# AC Space Common Justice

## Framework

**I affirm the resolution resolved: The appropriation of outer space by private entities it unjust. To provide clarity for the round I offer the following definitions First appropriation: the act of taking or using something especially in a way that is illegal, unfair. Second unjust: absence of justice: violation of right or of the rights of another**

**Third Entity: an organization (such as a business or governmental unit) that has an identity separate from those of its members. These definitions are from the Merriam Webster dictionary.**

**Now leading on to my value which Stemmed from the term just in the resolution my value is Justice. When valuing Justice, one must make the choice to act with righteousness and virtues and in a manner that meets their due.**

Robert71

Cavalier, Robert. “A Theory of Justice(1971).” John Rawls, <http://caae.phil.cmu.edu/Cavalier/Forum/meta/background/Rawls.html>.

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#### Rawls's theory of justice revolves around the adaptation of two fundamental principles of justice which would, in turn, guarantee a just and morally acceptable society. The first principle guarantees the right of each person to have the most extensive basic liberty compatible with the liberty of others. The second principle states that social and economic positions are to be (a) to everyone's advantage and (b) open to all. A key problem for Rawls is to show how such principles would be universally adopted, and here the work borders on general ethical issues. He introduces a theoretical "veil of ignorance" in which all the "players" in the social game would be placed in a situation which is called the "original position." Having only a general knowledge about the facts of "life and society," each player is to make a "rationally prudential choice" concerning the kind of social institution they would enter into contract with. By denying the players any specific information about themselves it forces them to adopt a generalized point of view that bears a strong resemblance to the moral point of view. "Moral conclusions can be reached without abandoning the prudential standpoint and positing a moral outlook merely by pursuing one's own prudential reasoning under certain procedural bargaining and knowledge constraints."

**Thus leading to my value criterion to protect the common good, as all humans are due common human heritage. Including outer-space.**

## Contention 1: Common Human Heritage

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| Space is best regulated through a global commons Saletta, Morgan Sterling, and Kevin Orrman-Rossiter. "Can space mining benefit all of humanity?: The resource fund and citizen's dividend model of Alaska, the ‘last frontier’." *Space Policy* 43 (2018): 1-6. Morgan Rossiter 18(2) Some studies have optimistically suggested that profit making ‘space mining’ ventures could be undertaken with little or no govern- ment funding [8]. This does not, however, reflect that which has al- ready been invested in research, surveys and mapping of celestial bodies and the development of space technology by governments (in- cluding public/private partnerships), or the necessary technological developments likely to emerge from future missions by NASA and other Space Agencies. NASA's use of Space Act Agreements to engage in public-private partnerships such as that with SpaceX and Orbital ATK is part of a broad reshaping of the aerospace industry that will see in- creased privatization and commercial activities in space and new forms of Public-Private Partnerships (PPPs) which may also play a role in space resource exploitation [13]. **As greater numbers of actors, with complex relationships to stakeholders, including national governments, become active in outer space, the need to insure peaceful interactions, one of the primary goals of the (Outer Space Treaty) OST, will be increasingly important. Advocates of space exploration argue that human exploration (and utilization) of space has and will benefit all of humanity**. Indeed, the rhetoric of space exploration has been, since at least the time of Konstantin Tsiolkovsky, imbued with both techno-utopian and religious overtones by many of its advocates, many of whom speak in prophetic terms of a space faring human destiny [14–17]. The influence of the ‘Spaceship Earth’ metaphor [18], Apollo era Earth-rise photographs and what Frank White has called the “overview effect” [19] have been cited by numerous environmentalists as having an influence on the devel- oping environmental movement of the 1970's as well as offering humanity a vision of the Earth absent the political divisions seen on **1 programs have already benefitted much of humanity, access to these benefits remains uneven and challenges remain for the future in this regard [20]. Advocates of the privatization and commercialization of space also often frame their advocacy in terms of the benefits to man- kind and humanity as a whole [21], and there have been attempts to outline frameworks for the exploitation of resources in space which both provide for private entrepreneurship and profit making while also benefiting mankind as a whole [2**2]. Peter Diamandis, co-founder of the asteroid prospecting and mining company Space Resources, has re- cently cited Tsiolkovsky's famous UB in advocating a moral duty to explore and colonize space and expounding on the many riches of outer space which will drive this project, end terrestrial conflicts over resources, and enrich humanity [24]. Unsurprisingly, there is a ‘Silicon Valley’ venture capitalist mar- keting spin in the discourse surrounding the prospect of commercial resource exploitation in space, characterized by appeals to the mythos of the Wild West, gold rushes and with not infrequent echoes of Manifest Destiny. While companies and entrepreneurs justifiably intend to enrich their investors, claims that this will in turn enrich humanity more generally sound suspiciously like trickle-down economics [25**]. Private enterprise and the profit motive certainly have an increasingly crucial place in space exploration, and the current authors support commercial endeavors in space, but Space is not the Wild West frontier of Frederick Jackson Turner [26], with ‘free’ land for the taking-it is an international commons regulated by the Outer Space Treaty as ‘the common province of all mankin**d [27].” Thus, we argue that in a very real and legal sense, the sky belongs to everyone. Indeed, the current authors follow Virgiliu Pop [28] and others [29] in the view that outer 1 “When you're finally up at the moon looking back on earth, all those differences and nationalistic traits are pretty well going to blend, and you're going to get a concept that maybe this really is one world and why the hell can't we learn to live together like decent people.”— Frank Borman, Apollo 8, Newsweek Magazine, 23 December 1968. space is a res publica internationalis, or res communis, as is the atmo- sphere, much of the oceans and the sea floor. Is it possible to create a ‘balanced’ framework for the exploitation of outer space which encourages private enterprise while also tangibly accruing benefits to all humanity by a means more certain than vague platitudes and promises? Certainly, the need to create a stable frame- work for space exploration and resource exploitation has been high- lighted by many authors [30]. However, underlying the many different approaches to space exploration and exploitation at the international, national and subnational levels are various and often divergent poli- tical, economic, philosophical and ideological visions of property, the commons, and the appropriation of natural resources [31,32] with important implications for humanity's future in space and how the benefits of such a future will accrue and be apportioned. In considerations of future regimes governing outer space**, it is common to look to analogous terrestrial examples of 'global commons' management such as the UN Convention on the Law of the Seas (UNCLOS) and the Antarctica Treaty System (ATS) for inspiration [22].** While acknowledging the importance of these treaty systems as po- tential models, the current authors suggest that to establish a balanced, pragmatic framework for the exploitation of outer space, other terres- trial resource regimes can provide useful models and mechanisms that can enrich these discussions. In what follows, the present authors will briefly examine current debates with regard to the exploitation of outer space and the current corpus juris spatialis embodied in the Outer Space Treaty. It is our view that to achieve a balanced regime for the exploitation of outer space, building on the existing treaty system, policy makers, space agencies and would-be space mining entrepreneurs must be willing both to carefully examine existing terrestrial regimes of resource exploitation of public lands and global commons. The authors then examine one po- tential, and largely overlooked, terrestrial model of resource exploita- tion from Alaska, frequently referred to as the ‘last frontier’. **The Alaska Permanent Fund, a type of Natural Resource Fund**, is thus explored as a successful terrestrial example that encourages profit driven resource exploration and exploitation by commercial entities while also accruing tangible and sustainable benefits directly to re- sidents of Alaska. Adapted to the ‘final frontier’ of outer space, the **Alaska Permanent Fund and its citizen's dividend provide one possible model for building a balanced economic and legal framework with a purpose to encourage commercial enterprises**, whether private or public, while simultaneously accruing tangible, quantifiable benefits to all of humanity, in keeping with the visionary ideals fitting for a human future in space. 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 in- ternational space law, the current corpus juris spatialis. The treaty de- clares 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 in- creased 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 ce- lestial bodies. This is frequently interpreted to mean that the OST de- nies private property claims in outer space, some authors and in- dividuals [39–41] have argued that appropriation by non-national entities 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 explora- tion, exploitation and colonization has been highlighted by many au- thors [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 ap- proach 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 ex- amples. 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 pro- vide an adequate framework for commercial development in space, that fee-simple ownership is unnecessary and: “those who advocate the renunciation and abandonment of the non- appropriation 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 pro- portion 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 in- ternational 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 re- sources in a harmonious way [[5], p. 47]”, and that, as resource ex- ploitation 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 explora- tion, development and exploitation and **which encourages en- trepreneurial development but also moves beyond vague utopian pla- titudes to real and concrete benefits for all of humanity.**  . |

#### Common human heritage betters mankind through unified ownership ,Buxton states:

Carol R. Buxton, Property in Outer Space: The Common Heritage of Mankind Principle vs. the First in Time, First in Right, Rule of Property, 69 J. Air L. & Com. 689 (2004) https://scholar.smu.edu/jalc/vol69/iss4/3

Understanding the extension of property laws to outer space and celestial bodies requires comprehension of the underlying common heritage ideal, the essence of man's attempt to civilize outer space. Under the common heritage of mankind principle (the "common heritage principle" or the "principle"), nations

manage, rather than own, certain designated international zones.9 No national sovereignty over these spaces exists, and international law (i.e., treaties, international custom) governs. The common heritage of mankind principle deals with international management of resources within a territory, rather than the territory itself.' Because the principle renders claim of title to designated international, common heritage areas worthless and unrecognized, the issue for countries becomes access.1 **The common heritage principle seems unconcerned with ownership of designated areas, but rather focuses on the "uses of them for the benefit of humankind, to serve the common interest of peoples everywhere.'** 1 2 **It may prove difficult, however, to distinguish[es] the idea of access from that of ownership. As with most international principles, a split between less-developed nations and developed nations over the interpretation of the common heritage principle evolved. Less-developed nations believe that international areas designated for the common heritage of mankind do not belong to any one sovereign, but instead to all nations.13** **Therefore, any resource or benefit derived from those resources, or the use of them, should serve all of mankind. 4 Referring to it as a "common property" approach, less-developed nations assert that there should be common management of such areas, with a singular group possessing exclusive rights to exploit natural resources and distribute [distribution of] those resources equally to all nations, regardless of which nations actually funded the effort (either economically or by developing the technology or both)."**

#### The Alaska Permanent fund is a provides an exemplary example of how to implement justice through appropriation of the common good

. Saletta, Morgan Sterling, and Kevin Orrman-Rossiter. "Can space mining benefit all of humanity?: The resource fund and citizen's dividend model of Alaska, the ‘last frontier’." *Space Policy* 43 (2018): 1-6.

**Morgan 18(3)**

**The Alaska Permanent Fund was proposed by t**hen **Governor Jay Hammond** and established in 1976 by a constitutional amendment **with the purpose of investing a portion of the royalty payments from oil production on state owned land.** The purpose of the fund was twofold: to create a sustainable investment fund with the revenues from a de- pleting non-renewable resource, but also to limit the ability of politi- cians to spend these revenues on wasteful projects. Indeed, it is im- portant to note that while the APF is considered a model in terms of its transparency, in some countries resource funds have undermined the public interest and contributed to nepotism and corruption [49]. The creation of the Alaska Permanent Fund was motivated by lib- ertarian principles rather than 'socialist' ideology**. In 1977 Gov. Hammond proposed that a portion of the investment proceeds be payed as dividends to all Alaskan residents as part of his “Alaska, Inc.” plan** [50]. This is a unique feature of the APF- although many states have created wealth funds for various purposes, none pays a **dividend to all residents, regardless of age.** Indeed, the fund is a unique and democratic experiment in “intergenerational transfer of wealth and in the redis- tribution of public funds back to the private sector [[51], p. 139].” Many, if not most, Alaskans view the dividend as their right as share- holders in the natural resources of the state [52]. In keeping with the desire to shield the Fund from politicians, the establishment of an in- dependent trust corporation and a mandated ‘prudent investor' policy (adopted in 1980) means that the Fund is insulated from political pressure to invest in pet projects, and the dividend has created a vested and personal interest on the part of Alaskan residents in the health of the fund [50]. The APF is now worth some 63 billion dollars and recent payments from the Alaska Permanent Fund Dividend (APFD) to **each Alaskan resident have ranged from $2072 (US) in 2015 to $1100 in 2017** [53,54]. As the size of the dividends has generally grown over time and become an expected component of household budgets, there is active political support for the APFD across the political spectrum with active proponents including former Governor Sarah Palin. By investing the revenue from resource leasing rights in the global commons of outer space, and paying a ‘citizens’ dividend’ to all eligible residents of Earth, a **hypothetical 'outer space resource fund' modelled on the APF could create a vested public and international interest in its management**. By bypassing national governments and paying a divi- dend directly and equally to all eligible individuals (for example, adults over the age of 18) **such an approach could help prevent the potential mismanagement by politicians of funds from leasing outer space re- sources**. Most importantly, such a system would provide a framework encouraging commercial exploitation of outer space by ensuring legal clarity while simultaneously ensuring that the exploitation of “the common province of all mankind” [27] accrues tangible benefit to all of humanity. Such a system would also be consistent with the Moon Treaty should it gain renewed interest and increased participation by space faring nations. By accruing tangible benefits equally to all eligible human beings directly, a properly adapted Alaska Permanent Fund and citizen's dividend model applied to outer space resource licensing fees offers one possible means **with which to ensure future benefits from resource[resources] exploitation in outer space accrue to all of humanity-indeed** such a model **might very well be applicable to analogous terrestrial commons such as the Sea Floor and Antarctica. While the technological challenges in creating a payment system for all eligible members of the Earth's population are significant, they are probably less than the technological challenges in successfully mining asteroids or other celestial bodies.** Technological innovations such as mobile banking are rapidly penetrating the developing world [55,56] and represent one way that challenges to creating and distributing a ‘space dividend’ to all eligible members of the Earth's population could be overcome. Alternatively, as previously mentioned, the international commu- nity might implement a system in which royalties on production from outer space resource exploitation were apportioned to national gov- ernments rather than to individual citizens. That such an approach might be pragmatically more acceptable in the current international environment neither means that this will necessarily be the case in the future, nor should it preclude the serious discussion of alternatives such as we have outlined here from informing the discussion concerning the elaboration of future international regimes for managing the exploita- tion of resources in outer space. Furthermore, because even moderate dividends by developed countries standards would be proportionally much more significant in developing nations, such dividends, whether payed to nation states or to individual citizens, could be instrumental in achieving some of the most urgent goals of sustainable global development, goals embodied in the UN's Sustainable Development Goals Astronomers often point out that we share the same sky [58], and in many ways this sentiment is enshrined in the Outer Space Treaty. Providing a framework for the exploitation of space resources that balances international, **national and commercial interests while also benefitting all of humanity is both achievable and desirable**. Policy makers and academics should thoroughly explore terrestrial examples, including business-as-usual practices of royalties on production as well as more unusual models such as the APF for possible mechanisms and frameworks to further the goal of achieving an international regime that balances the many national, international, commercial and hybrid public/private interests in **outer space while minimizing the risks of conflicts between actors, including nation states and commercial or other interests acting as nation state proxies**. The exploitation of outer space resources may be a reality in the next 50 years. The resource fund model, built on royalties on production and with a system for the dis- tribution of benefits, of which the citizen's dividend mechanism of the Alaska Permanent Fund is but one example, provides one possible pathway, worth wider discussion and consideration, to build an inter- national regime for space exploration and exploitation that encourages entrepreneurial ventures while tangibly and truly benefiting all of humanity

## Contention 2: The Damages Associated with Private Appropriation

#### Private space appropriation leads to a massive increase in space junk, Holden 18

John Holden, July 12, 2018, The Irish Times, Why space capitalism will eat itself, https://www.irishtimes.com/business/innovation/why-space-capitalism-will-eat-itself-1.3556368

Which is great because when it comes to exploring space the end justifies the means. But now we must deal with the fallout from turning our galaxy into another market. Wild West It would be trite to compare the commercial space sector to the American Wild West. But with no one policing the burgeoning industry, **businesses operate untethered in a market where there are no rule**s and no open channels of communication**. It means satellites are launched unchecked every day by anyone** – from the amateur enthusiast in her back garden to major international space co-operatives. **It’s nearly impossible to know what’s really going on up there**. US officials believe there are about half a million man-made objects floating around in orbit. But that’s about as specific as they can get. Not very scientific. The only thing more predictable than tired Wild West analogies is the human species itself. We are a predictable bunch, prone to making the same mistakes over and over. As such, we enter a new era where space pollution is an issue. What could be a more iconic symbol of our wretched love for creating waste than flying devices designed never to return? Earlier this year, India broke all previous records by launching 104 satellites at once into orbit. Cool. Except those 104 satellites are destined to become 104 (or more) pieces of trash floating around in space. That’s right. Satellite technology, in its current state, is the new “lightbulb” of planned obsolescence. What could be a more iconic symbol of our wretched love for creating waste than flying devices designed never to return? When a satellite’s mission is complete, or it malfunctions, it’s gone. Girl, bye. **“Space junk” makes up a significant proportion of the guesstimated 500,000 plus objects floating around in orbit. About 23,000 of these objects are currently being tracked and maintained by the US Strategic Command. These so-called resident space objects are either satellites still in use or are known objects no longer fit for purpose. They could be as small as a tennis ball or the size of a double decker bus. I**n addition, however, **there are hundreds of thousands of other objects – bolts, exploded satellite pieces, large rockets and other space debris – that are unaccounted for. Efforts have been made to try to consolidate public with private data on what is up there but, for various reasons, the space community does not openly share information on where all objects are located.** Lack of regulation For the entrepreneurially inclined, it is probably not that surprising to hear **many are taking advantage of the severe lack of regulation in space**. Sure why wouldn’t you? Moreover why would anyone publicly disclose how and where their interests lie in a given market, intergalacticor otherwise, if they weren’t obliged to? But space isn’t just another market. Thinking one can apply the same rules up there as we use on earth is shortsighted for so many reasons. Down here the economic “unknowns” are known. Space is replete with unknown unknowns. If a satellite that is used to collect data to sell on to business customers one day stops sending data, and you haven’t the foggiest notion why, what do you tell the customers? How do you attribute cause? How does a company predict the likelihood of loss or damage to its equipment in space or perform other prudent exercises before getting into the space game? One of the chief concerns for any new business is risk and how to mitigate it. There couldn’t be a much riskier bet than entering a market with no regulation, patchy knowledge of your competitors’ location or size, and to top it all off, little understanding of the physical environment within which the business will operate. Until everyone is economically incentivised to behave responsibly in space, the chaos will continue. With aplomb. It won’t last forever though. The current lack of regulation is, in itself, the mother of all gaps in the biggest market civilization may ever exploit. And the Trump administration is the first to corner it. Suddenly the decision to give responsibility for space traffic management issues to the commerce department, and not the FAA, begins to make sense.

#### This increase of space debris is known as the Kessler Effect which cascades to means of nuclear war .

Les Johnson 13, Deputy Manager for NASA's Advanced Concepts Office at the Marshall Space Flight Center, Co-Investigator for the JAXA T-Rex Space Tether Experiment and PI of NASA's ProSEDS Experiment, Master's Degree in Physics from Vanderbilt University, Popular Science Writer, and NASA Technologist, Frequent Contributor to the Journal of the British Interplanetary Sodety and Member of the American Institute of Aeronautics and Astronautics, National Space Society, the World Future Society, and MENSA, Sky Alert!: When Satellites Fail, p. 9-12 [language modified]

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 [destruction] ~~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.

**On the odds that space debris does not lead to nuclear war, the act of private appropriation of space causes conflict between countries and puts our already established allies at risk.**

**Finkelstein and Nevitt 18**

Claire Finkelstein, Claire Finkelstein is the Algernon Biddle Professor of Law and Professor of Philosophy, and director of the Center for Ethics and the Rule of Law at the University of Pennsylvania. Mark Nevitt is the Sharswood Fellow at University of Pennsylvania Law School. "Trump risks leading the world into a space arms race." TheHill, 21 Aug. 2018, thehill.com/opinion/national-security/402640-trump-risks-leading-the-world-into-a-space-arms-race. [QC]

A motive might be sought in the potentially profitable commercial ventures in outer space, such as asteroid mining, for which the president has voiced support. The president may imagine that a Space Force is the way to gain control over and protect the valuable assets involved. However, this way of thinking is risky. Currently, outer space is “militarized” but not yet “weaponized.” **Militaries around the globe make heavy use of satellite technology** — such as surveillance and global positioning — but so far **they have refrained from placing weapons on satellites in outer space or using them directly for warfighting**. The administration’s ad hoc push for space dominance risks upsetting a delicate balance: space now hovers precariously at the brink of weaponization and it would take only one major country defecting from the current system of peaceful self-constraint to drive us into a major arms race in outer space. The current peaceful equipoise is largely because of the remarkable success of the 1967 Outer Space Treaty, an international agreement with which more than 100 signatory countries have been compliant. Under this treaty, space is considered a “province of mankind” that is not owned or controlled by any single nation. Article IV of the treaty provides that celestial bodies be used “for peaceful purposes only,” and objects in orbit carrying nuclear or weapons of mass destruction are strictly prohibited. Article II of the treaty makes clear that outer space “is not subject to national appropriation by claim of sovereignty**.”Seeking military dominance in space, coupled with encouraging appropriation of space for commercial purposes, puts us at loggerheads with our traditional allies, upsets stable and well-established treaty obligations, and moves the world closer to a highly dangerous arms race in outer space.** It is important to distinguish the idea of a Space Force from the pursuit of military and economic superiority in space. There may not be anything intrinsically wrong with the idea of a Space Force, or in somewhat more moderate form, a “Space Corps,” similar to the Marine Corps, or a “Space Command,” as Congress has called for in the 2019 National Defense Authorization Act, which President Trump signed into law last Monday. The merits of a stand-alone space unit depend on how its mission is conceived and how it fits into broader U.S. policy objectives in outer space, but a thoughtful, coherent and measured inter-agency space policy has yet to emerge. The danger comes from the aim of dominance, not the particular way in which dominance is sought. **In addition to potentially touching off an arms race of planetary proportions, there could be an economic race over space resources, comparable to the emerging fight over the Arctic or over deep-sea fishing rights. The combination of space weaponization and space commercialization easily could thrust us into a new cold war (or worse).** A hot war in outer space is unthinkable, and we cannot let it occur.