process. The Working Group reflects a so-called bottom-up approach to norms development240 by representing the wider outer space community, including industry, states, international organisations, academia and NGOs. On 12 November 2019 the Working Group adopted the "Building Blocks for the Development of an International Framework on Space Resource Activities".241 The Building Blocks could thus form the basis for multilateral discussions on the development of softlaw rules for the regulation of commercial activities in outer space.

The unregulated exploitation of outer space is not only a catalyst for conflict between states, but could also cause irreparable harm to the outer space environment because of human contamination and the creation of more space debris.242 The international community will have to act swiftly if the aspirations of using outer space for peaceful purposes and preserving it for future generations are to be fulfilled.

#### Private appropriation unravels the institutions of space law which have maintained peace in space – triggers conflict.

Tronchetti 08 [Fabio Tronchetti (LL.M Bologna University & Lecturer at the International Institute of Air and Space Law) “The Non-Appropriation Principle as a Structural Norm of International Law: A New Way of Interpreting Article II of the Outer pace Treaty,” Air & Space Law, Vol XXXIII/3 (June 2008).] CT

1. The Non-Appropriation Principle: The Basis of Space Law

The non-appropriation principle is the fundamental pillar on which space law is built. It provides direction and guidance to all activities in outer space. Since the first satellite was launched States agreed to renounce any sovereignty claims in outer space and to consider outer space as non-appropriable. The space era was seen as a unique opportunity for all mankind and as a possible instrument to improve the quality of life of all people on Earth. The presence of the nonappropriation principle represented the best guarantee that this ‘humanitarian’ and idealistic approach to the management of the space environment was put in practice. Its presence, indeed, was a clear commitment made by States to perform space activities on a cooperative basis and to carry out the exploration and use of outer space for the benefit of all.

2. Predominance of the Non-Appropriation Principle over the Other Space Law Rules

The non-appropriation principle represents the premise for the putting into practice and realization of the other principles set forth in the Outer Space Treaty. Firstly, the freedom of exploration and use by all States of outer space may exist only in the presence of the non-appropriation principle. If each State was allowed to extend territorial rights over parts of outer space, the freedom to accede to and use outer space would be reduced or completely abolished. The non-appropriation principle, indeed, is to be considered the crucial component of the res communis idea. Secondly, if national appropriation in space was al-lowed, the preservation of outer space for peaceful purposes would be put in serious danger. As previously analysed, the prohibition to appropriate outer space has prevented territorial conflicts and rivalries in outer space so far. The removal of such prohibition would generate the opposite effect. Moreover, if States were free to 'nationalize' parts of outer space there is serious doubt that the principle of cooperation and mutual assistance (Article IX of the Outer Space Treaty) would continue to guide the activities of States in outer space.

3. Evidences of the Structural Status of the Non-Appropriation Principle

It is possible to list several examples which support and confirm the structural status of the non-appropriation principle. These examples come both from the past, namely from the process leading to the setting up of space law, and from the current practice of States and private operators in space. Therefore, I have classified such evidences as either historical or modem.

3.1) Historical Evidences

The res communis omium nature of outer space found support in legal theory and in official declarations since the beginning of the space era. Already in 1947, D. Manuilsky, UN Delegate of the USSR, proposed to submit a resolu-tion to the UN declaring outer space 'an international entity'." Such proposal did not find any positive answer. However, in the literature of the pre and post satellite era there was a generally accepted view that outer space could not be subject to national appropriation. For instance, in 1965 Professor Jenks in 1965 affirmed that: 'Space beyond the atmosphere is and must always be a res extra commercium incapable of appropriation by the protection into such space of any particular sovereignty based on a fraction of the Earth's surface',32 while in 1959 M.S. Smimoff stated: 'The right of occupation and discovery does not exist in space which is considered as res communis'." The non-appropriative na-ture of outer space was also affirmed in the 1960 Resolution of the International Law Association declaring that: outer space may not be subject to the sover-eignty or other exclusive rights of any State',' and in the 1962 Draft Code of the David Davies Memorial Institute providing: 'Outer space, and the celestial bodies, therein, are recognized as being res communis omnium ... and neither outer space nor celestial bodies in it are capable of appropriation or exclusive use by any State'." As to official statements, already in 1958 Senator Johnson addressed the United Nations by declaring that: 'We of the United States have recognized and recognize, as most all men, that the penetration into outer space is the concern of all mankind. If nations proceed unilaterally, then their penetration into space becomes only extension of their policies on Earth. Today outer space is free. It is unscarred by conflict. No nation holds a concession there. It must remain that way'. On 14 September 1959, the Soviet space device Lunik-2 crashed on the surface of the Moon by carrying metal emblems bearing the coat of arms of the Soviet Union and the Soviet Republics. Shortly after the Lunik's reaching the Moon, the soviet academics L.I. Sedov and A.V. Topchiyev declared that the Soviet Union was not claiming any territorial right as a result of such opera-tion.' This statement was confirmed by Premier Khruschev who stated: 'The Soviet pennant as an old resident, will then welcome your pennant and they will live together in peace and friendship and as well as people should live who in-habit our common mother the Earth. ...We regard the sending of the rocket into outer space and the deliverance of our pennant to the Moon as our achievement and by this word "our" we mean the countries of the entire world, i.e., we mean that this is also your achievement and the accomplishment of all the people liv-ing on the Earth'." From the United States side, we can quote the declaration of President Eisenhower who, on 22 September 1960, addressed the United Nations General Assembly by indicating some basic concepts that in his opinion had to consti-tute the basis for international space cooperation. Among those there were the following principles: 'We agree that celestial bodies are not subject to national appropriation by any claims of sovereignty'." Later, as we have seen, the non-appropriation principle was incorporated in UNGA Resolution 1721 and 1962.

In June1966, both the United States and the Soviet Union submitted to the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) drafts of an instrument that would become the Outer Space Treaty. These drafts were based on the non-appropriative nature of outer space. In 1967, the non-ap-propriative nature of outer space was formally laid down in Article II of the Outer Space Treaty. Nine years after the signature of the Outer Space Treaty, an international case confirmed the importance of the non-appropriation principle. In 1976, eight equatorial States which were not parties to the Treaty, claimed, by means of the Bogota Declaration, sovereignty rights over the part of the geostationary orbit above their territory.39 These States affirmed their non-acceptance of the principles of the Treaty, particularly the non-appropriation provision. Their claim was rejected by the overwhelming majority of States on the ground that the non-appropriative nature of outer space was a rule binding all States irre-spectively of their being a party to the Treaty.

3.2. Modem Evidences

As previously analyzed in this paper, a large number of authors consider the non-appropriation principle the major obstacle to the commercial development of outer space. The reasons why the legal proposals of these authors are not ac-ceptable have already been explained. The important point to notice at this stage is that all these attacks on the non-appropriation principle symbolize a confirmation of the special status of this principle within the context of space law. The more such authors attack the non-appropriation principle, the more its im-portance and the need for keeping it as the basis of space activities emerge. The fact that these authors only focus on this principle and not on others, such as the one establishing that the exploration and use of outer space shall be carried out for the benefit and in the interests of all mankind, is an indication that it is the essence of the space law system. Apart from these theories, the other major threat to the non-appropriation principle comes from private companies which are selling plots on lunar and other celestial bodies'. These companies, which claim to be allowed to carry on such activities by relying on the idea that private operators are not subject to Article II of the Outer Space Treaty, substantially operate as if the non-appro-priation principle was not in force. Indeed, they promise to their customers the enjoyment of full property rights over the acquired acres. One of these compa-nies is Lunar Embassy, which has established the practice of setting up twin companies and nominating ambassadors from around the world. Recently a case involving the so-called Lunar Embassy in China, was decided upon by a Beijing court. In October 2005, Beijing industrial and commercial authorities suspend-ed the license of Lunar Embassy in China for having engaged in speculation and profiteering and fined it 50,000 Yuan. Lunar Embassy in China sued the Beijing Administration.49 The Haidian District People's Court ruled against the company in November 2005. Then, the company decided to appeal against the Court's decision.4' In March 2007, the Beijing First Intermediate People's Court ruled against the company, stating that no individual or State could claim own-ership of the Moon.42 In its judgment the Court cited the fact that, since 1983, China was a party to the Outer Space Treaty, which prohibits appropriation of outer space parts thereof. Another significant re-affirmation of the relevance of the non-appropriation principle is the 2004 'Statement of the Board of Directors of the International Institute of Space Law on Claims to Property Rights Regarding the Moon and Other Celestial Bodies'.43 The Statement reads: The prohibition of national appropriation ...precludes the application of any legislation on a territorial basis to validate a private claim. Hence, it is not sufficient for seller of lunar deeds to point to national law, or the silence of national authorities, to justify their claims'. The Statement also calls the State Parties to the Outer Space Treaty to `comply with their obligation under Articles II and VI of the Outer Space Treaty...under the duty to ensure that, in their legal systems, transactions re-garding claims to property rights to the Moon and other celestial bodies or parts thereof, have no legal significance or recognised legal effect'. The Statement on one hand rejects those theories supporting the national registration of private claims to the Moon and other celestial bodies and on the other restates the spe-cial obligation for States to respect and to ensure the respect of the non-appro-priative nature of outer space.

4. The Abrogation of the Non-Appropriation Principle will Result in the Collapse of the System of Space Law

If the non-appropriation principle would be abrogated, it is very likely that the system of space law as we know it would cease to exist. In a future space scenario without its presence, conflicting claims among States would arise. This situation would engender international tension and would increase the risk of conflicts in space. Moreover, it is not sure that the abrogation of the non-appropriation principle is a good move from an economic and profit-oriented point of view. As we have seen, if States were allowed to gain control over an area of a celestial body, there would be nothing to prevent such States to impose fees for the access and use of that area. The costs for using space resources and for carrying out exploitative activities would, thus, increase. Therefore, the dis-appearance of the non-appropriation principle would slow-down instead of stimulate, the commercial development of outer space.

5. Mandatory Requirements for a Theoretical Disappearance of the Non-Appropriation Principle

The non-appropriation principle constitutes the central rule of the space law system. It ensures the proper functioning of that system and gives all States the possibility to obtain benefits from the exploration and use of outer space. Its hypothetical disappearance could be acceptable only in the presence of another rule which is able to guarantee the same level of order and security as the non-appropriation principle has provided in the past 40 years. It is not sufficient to say that its disappearance will be a profitable move for space operators and will generate benefits for all. Evidence and valid legal arguments to prove and sup-port that proposition must be provided. As it has been shown, none of the proposals put forward so far is able to sufficiently demonstrate the advantages coming from the removal of the non-appropriation principle. Moreover, none of these proposals provides an alternative mechanism to guarantee the orderly and peaceful carrying out of space activities.

6. The Preservation of the Principle's Leading Role is the Pre-Requisite for the Further Development of Space Law

The non-appropriative nature of outer space was formally confirmed in 1967 by means of Article II of the Outer Space Treaty. Since then, space law has evolved in order to meet the changing needs of States and private entities operating in space. The new century poses a new challenge for space law, name-ly the commercial use of space resources. The presence of the non-appropriation principle does not present an obstacle to such use. As has been demonstrated, this principle has contributed to the successful and peaceful development of space activities so far. Thus, given its vital importance for the proper function-ing of space law, it is necessary that, also in the future, this fundamental role continues to be safeguarded. Therefore, I see the preservation of the non-appropriative nature of outer space as the pre-requisite for any possible evolution of the system of space law.

7. Special Responsibility and Consequences for the Violation of the Non-Appropriation Principle

As we have seen, if the non-appropriation principle were abrogated, the risk for armed conflict in outer space would be high. Therefore, States have a special duty to act in conformity with that principle. But what if a State would sudden-ly decide contrary to that principle, and to appropriate part of outer space? What would be the legal consequence of such behaviour? In view of the fact that Article III of the OST makes international law, including the Charter of the United Nations, applicable to the exploration and use of outer space and considering that Article I (1) of the UN Charter lays down the obligation to maintain peace and security, and to prevent or remove threats to the peace, the individual violation by a State of the principle contained in Article II of the OST should be considered as a threat to international peace. Such a State should be seen as responsible for a particularly serious act towards the whole community of States. As a result, in such a situation, other States would be entitled to act collectively through the United Nations to stop such behaviour and to remove this threat to peace. A joint effort and pressure to that effect would hopefully restore the status quo ante. The argument could be put forward that if a State should decide to withdraw from the Outer Space Treaty, it would no longer be bound by the provisions of Article II and thus could appropriate parts of outer space. This argument should be rejected because, even after that withdrawal, such a State would be obliged to respect the non-appropriation principle in view of its structural status.

#### Land grabs -- appropriation causes space racing and land-grabs between states and private entities, making war inevitable

Tronchetti 08 [Fabio Tronchetti (LL.M Bologna University & Lecturer at the International Institute of Air and Space Law) “The Non-Appropriation Principle as a Structural Norm of International Law: A New Way of Interpreting Article II of the Outer pace Treaty,” Air & Space Law, Vol XXXIII/3 (June 2008).] CT

The first proposal of this group is a very radical one: it simply argues that the best solution for promoting the use of space resources and for securing the interests of private operators is to remove the non-appropriation principle.19 Thus, private individuals and entities would be free to appropriate celestial bodies and their resources and to be allowed to keep the profits and the benefits obtained therefrom. This solution would remove the legal uncertainty which has stopped private operators so far from investing in space exploitative activities and would give these operators the go-ahead for commercial activities. This proposal is not acceptable for several reasons. First of all, it is important to stress that every theory which calls for the abolition of the non-appropriation doctrine must be looked at with scepticism. Abrogation of the non-appropriation principle is not justified simply because it would make space commerce possible. On the contrary, the principle must remain the basis for present and future activities in outer space. Secondly, the only predictable result of the removal of the non-appropriation principle would be the beginning of a space race which is likely to adversely affect one of the main features of outer space, namely its peaceful nature. States and private operators, indeed, would start to compete in appropriating celestial bodies and the resources contained therein. In a similar scenario the risk of disputes between competing claimants would be high, and armed conflicts beyond the Earth’s boundaries would be inevitable. Moreover, it is questionable whether the removal of the non-appropriation principle would be beneficial to the development of space commerce. Once States have gained sovereignty over an area of outer space, they would surely impose tributes in the form of fees, royalties and other charges for the access, use or occupation of their space property. This would increase the cost of doing business in space and, as a consequence, would restrain rather than support the commercialization of space and its resources. Additionally, it is quite clear that when States and private operators would start appropriating areas of outer space, the principle established in Article I of the Outer space Treaty requiring the exploration and use of outer space to be carried out for the benefit and in the interests of all countries would progressively lose its relevance. States and private operators, indeed, would operate with the purpose of maximizing their investments and getting maximum profit from their activities. Thus, the requirement to use outer space as a means for generating benefits for all countries would effectively be cast aside. Therefore, this proposal must be firmly rejected. If accepted, not only would outer space would lose its res communis omnium nature, but it would also become the theatre of conflict and tensions among States and private operators.

#### Ownership disputes -- Private appropriation inevitably leads to overlapping claims causing armed conflict.

Tennen 10 [Leslie I. Tennen, Esq.\* “ Towards a New Regime for Exploitation of Outer Space Mineral Resources,” Nebraska Law Review, 88 (2010), 794. <https://advance-lexis-com.ezp-prod1.hul.harvard.edu/api/document?collection=analytical-materials&id=urn:contentItem:50MP-12V0-00CT-T042-00000-00&context=1516831>.] CT

a. Should Article II be Abrogated?

It has been asserted that the non-appropriation principle is an obstruction to the commercial development of space, and that article II, if not the entire Outer Space Treaty, should be abrogated. 61 The Outer Space Treaty permits states party to withdraw on one year's notice. 62 It seems unlikely that a major space power will seek to withdraw from the Outer Space Treaty in the foreseeable future, or that article II will be repealed anytime soon. Nevertheless, the abrogation of article II would not benefit the commercial development of space. First and foremost, the reasons which warranted the adoption of the non-appropriation principle in 1961 continue to be applicable today, notwithstanding the end of the Cold War. Abrogation of article II would result in a multitude of claims to orbits, locations, and entire moons and other celestial bodies. These claims would not have any uniformity in terms of method of discovery. That is, claims could be founded on any basis on which the claimant can assert that it was the first to "discover" the subject of the claim, 63 whether by exploration, use, landing, imaging, mapping, surveying, or telepossession. 64 As a matter of equity, the Russians, as successors to the Soviet Union, would have an historic justification to assert vast claims of ownership to near-Earth and cis-lunar space, and the Moon, Venus, and perhaps other celestial bodies, from their early triumphs during the initial days of the space age. However, claims would not be restricted to the technologically advanced states, as other nations would assert claims to space "properties." It can be anticipated that the Bogota Declaration, 65 [\*808] declaring claims to the geostationary orbit, would be resurrected in one form or another. In addition, private entities, if permitted to engage in appropriation, would overlay yet another level of claims, separate and distinct from the claims of states. Whether individual states would enact domestic laws recognizing and enforcing such private claims is a matter of pure speculation. It is difficult to envision a scenario whereby the various claims would not overlap and thereby conflict. Thus, it is foreseeable that international tensions between claiming states would arise, with the concomitant potential for the export of armed conflict from the confines of this planet to the heavens. 66 Pop has identified several theories which conceivably could give rise to claims to property, 67 but no matter what basis is utilized to provide theoretical justification for the assertion of claims, the enforcement of claims (i.e., the exclusion of others therefrom) in the final analysis ultimately devolves upon the successful application of military force. Armed conflict in space obviously would not engender an atmosphere conducive to private commercial ventures. Even where conflict or the threat of conflict may be averted, states claiming sovereign rights over space and celestial resources would be able to impose taxes, royalties, duties, auction fees, or other forms of economic tribute upon private entrepreneurs in exchange for the right to utilize the resources within the claimed territories, even where claims to those areas and resources overlap. 68 The corpus juris spatialis provides that states have the right to explore and utilize areas on or below the surface of celestial bodies. The abrogation of the non-appropriation principle of article II would transform the right to explore and utilize areas of celestial bodies into a commodity available only to those willing to pay the highest price. Monopolies and other anti-competitive practices could result. In this regard the non-appropriation principle is double-edged: article II not only prevents an entity from establishing a monopoly, it also prevents the competition from establishing one as well, and thereby creates a level playing field. 69 Those who advocate for the abrogation of article II fail to recognize that the non-appropriation principle is not solely dependent upon the Outer Space Treaty. As noted above, the prohibition on national appropriation was expressed by the community of nations in U.N. resolutions dating back to the early 1960s. The substance of article II of [\*809] the Outer Space Treaty was reaffirmed in article 11.2 of the Moon Agreement. More than 125 nations have signed or ratified the Outer Space Treaty; thus, the non-appropriation doctrine has received widespread acceptance among states for almost fifty years. In addition, state practice during the space age has been consistent with article II. 70 Thus, the non-appropriation principle has become part of customary international law, and as such, is binding on states independently of the Outer Space Treaty. 71 That is not to say, however, that a majority of the community of nations would not be able to agree to abrogate article II, or the entire Outer Space Treaty, if so inclined. However, there is no indication that states have expressed any official interest is so doing at this time.

#### Space conflicts go nuclear- both fast and probable.

Grego 15 [Laura Grego, an expert in space weapons and security; ballistic missile proliferation, and ballistic missile defense, "Preventing Space War", Union of Concerned Scientists, 07-05-2015 <https://allthingsnuclear.org/lgrego/preventing-space-war>] JDN

So says a very good New York Times editorial “Preventing a Space War” this week. Sounds right, if X-Wing fighters come to mind when you think space conflict. But in reality conflict in space is both more likely than one would think and less likely to be so photogenic. Space as a locus of conflict The Pentagon has known that space could be a flash point at least since the late 1990s when it began including satellites and space weapons in earnest as part of its wargames. The early games revealed some surprises. For example, attacking an adversary’s ground-based anti-satellite weapons before they were used could be the “trip wire” that starts a war: in the one of the first war games, an attack on an enemy’s ground-based lasers was meant to defuse a potential conflict and protect space assets, but instead was interpreted as an act of war and initiated hostilities. The games also revealed that disrupting space-based communication and information flow or “~~blinding~~” could rapidly escalate a war, eventually leading to nuclear weapon exchange. The war games have continued over the years with increased sophistication, but continue to find that conflicts can rapidly escalate and become global when space weapons are involved, and that even minor opponents can create big problems. The report back from the 2012 game, which included NATO partners, said these insights have become “virtually axiomatic.” Participants in the most recent Schriever war games found that when space weapons were introduced in a regional crisis, it escalated quickly and was difficult to stop from spreading. The compressed timelines, the global as well as dual-use nature of space assets, the difficulty of attribution and seeing what is happening, and the inherent vulnerability of satellites all contribute to this problem. Satellite vulnerability & solutions Satellites are valuable but, at least on an individual basis, physically vulnerable. Vulnerable in that they are relatively fragile, as launch mass is at a premium and so protective armor is too expensive, and a large number of low-earth-orbiting satellites are no farther from the earth’s surface than the distance from Boston to Washington, DC.

### Plan/Solvency

Since, in a just world, outer space would be treated as a global commons, and a global commons model precludes appropriation by private entries, then the appropriation of outer space by private entries is unjust.

Thus, the plan: States ought to adopt a binding international agreement that bans the appropriation of outer space by private entities by establishing outer space as a global commons subject to regulatory delimiting and global liability.

#### The aff:

#### solves debris and space conflict by ensuring the sustainable and equitable use of outer space resources.

* prevents circumvention by aligning the interests of state parties
* is normal means since it models numerous successful agreements governing all other global commons.

Vollmer 20 [Sarah Louise Vollmer (St. Mary's University School of Law), “The Right Stuff in Geospace: Using Mutual Coercion to Avoid an Inevitable Prison for Humanity,” 51 ST. MARY'S L.J. 777 (2020). <https://commons.stmarytx.edu/thestmaryslawjournal/vol51/iss3/6?utm\_source=commons.stmarytx.edu%2Fthestmaryslawjournal%2Fvol51%2Fiss3%2F6&utm\_medium=PDF&utm\_campaign=PDFCoverPages> ]CT

IV. NECESSITY FOR REGULATION TO PRESERVE THE HERITAGE OF MANKIND—A PROPOSAL

Conceptually, all persons hold an implied property right in the space commons.111 As such, spacefaring entities and developing nations possess an equitable right to access and use orbital resources.112 But the sui generis nature of geospace presents a paradox requiring a unique regime for the sustainable usage of its resources.113 The international community cannot realize the advantages of the common heritage principle under a property regime because any conceivable assignment would violate the non-appropriation clause or unjustly enrich a particular interest.114 This means that only regulatory solutions can protect the interests inherent in a commons protected for the common heritage of mankind.

A. The Motivations for International Compliance

The crux of a workable treaty lies in the consent of the parties to the agreement.115 Thereafter, signatories internalize the agreement’s object and purpose into their domestic law, or in the case of international organizations, into an institutional framework.116 To implement a binding international instrument, we must therefore ask the question: Why do nations follow international law,117 and how can we use those behavioral realities to construct a workable framework to ensure geospace survives?118

At the dawn of civilized society, depending on a particular jurisdiction’s values, the laws of nature and morality compelled obedience and social order.119 When nation-states concluded international agreements, it represented the coalescence of the various values-based systems, the overlap of which formed a universal understanding of the law of mankind.120 “[The] fundamental conceptual boundary between municipal and international law . . . view[s] international law largely in terms of contractual relations, therefore assigning to the ‘sovereign’ a central place in the construction of the two orders.”121 In other words, transnational cooperation operated through balancing the competing autonomy and values of the parties involved. Despite centuries of debate, values systems remain the principal motivating factor of compliance with international law.122 Effective regulatory regimes must, therefore, strike at the heart of what nation-states value the most, which is often related to national security.123

When entering an international agreement, whether or not a nation-state will ratify it informs us of the value a nation-state places on the instrument’s subject matter. That value equates to the utility a nation-state places on certain allowances or prohibitions.124 Incorporating these motivating factors with Hardin’s regulatory solution, any freedoms infringed upon must manifest a higher utility than currently realized. If COPUOS proposes a protocol for sustainable uses of space, the provisions must either have a negligible effect on the global community’s perceived utility of space access or substantially increase that utility. Assuming the propositioned regulatory scheme aligns with the values system of each nation-state, the probability of internalizing such regulations through domestic codification is high.

To ascertain the interests of nation-states, we must look to the factors motivating current space utilization. Routine access to space undeniably aids our technological advancement. The ISS’s antigravity environment provides unique conditions to study medicine.125 Satellites provide real-time tracking of environmental conditions and transmit crucial information for disaster recovery planning.126 Space telescopes track objects with the potential to cause the extinction of life of Earth.127 Free from the veil of our hazy atmosphere, satellites can produce better imagery and ascertain the composition of potential resource deposits on celestial bodies.128 And simply receiving satellite imagery of our planet forces us to confront the realities of our fragile existence. These benefits signify the tangible realization of the OST’s object and purpose, which flow to all members of the global community.129 If we do not begin active decontamination and mitigation of space debris, the utility of geospace will cease to exist. Imagining our existence without these advances is a potent method to stress the criticality of unabated pollution in geospace.

B. Existing Proposals

Legal scholars have formulated several frameworks to mitigate space debris. Some recommend implementing a market-share liability regime, which assigns liability according to the volume of each nation-states’ exploits.130 Opponents of this construction rightfully highlight the inequities inherent in such a scheme. Considering the United States, Russia, and China make up the bulk of spacefaring activity, market-share liability would unduly burden these nations, and coerce a categorical exit from the space industry or a repeat of the Moon Treaty.131 Another scholar advocates for an environmental law approach, asserting that the space commons would benefit from a protocol closely mirroring the Madrid Protocol.132 While prospective applications of such a model could prevent additional accumulations, it would not feasibly abate the current collection of debris.133 The strengths of Mary Button’s mitigation proposal lie in the binding nature of the Madrid Protocol and compulsory environmental impact requirements. And though it advocates for a more collaborative conference mechanism, rather than the strict unanimous consent required of UNCOPUOS’s resolutions, it still shies away from compulsory requirements for active debris removal. Along with the Antarctic Treaty (ATS), the Law of the Sea (UNCLOS) also served as a model for the Corpus Juris Spatialis. But oddly, the law of salvage was omitted from the treaties. Unlike abandoned objects at sea, once a nation-state places an object into space, ownership exists in perpetuity. Sandra Drago addressed removing the OST’s property-in-perpetuity mechanism134 so as to permit the active salvage of inoperable satellites.135 Drago’s proposal is vital to any mitigation framework. But while this removes a substantial bar currently restricting debris removal, it does not address free-riding, and spacefaring enterprises are free to choose more lucrative space activities other than salvage operations.136

C. A Coercive Proposal

Mutual coercion lies at the core of Hardin’s solution.137 To summarize, law-abiding citizens make concessions to regulatory social constructs in the interest of conserving some utility otherwise lost.138 The coercive element lies in relinquishing one’s ability to exploit some freedom, the detriment of which cannot be realized at that moment in time.139 Conceding to a regime that tempers free exploitation of the commons allows everyone to benefit from the positive externalities of individual usage. Equated to space, nation-states currently concede to non-appropriation in the interest of maintaining equitable access. But because of the sui generis nature of geospace, even non-participants receive a benefit from the use of the commons. In effect, beneficiaries are free-riding from the capital investment of spacefaring nations and entities. This informs the structure of the ensuing two-part framework: geospace delimitation and global liability

1. Geospace Delimitation

The history of regulatory delimitation illustrates its effectiveness at balancing the rights of individuals, sovereigns, and mankind. Each instance explained in Part II infra, arose out of public necessity to ensure and protect the maximum utility of the global commons, without the deleteriousness of inhabitability, sovereign interference, or over-exploitation.140 The regimes governing Antarctica, the High Seas, the Atmosphere, and the radio-frequency spectrum evidence that mutually coercive delimitation can honor the common heritage of mankind, without encroaching on the peaceful enjoyment and benefits attributable to these areas.

a. Antarctica

In the 1950s, there was concern that Antarctica would succumb to Cold War hysteria, becoming a target for international discord and nuclear arms testing.141 In a move to reestablish global scientific exchange, the international scientific community hosted the International Geophysical Year project, and after identifying the potential of Antarctica, sought to protect it from any ruinous power posturing.142 This necessity for regulating permissible activity resulted in the formation of the ATS.143 Subsequent technological advancement revealed mineral deposits, triggering commercial interest in exploiting its natural resources. The threat catalyzed the promulgation of the Madrid Protocol.144 Again, these delimitations did not sever humanity’s utility in Antarctica. Rather, mankind conceded to the prohibition of deleterious usage in the interest of preserving its scientific utility.145

b. The High Seas

Similar to Antarctica, the High Seas faced threats in the 1960s when nation-states began unilaterally and arbitrarily, extending resource recovery activities further into the depths of international waters.146 In the interest of equity, particularly the interests of landlocked nations, UNCLOS delimited sovereign access to the seas, allowing usage only within the established exclusive economic zones (EEZs).147 An annex to UNCLOS provided a procedural framework in which resource recovery enterprises could operate in international common areas beyond the EEZs, precluding the unilateral capture of global resources by one nation.148 Once more, a mutually coercive framework removed certain freedoms in the interest of mankind without unjustly limiting equitable access to resources.

c. The Atmosphere

Divergent from the problems of the ice and sea, atmospheric regulation resolved an issue more analogous to geospace debris proliferation. Atmospheric utility is quite simple: breathable air and protection from deadly cosmic radiation. When satellite imagery revealed the sizable hole in the ozone layer, the Montreal Protocol to the Vienna Convention placed an outright ban on ozone-depleting chemicals in everyday consumables.149 This prohibition directly addressed the source of the negative externality, forcing humanity to internalize the externality through alternate investment in refrigerants. Recent evidence of the reduction of ozone loss validates the mutually coercive delimitation within the Montreal Protocol.150

d. Regulating the Telecommunication Spectrum

The business model and financial strategy of telecommunications entities influence satellite deployment planning. Typically, orbital placement aims to “maximize [a] potential user base,” and if that base happens to encompass, for instance, the continental United States, market competition drastically narrows the availability of slots for satellite positioning.151 Realizing that satellite acquisition becomes moot without conscientious “use of telemetry and control . . . required for spaceflight,”152 the Space Radiocommunication Conference convened to revise the Radio Regulations in 1963,153 granting the ITU authority to allocate radio frequencies among spacefaring entities.154 Originally, the ITU:

[A]llocated orbits and frequencies solely through a first-in-time system. This led to concern that developed countries would secure all of the available slots before developing countries had the technological capacity to use them. Although some orbits and frequencies are still allocated on a first-in-time basis, each state is now guaranteed a certain number of future orbits and frequencies, regardless of its current technological capacity.155

The FCC regulates the segment of the electromagnetic spectrum allocated to the United States.156 Arguably, the ITU and agencies like the FCC engage in de facto appropriation of the more highly sought-after orbits.157 Yet to an extent, the ITU’s delimiting of the radio-frequency spectrum remedied the negative externalities of non-appropriation in geospace, such as the overcrowding of active satellites and the resultant interference. Where the ITU’s scheme does not remedy the byproduct of geospace resource use, it succeeds in ensuring communication capabilities remain free from inequitable use.158

e. The OST’s Ineffective Delimitations

The recurrent theme among the aforementioned regulatory schemes is the preservation of utility within the commons concerned.159 The frameworks each provide a means to enjoy shared resources while removing the potential for destruction. The OST’s nonproliferation provisions properly regulate the usage of the space commons to further the enjoyment of space’s true utility: scientific discovery and telecommunications. Likewise, the Liability Convention reinforces the necessity to maintain heightened situational awareness to guarantee the mutual, uninterrupted enjoyment of activity in space.160 But nation-states exploit the loop-holes within these documents to avoid internalizing some of their externalities. Specifically, the Liability Convention only assigns liability for damage caused to space objects when fault can actually be determined.161 Though it would be simple to assign fault to a collision caused by an intact and inoperative satellite, it is virtually impossible to identify the owner of smaller pieces of debris. Further, while the ITU reserves slots for nations not represented in space,162 it does nothing to stop those capable of reaching geospace from littering the commons and destroying the utility of reserved slots.163 Holistically, none of the delimitations in the Corpus Juris Spatialis negate the cause of the growing belt of debris in geospace.

As a sui generis resource, the mere occupation of LEO or GSO equates to the reduction of the overall utility of geospace. When an entity launches a rocket into space, the accompanying payload causes either (1) temporary reduction of the aggregate utility of geospace or (2) permanent reduction of the aggregate utility of geospace.164

The first delimitation prong will recommend bifurcating the applicability of the Corpus Juris Spatialis, with separate regimes for outer space and geospace. While the commercialization of outer space is not overly injurious to the international commons or interests of developing nations, the overcrowding of affluent spacefaring entities vying for orbital acquisition puts immense pressure on the finite resources within geospace. Therefore, demarcating the upper limit of geospace will allow entities to continue exploring the universe without imposing the restrictions placed on those seeking geospace positioning.165 This modification will allow continued use of both regions, but coerce more sustainable usage of geospace with the assistance of the secondary prong below.

2. Global Liability

Operating under the theory that humanity holds an implied property right in the global commons but limited under the non-appropriation clause to protect those interests through traditional property mechanisms, the logical alternative is to impose liability on actions violative of the global interest.166 Further, assuming humanity collectively benefits from utilization of this commons, then humanity likewise must internalize the cost of the negative externalities imposed.167 This means that spacefarers, as members of the global collective, hold both the right and obligation to protect that right for others.168 Therefore, anyone utilizing or benefitting from the utilization of the geospace commons has an equitable duty to ensure its sustainability. Under traditional tort theories, when one has a duty, breach of that duty causally linked to a measurable injury is actionable. In terms of the duty to humanity when utilizing geospace, the culmination of Kessler Syndrome represents the measurable injury.

Kessler informed the scientific community in 1970 of the probable cataclysmic chain-reaction and destructive conclusion of unabated geospace debris pollution.169 This theory, reiterated consistently since its dissemination, materialized in 2009.170 Fundamentally, every spacefaring entity and approving launching state knows of this monumental threat to the utility of geospace. Yet to date, mitigation guidelines remain non-binding, and four-figure satellite constellations continue to receive approval.171 To incorporate a time-honored risk calculation method, the Hand Formula is instructive and evidences a trend toward unapologetic endangerment to the utility of geospace in isolation of the associated tort regime.

Let us assume the burden to mitigate space debris is $18.5 million172 but the probable magnitude of not mitigating the accumulation of space debris equates to reverting our technological capabilities back to the 1800s. Considering the accumulation of debris from the accidental or intentional breakup of geospace satellites, the probability of Kessler Syndrome fully concluding in the absence of a comprehensive mitigation protocol is one hundred percent.173 While difficult to quantify, the value of our scientific progress attributable to the advent of space travel far outstrips the burden to mitigate space debris. Should Kessler Syndrome become our reality, the measurable injury is the cost of reestablishing global communications without the usage of satellite relays. To add insult to injury, the invaluable utility of geospace will cease to exist.

A viable alternative would institute a regime of shared global liability which makes consideration of capital investors as well as nonparticipating beneficiaries in the interest of equity. That is, should the inevitable prison for humanity become a reality, the entire global community will be liable to pay an equitable share of the overall cost of recovery efforts.174 The Liability Convention should undergo a similar trifurcation, adding this new scheme to the current strict and absolute liability mechanisms.175 As such, shared global liability will consider the responsibility of nation-states and private entities in isolation.176 This will coerce cooperation among all agencies, nations, and private entities because the equitable share of responsibility will drive collective resolution.

V. CONCLUSION

In light of the emerging global sentiments regarding environmental conservation and sustainability, instituting a regime that clearly defines a legal consequence in the event of environmental ruin boasts greater coercive force than non-binding resolutions. 9 This international agreement aligns with the universal value that the international community places on the utility of geospace.177 In essence, it protects geospace by forcing the signatory to face the reality of their negative externalities. It is unlikely that a nation-state exists that does not value space exploration and the benefits attributable.

In April of 2019, in the spirit of the Sustainable Development Goals (SDGs), COPUOS adopted an agenda that focused on the long-term sustainability of the space commons, space traffic management, equitable uses of GSO, and the mitigation of space debris.178 Mindful of space’s critical role in attaining many of the SDGs, the Committee put forth guidelines to facilitate capacity building without prejudice to any one nation-states’ economic capabilities. To be sure, the Guidelines for the Long-Term Sustainability of Outer Space Activities are an important step forward, but many delegates reiterated the importance of developing binding instruments, particularly in light of developments in “space resource exploitation, large constellations, and space debris remediation.”179

Looking forward, research continues to advance the availability of debris mitigation mechanisms, such as the European Space Agency’s newly-commissioned ClearSpace-1 satellite.180 Mission objectives increasingly include end-of-life procedures to place satellites in appropriate orbits to decrease clutter in areas where active satellites operate.181 In the context of private entities, Planetary Resources—originally positioned to become a principle player in the space mining industry—merged with Consensys Space and quickly launched TruSat, a crowd-sourced situational awareness forum that compiles the reports of private citizens to track objects in geospace.182 These developments instill confidence in the international community’s sentiments toward ameliorating this ever-approaching catastrophe. It is with great hope that this trend continues, and COPUOS promulgates binding regulations to ensure the sustainability of geospace for the common heritage of mankind. “But we can never do nothing. That which we have done for thousands of years is also action. It also produces evils.”183

#### Treating space as a commons solves orbital debris. Current non-binding agreements are not enough.

Silverstein & Panda ‘3/9 - Benjamin Silverstein [research analyst for the Space Project at the Carnegie Endowment for International Peace. MA, International Relations, Syracuse University Maxwell School of Citizenship and Public Affairs BA, International Affairs, George Washington University] and Ankit Panda [Stanton Senior Fellow in the Nuclear Policy Program at the Carnegie Endowment for International Peace. AB, Princeton University], “Space Is a Great Commons. It’s Time to Treat It as Such.” *Carnegie Endowment for International Peace* (Web). March 9, 2021. Accessed Dec. 13, 2021. <<https://carnegieendowment.org/2021/03/09/space-is-great-commons.-it-s-time-to-treat-it-as-such-pub-84018>> AT

The failure to manage Earth orbits as a commons undermines safety and predictability, exposing space operators to growing risks such as collisions with other satellites and debris. The long-standing debris problem has been building for decades and demands an international solution.¶ Competing states need to coalesce behind a commons-based understanding of Earth orbits to set the table for a governance system to organize space traffic and address rampant debris. New leadership in the United States can spur progress on space governance by affirming that Earth orbits are a great commons. So far, President Joe Biden and his administration have focused on major space projects, but a relatively simple policy declaration that frames Earth orbits as a great commons can support efforts to negotiate space governance models for issues like debris mitigation and remediation. The Biden administration can set the stage to pursue broad space policy goals by establishing a consensus among states, particularly those with the most invested in Earth orbits, that space is a great commons.¶ THE PRESSING NEED FOR SPACE GOVERNANCE¶ The Earth orbits that provide the majority of benefits to states and commercial ventures represent only a tiny fraction of outer space as a whole. Competition for the limited volume of these Earth orbits is especially fierce since two satellites cannot be in the same place at the same time and not all orbits are equally useful for all missions. The number of objects residing in Earth orbits is now at an all-time high, with most new objects introduced into orbits at altitudes of between 400 and 700 kilometers above sea level. Millions of pieces of debris in Earth orbits pose a threat to continuing space operations. For instance, the final U.S. space shuttle missions faced 1-in-300 odds of losing a space vehicle or crew member to orbital debris or micrometeoroid impacts.¶ Collisions with fragments of orbital litter as small as a few millimeters across can ruin satellites and end missions. Current technologies cannot track all of these tiny pieces of debris, leaving space assets at the mercy of undetectable, untraceable, and unpredictable pieces of space junk. Some researchers have determined that the debris population in low Earth orbit is already self-sustaining, meaning that collisions between space objects will produce debris more rapidly than natural forces, like atmospheric drag, can remove it from orbit.¶ States—namely the United States, Russia, China, and India—have exacerbated this debris accumulation trend by testing kinetic anti-satellite capabilities or otherwise purposefully fragmenting their satellites in orbit. These states, along with the rest of the multilateral disarmament community, are currently at an impasse on establishing future space governance mechanisms that can address the debris issue. A portion of this impasse may be attributable to disparate views of the nature of outer space in the international context. Establishing a clear view among negotiating parties that Earth orbits should be treated as a great commons would establish a basis for future agreements that reduce debris-related risks.¶ Beyond debris-generating, kinetic anti-satellite weapons tests, revolutionary operating concepts challenge existing space traffic management practices. For instance, commercial ventures are planning networks of thousands of satellites to provide low-latency connectivity on Earth and deploying them by the dozens. States are following this trend. Some are considering transitioning away from using single (or few) exquisite assets in higher orbits and toward using many satellites in low Earth orbits. These new operational concepts could lead to an increase in collision risks.¶ Without new governance agreements, problems related to debris, heavy orbital traffic, and harmful interference will only intensify. Debris in higher orbits can persist for a century or more. The costs of adapting to increasingly polluted orbits would be immense, and the opportunity costs would be even higher. For instance, all else being equal, hardening satellites against collisions increases their mass and volume, in turn raising launch costs per satellite. These costs, rooted in a failure to govern space as a commons, will be borne by all space actors, including emerging states and commercial entities.¶ EXISTING FORMS OF SPACE GOVERNANCE¶ A well-designed governance system, founded on a widespread understanding of Earth orbits as a great commons, could temper these risks. Currently, space is not wholly unregulated, but existing regulations are limited both in scope and implementation. Many operators pledge to follow national regulations and international guidelines, but decentralized accountability mechanisms limit enforcement. These guidelines also do not cover the full range of potentially risky behaviors in space. For example, while some space operators can maneuver satellites to avoid collisions, there are no compulsory rules or standards on who has the right of way.¶

Development of space resources is still possible with a commons model. Property rights are not necessary. Existing models governing commons encourage responsible development, numerous examples prove.

Saletta Sterling & Orrman-Rossiter 18 [Sterling Saletta, Morgan; Orrman-Rossiter, Kevin (2018). Can space mining benefit all of humanity?: The resource fund and citizen's dividend model of Alaska, the ‘last frontier’. Space Policy, (), S0265964616300704–. doi:10.1016/j.spacepol.2018.02.002] CT

The Outer Space Treaty (OST) came into force in 1967 and, having been ratified by all the major space faring governments as well as some 100 other nations, the Outer Space Treaty serves as the basis for international space law, the current corpus juris spatialis. The treaty declares the exploration and use of outer space shall be for, “the benefit and in the interests of all countries [27]” and that outer space, as mentioned previously, “shall be the province of all mankind [27]”.

With the increased commercialization of space, and the entrance of new actors, both national and private, the OST has come under increased scrutiny, with calls to expand, modify, and even to abrogate it [35,36]. Issues surrounding the mining of celestial bodies have received particular attention and debate [37]. Of particular concern is the matter of exploitation licences and property rights [38]. The OST expressly forbids the “national appropriation by claims of sovereignty, by means of use or occupation, or by other means” [27] of outer space and celestial bodies. This is frequently interpreted to mean that the OST denies private property claims in outer space, some authors and individuals [39–41] have argued that appropriation by non-nationalentities is allowed.

The Outer Space Treaty, and its terrestrial analogues, UN Convention on the Law of the Seas (UNCLOS) and the Antarctica Treaty System (ATS) are ‘global commons regimes', though the terminology governing these commons differs and juridical concepts such as “common heritage of humanity” found in UNCLOS (and the Moon Treaty of 1979) and the “common province of mankind” found in the Outer Space Treaty have been interpreted in various manners. Due in part to these varying wordings, interpretations and attendant uncertainties, the need for a more comprehensive framework governing the environmental, ethical, and commercial aspects of space exploration, exploitation and colonization has been highlighted by many authors [30,33,34].

Some advocates for the commercial exploitation of space claim that the absence of property rights is a barrier to such ventures, and in particular to the mining of celestial bodies such as the Moon or near earth asteroids [35]. Some have gone so far as to suggest an abrogation of the OST in favor of a treaty that allows something like fee-simple ownership and what might best be called a California gold rush approach to outer space resource exploitation [36–38]. Advocates of this approach would give something like fee-simple ownership of outer space resources on a ‘first in time, first in right’ basis with no clear licensing regime for such activities [39]. In recent US law, Title IV of H.R. 2262- the U.S. Commercial Space Launch Competitiveness Act, grants ownership of asteroid resources to entities obtaining them but attempts to walk a fine line between this approach and international treaty obligations. It does not grant ownership of asteroid themselves, and explicitly states that resource exploitation must be in accordance with federal laws and existing treaty obligations, i.e. the OST [40]. How such eventual exploitation occurs, and under what precise national and international regulatory and licensing regimes, is thus still a matter for the future to decide.

On the other hand, it has also been suggested that modifications and additions to the OST based on terrestrial models will provide sufficient guarantee of the right to make profits from the exploitation of outer space resources. Henry Hertzfeld and Frans von der Dunk argue the current regime does not pose a problem for exploitation rights and that terrestrial models would allow private ventures the right to reasonable returns on investment from resource exploitation in space [41]. Furthermore, in addition to important, and possibly irreconcilable, differences between a California gold rush style approach and the OST [42], arguments suggesting fee-simple or similar ownership is necessary for profitable private outer space resource exploitation simply do not stand in the face of contrary evidence from numerous terrestrial examples. These include offshore oil drilling, mining, timber and grazing operations in the United States and internationally which are regularly and profitably undertaken without ownership [43]. Thus P. M. Sterns and L. I. Tennen argue that the current international regime does provide an adequate framework for commercial development in space, that fee-simple ownership is unnecessary and:

“those who advocate the renunciation and abandonment of the nonappropriation principle are either seeking to increase their own bottom line by disingenuous and deceptive constructs, or lack an appropriate appreciation and respect for international processes [[44], p. 2439]”.

Thus, claims that a lack of private property rights in outer space will be a deterrent to commercial resource exploitation ventures in space do not reflect an adequate reflection and analysis of the manner in which current terrestrial practices might be extended into outer space without abrogating the current treaty regime. Nor would a system based on fee simple ownership be likely to tangibly benefit more than a small proportion of the world's population. Instead, the eventual wealth from exploiting celestial bodies would be concentrated in the hands of a few, exacerbating rather than alleviating existing problems for humanity and global sustainable development.

The Outer Space Treaty has provided an effective legal framework for the exploration of outer space for over 50 years. Based on the history of treaty regimes governing other international spaces, UNCLOS and the ATS, it seems likely that, in future, additional protocols and agreements will be layered onto the OST and that calls to abrogate and to negotiate a wholly new treaty system are unlikely to succeed. While low participation in the Moon Agreement, also known as the Moon Treaty of 1979, which has not been ratified by either the United States, Russia, or China, has raised questions of legitimacy, it has recently been argued that the Moon Treaty may receive renewed interest in the international community. René Lefeber argues that, far from stifling commercial ventures, the Moon Agreement “provides the best available option for mankind, states and industry to develop space mineral resources in a harmonious way [[5], p. 47]”, and that, as resource exploitation in outer space now seems likely, the need to elaborate an international regime to prevent conflict over resources may bring other parties to ratify, accede to, or sign the treaty.

Ultimately, some form of international governance of outer space as a global commons [45] building on the OST and the current corpus juris spatialis seems both more likely and more desirable than an abrogation of the OST and its replacement with an entirely new treaty regime. Thus, an international regime built upon this existing regime will need to be constructed which takes a balanced approach to space exploration, development and exploitation and which encourages entrepreneurial development but also moves beyond vague utopian platitudes to real and concrete benefits for all of humanity.