NC

I negate: The appropriation of outer space by private entities is unjust. I value justice, because the resolution concerns the justness of a state action. The criterion is maximizing well being, prefer because:

[1] Pleasure and pain are intrinsically valuable. People consistently regard pleasure and pain as good reasons for action. **Moen 16** [Ole Martin Moen, Research Fellow in Philosophy at University of Oslo "An Argument for Hedonism" Journal of Value Inquiry (Springer), 50 (2) 2016: 267–281] GI

I think several things should be said in response to Moore's challenge to hedonists. First, I do not think the burden of proof lies on hedonists to explain why the additional values are not intrinsic values. If someone claims that X is intrinsically valuable, this is a substantive, positive claim, and it lies on him or her to explain why we should believe that X is in fact intrinsically valuable. Possibly, this could be done through thought experiments analogous to those employed in the previous section. Second, there is something peculiar about the list of **additional intrinsic values** that counts in hedonism's favor: the listed values have a strong **tend**ency **to be** well **explained as things that** help **promote pleasure and avert pain.** To go through Frankena's list, **life** and **consciousness** are necessary presuppositions for pleasure; **activity**, health, and strength **bring about pleasure;** and happiness, beatitude, and contentment are regarded by Frankena himself as "pleasures and satisfactions." The same is arguably true of beauty, harmony, and "proportion in objects contemplated," and also of affection, friendship, harmony, and proportion in life, experiences of achievement, adventure and novelty, self-expression, good reputation, honor and esteem. Other things on Frankena's list, such as understanding, wisdom, freedom, peace, and security, although they are perhaps not themselves pleasurable, are important means to achieve a happy life, and as such, they are things that hedonists would value highly. Morally good dispositions and virtues, cooperation, and just distribution of goods and evils, moreover, are things that, on a collective level, contribute a happy society, and thus the traits that would be promoted and cultivated if this were something sought after. To a very large extent, the intrinsic values suggested by pluralists tend to be hedonic instrumental values. Indeed, pluralists' suggested intrinsic values all point toward pleasure, for while the other values are reasonably explainable as a means toward pleasure, pleasure itself is not reasonably explainable as a means toward the other values. Some have noticed this. Moore himself, for example, writes that though his pluralistic theory of intrinsic value is opposed to hedonism, its application would, in practice, look very much like hedonism's: "Hedonists," he writes "do, in general, recommend a course of conduct which is very similar to that which I should recommend."24 Ross writes that "[i]t is quite certain that by promoting virtue and knowledge we shall inevitably produce much more pleasant consciousness. These are, by general agreement, among the surest sources of happiness for their possessors."25 Roger Crisp observes that "those goods cited by non-hedonists are goods we often, indeed usually, enjoy."26 What Moore and Ross do not seem to notice is that their observations give rise to two reasons to reject pluralism and endorse hedonism. The first reason is that*7if the suggested non-hedonic intrinsic values are potentially explainable by appeal to just pleasure and pain (which, following my argument in the previous chapter, we should accept as intrinsically valuable and disvaluable), then—by appeal to Occam's razor—we have at least a pro tanto reason to resist the introduction of any further intrinsic values and disvalues. **It is ontologically** more **costly to posit a plurality of intrinsic values and disvalues, so in case all values admit** of **explanation by** reference to **a single intrinsic value and** a single intrinsic **disvalue, we have reason to reject more complicated accounts.** The fact that suggested non-hedonic intrinsic values tend to be hedonistic instrumental values does not, however, count in favor of hedonism solely in virtue of being most elegantly explained by hedonism; it also does so in virtue of creating an explanatory challenge for pluralists. The challenge can be phrased as the following question: If the non-hedonic values suggested by pluralists are truly intrinsic values in their own right, then why do they te nd to point toward pleasure and away from pain?27

[2] Moral uncertainty means preventing extinction should be our highest priority. **Bostrom 12** [(Nick Bostrom, Faculty of Philosophy & Oxford Martin School University of Oxford) "Existential Risk Prevention as Global Priority." Global Policy, 2012] TDI

These reflections on moral uncertainty suggest an alternative, complementary way of looking at existential risk; they also suggest a new way of thinking about the ideal of sustainability. Let me elaborate.¶ Our present understanding of axiology might well be confused. We may not now know — at least not in concrete detail — what outcomes would count as a big win for humanity; we might not even yet be able to imagine the best ends of our journey. If we are indeed profoundly uncertain about our ultimate aims, then we should recognize that there is a great option value in preserving — and ideally improving — our ability to recognize value and to steer the future accordingly. Ensuring that there will be a future version of humanity with great powers and a propensity to use them wisely is plausibly the best way available to us to increase the probability that the future will contain a lot of value. To do this, we must prevent any existential catastrophe.

Prefer-

1~ Bindingness— I could put my hand on a hot stove and I'd automatically pull it back before a signal is sent to my brain— Anything else fails to be morally binding because one could always ask "why not?"

2~Degrees of wrongness – only consequentialism can explain why breaking a promise to take someone to the hospital is worse than breaking a promise to play video games – absolutist frameworks fail because you can't weigh between violations of framework

That outweighs:

3~ Extinction first under any framework

A~ Future lives — trillions of future lives are lost. They are just as valuable as current ones – anything else says some lives are worth less than others which is genocidal rhetoric

B~ Reversibility — extinction forecloses future improvement; prefer — if we're unsure about which interpretation of the world is true, we should preserve it to figure things out.

Asteroid Mining DA

States need to guarantee property rights only on extracted minerals from asteroids, Macwhorter '15

MacWhorter, Kevin. "Sustainable mining: Incentivizing asteroid mining in the name of environmentalism." *Wm. & Mary Envtl. L. & Pol'y Rev.* 40 (2015): 645.

Congress should pass a law including two components: a domestic provision and an international provision. First, the law should **guarantee property rights in extracted minerals on a first-in-time basis, within the borders of the United States**. This could be accomplished **by declaring all private claims to extracted minerals, brought from outer space, to be respected within the United States,** much like Truman declared when he established the 200-mile economic zone.241 This would protect United States' economic interests, as well as the interests of its private space companies. Further, such a law would attract more investment and spur technological development within the United States. Second, to comply with international obligations, **the law should direct the President to treat with OST signatories to guarantee private property rights in extracted minerals from asteroids.** Again, based on a first-in-time theory of possession, the private actors would come into ownership t**hrough converting real property into personal property** and bringing it back to Earth. This is necessary in order to clearly define the liability of individual nations with respect to their private companies that venture to asteroids. It will also allow private companies to register their minerals, providing them with security in their possession while in outer space. It further decreases the ambiguous limbo many companies see as a barrier to a viable asteroid mining operation.

Asteroid mining is affordable, cheap, and coming soon Hlimi 14 [Tina Hlimi, Canadian lawyer with a Bachelors and Masters Degrees in Environmental Sciences from McGill University, 2014, "THE NEXT FRONTIER: AN OVERVIEW OF THE LEGAL AND ENVIRONMENTAL IMPLICATIONS OF NEAR-EARTH ASTEROID MINING," ANNALS OF AIR AND SPACE LAW, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2546924]/Kanke II. NEAR EARTH ASTEROID: DESCRIPTION AND BENEFITS OF MINING A Near-Earth Asteroid (NEA), oftentimes mistaken for a meteoroid (e.g. a shooting star), a meteorite (e.g. meteoroid which enters Earth's atmosphere and lands on the surface) or a comet (e.g. a small object with ice which vaporizes creating a tail of dust and gas)14 is a rock formation, smaller than a planet. Accordingly, asteroids are occasionally considered minor planets, planetoids or space debris. They are often called the latter, as it is thought they are remnant fragments of the Solar System. It is alleged that the majority of asteroids are composed of "material which never accreted to form planets". 15 Hence, asteroids are ancient rock formations (up to 4.6 billion years in age), akin to ancient fossil fuels reserves on Earth, 16 and it is the antiquity of NEAs which heightens their mineral composition and economic value. Perhaps the most significant benefit of NEAs is the financial returns which commercial entities anticipate upon harvesting. For instance, fragments of the Chelyabinsk, Russia asteroid-meteorite, which entered the atmosphere on February 2013 at an astounding 66,000 km/hour and exploded over Russia's Ural region, have been sold to American laboratories17 for prices upwards of US $10,000.18 Around the same time, another asteroid, 2012 DA14, worth a staggering USD $195 billion came very close to the Earth's orbit. If such asteroids are harvested, the returns could be significant for commercial entities, notwithstanding the logistical costs of exploring and extracting the minerals. NEAs are also extremely sought after by commercial entities as they are closer to the Earth than other celestial bodies, including the Moon. Planetary Resources, one of the leading NEA exploration and mining entities asserts that "[S]ome near-Earth objects are the most accessible destinations in the Solar System". In addition to their prime location, NEAs often have minute gravitational fields, when compared to other celestial bodies. Thus, modest propulsion (e.g. as opposed to the Moon) is required to deploy and return mining spacecraft to and from NEAs, minimising costs for corporations looking to protect their bottom-line.19 Propulsion may also be circumvented; in the 1980s researchers developed a "mass driver" magnetic catapult which could launch recovered natural resources into the Earth's orbit from either the Moon or another celestial body (e.g. a NEA), thus making it a "[c]heap and efficient means of transporting mined resources". 20 Other benefits of NEA mining include accessibility to superior water resources and mineral ore as well as advancing and enhanced scientific knowledge and familiarity with asteroid composition. NEA exploitation will also inevitably spur economic development through job creation and business growth (e.g. terrestrial/extraterrestrial refineries, spacecraft construction, engineers, operators etc.) if and when legal ambiguities are settled.21At present, the technologies for NEA exploitation are also becoming economical and will continue to depreciate in time.22 The sole noteworthy repercussion of NEA mining emanates from environmental pollution and degradation as discussed in greater detail in the following sections. III. TECHNOLOGICAL AND ECONOMIC PROGRESS SPURRING THE NEW SPACE RACE The present world is driven predominantly by commercial interests, which are in turn driven by the demands of a global market economy. Accordingly, it is clear that sufficient developments in spacecraft design, propulsion systems and robotic mining systems [...] already exist to enable some form of robotic prospecting and mining of asteroids.23 Since the start of the Cold War era and the space rivalry between the Soviet Union and the United States,24 the world has entered the space age. Noteworthy developments have included: the launch of Sputnik-1 by the Soviet Union and the first artificial satellite, the enactment of the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (OST), 25 the US moon landing, the 1979 adoption of the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement), 26 the launch and inhabitation of the International Space Station, the use of unmanned devices to explore planets like Mars, space tourism for ordinary civilians, 27 and the recent exploration and imminent exploitation of NEAs for mineral and hydrologic resources.28 Space-faring activities were first tweaked in the 1970s and 1980s with

the emergence of intergovernmental players in the sphere of telecommunications, 29 thus shifting the playing field from State monopolised space exploits to intergovernmental organisations.30 Indeed, in the last 20 years, state-funded programmes like NASA have dramatically declined, and NASA is currently managing its lowest federal budget since the 1960s.31The private sector has accordingly assumed the lead in research and technology, with the objective of reaping profitable returns in the realm of NEA harvesting. NEA mining is an attractive opportunity for private sector commercial entities as terrestrial resources may only be reused a number of times due to purity loss, even with the most advanced recovery mechanisms. In 1955, Dr. Edward Price argued: [t]he thermodynamic law of entropy indicates that unavailability is the ultimate tendency of recurring mineral usage as they eventually become too dispersed or impure during each use to be recoverable. 32 Similar to reuse, recycling also results in lost purity and is also an energyintensive process utilizing fossil fuels.33 For this reason, there has been a surge of extraterrestrial technological advances to inhibit resource declination, thus stimulating a new space race amongst private entities; in contrast to the conventional and once dominant States. Jakhu and Buzdugan premise that NEA harvesting is economically feasible as some large-scale terrestrial projects (e.g. hydroelectricity and rare-Earth mineral mining) are more costly to operate or comparable in cost to launching a NEA spacecraft into space. The authors believe that NEA harvesting will occur if there is a market for the mineral and hydrologic resources (which is now emerging), practical payback times (e.g. usually less than five years in order to attract and sustain investors), controllable risks (e.g. environmental and legal) and the legal protection of property rights for commercial claims.34 In addition to the economic prerequisites, varying technological advances will permit NEA mining, including the simple identification and characterisation of viable NEAs and the anticipated use of powerful and enduring cosmic rays to fuel spacecraft and overcome propulsion and gravitational concerns. The private entity NEA contenders currently include US incorporated Deep Space Industries and Planetary Resources. Deep Space Industries' vision statement asserts that the corporation: [b]elieves the human race is ready to begin harvesting the resources of space both for their use in space and to increase the wealth and prosperity of the people of planet Earth. The rival start-up, Planetary Resources, has greater media presence due to its backing by Google Inc. founders Larry Page and Eric Schmidt and director James Cameron. 35 In June 2013, Planetary Resources managed to raise US $1 million through an online crowd funding campaign. The funds are to be allocated towards the construction of their ARKYD space telescope.36 The telescope will permit Planetary Resources to monitor and identify NEAs for future mining, in addition to developing the robotic spacecraft required to seize and return asteroids to Earth. 37 Hence, Deep Space Industries and Planetary Resources comprise the next generation of non-State entrepreneurs, which will soon compete for celestial resources, while swimming through pages of legal and regulatory requirements relating to property rights, liability and environmental law. IV. THE GENERAL LEGAL ATMOSPHERE AND NEA MINING

Non appropriation regulations wreck legal certainty required for investor confidence in asteroid mining Campo 21 [Jose A. Martin del Campo, J.D. Candidate at Texas A&M University School of Law, 3-23-2021, "Finders K Finders Keepers: Who Has Say Over Private Property in Space," Texas A&M Journal of Property Law, https://scholarship.law.tamu.edu/cgi/viewcontent.cgi?article=1155&context=journal-of-property-law] /Kankee

I. INTRODUCTION On October 4, 1957, the Space Age officially began when the Soviet Union launched Sputnik into orbit, the first successful, human-made satellite.1 A little more than a decade later, on July 20, 1969, American astronauts Neil Armstrong and Edwin "Buzz" Aldrin became the first humans to land and step foot on the moon.2 Neil Armstrong marked the completion of John F. Kenney's national goal of landing an astronaut on the moon when he radioed back to Earth "[t]hat's one small step for man, one giant leap for mankind."3 The launch of Sputnik, the moon landing, and other endeavors achieved by the scientific community, kick-started a chain of events leading to the current ambition of exploring outer space and mining resources throughout the solar system. The push for unlocking low-cost space travel and space industrialization by entrepreneurs, like Elon Musk and Jeff Bezos, propels the search for extraterrestrial materials such as water and minerals.4 According to NASA, minerals found in the asteroid belt between Mars and Jupiter contain an estimated value of approximately $100 billion for every person on Earth.5 However, uncertainty lingers because private entities are unsure that they will possess property rights to their payload or the mined celestial body.6 Celestial bodies refer to naturally occurring objects in space. The United States Commercial Space Transportation Advisory Committee ("COMSTAC"), an advisory body to the Federal Aviation Administration's ("FAA") Office of Commercial Space Transportation ("FAA-AST"), has undertaken review regarding the granting of private property licenses.7 COMSTAC expressed a desire to confirm that private entity resource extractions may be owned and utilized as it deems appropriate.8 The current framework of space law is a combination of agreements with the foundation of space law consisting of the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies ("Outer Space Treaty").9 At the time of signing, the Outer Space Treaty hoped to foster cooperative and peaceful exploration of outer space without discrimination of any kind.10 However, Article II of the Outer Space Treaty contains the bane of private property rights in outer space, which forbids the national appropriation of the moon and other celestial bodies.11 While the Outer Space Treaty explicitly mentions the prohibition of public entities claiming celestial bodies, private enterprises risk failing to have their interest in property rights recognized by the global community. Private entities and investors grapple with the issues pertaining to their rights to mine and extract resources from outer space legally. Without further international recognition of their property rights, private entities may shy away from exploring the concept of celestial mining. The issue of not knowing what laws are applicable, or to whom private companies are accountable, impedes the progress private entities make in achieving their goal of harvesting extraterrestrial resources. Private entities fear that the non-appropriation clause of Article II of the Outer Space Treaty, the epicenter of the issue, will strip them of the right to transport their mined resources back to Earth. A new legal regime will likely need to be formed that facilitates the continuation of innovation and promotes the exploration of outer space. Whether or not past private and public international doctrines, i.e., the law of the sea, may provide guidance in creating a new doctrine of space law is yet to be determined. The advancement in modern technology, along with the depletion of natural resources, creates a unique opportunity for private entities to resolve this issue through the exploitation of outer space. Space law is once again relevant due to its inadequacies in protecting the property rights of said entities in space. Part II will explore the different treaties and principles that gave rise to space law, and Part III will analyze whether the application of such principles should continue, or if the establishment of a new regime offers a more beneficial long-term solution. Part IV will then explore the structure of a new outer space regime and the enforcement of property rights. II. LEGAL PRINCIPLES INFLUENCING THE DEVELOPMENT OF SPACE LAW

Asteroid mining solves climate change, resource shortages, and environmental degradation Hlimi 14 [Tina Hlimi, Canadian lawyer with a Bachelors and Masters Degrees in Environmental Sciences from McGill University, 2014, "THE NEXT FRONTIER: AN OVERVIEW OF THE LEGAL AND ENVIRONMENTAL IMPLICATIONS OF NEAR-EARTH ASTEROID MINING," ANNALS OF AIR AND SPACE LAW, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2546924]/Kankee

THE ENVIRONMENTAL BENEFITS OF NEAR EARTH ASTEROID HARVESTING Let us recapitulate what we have already found. Shortage of resources is not a fact; it is an illusion born of ignorance. Scientifically and technically feasible improvements in launch vehicles will make departure from Earth easy and inexpensive. Once we have a foothold in space, the mass of the asteroid belt will be at our disposal, permitting us to provide for the material needs of a million times as many people as Earth can hold. Solar power can provide all the energy needs of this vast civilisation (10,000,000 billion people) from now until the Sun expires. Using less than one percent of the helium-3 energy resources of Uranus and Neptune for fusion propulsion, we could send a billion interstellar arks, each containing a billion people, to the stars. There are about a billion Sun-like stars in our galaxy. We have the resources to colonise the entire Milky Way. 122 In addition to demystifying the legal doctrine governing outer space natural resource appropriation it is also necessary to weigh the benefits and detriments of space-faring activities. Foremost, States around the world are developing at unprecedented rates and the human population is mounting in conjunction with demand for natural resources to sustain the current and newly established western standard of living. One of the fastest growing nations, China, is experiencing unhindered growth facilitated by fossil fuel use from coal and extensive mining. This has caused substantial water, soil and air degradation. In the face of these troubles, NEA mining could be the key to preserving the Earth's bounty and replenishing contaminated water supplies. The influx of natural resources could thwart the burning of dirty coal and fossil fuels, thereby mitigating the effects of climate change, such as, rising sea level, atmospheric pollution, melting of sea ice and rising temperatures. NEA harvesting could also protect the ocean and the fragile and largely unexplored deep seabeds 123 from oil and gas drilling. It could furthermore protect ecosystems from rare-earth mineral mining predominantly used to fuel the electronics sector. 124 NEA mining is especially pertinent as China restricted its global exports of rare-earth minerals in 2009, incongruously citing the need to protect the environment. Unfortunately, the supply cuts have forced dependent States like Japan, the United States and South Korea to heighten rare-Earth mineral exploration. This accordingly led to Japan's 2011 discovery of rare-earth minerals in the ocean-bed deposits of the Pacific Exclusive Economic Zone (PEEZ) thereby necessitating risky, deep-sea mining techniques, which may result in marine pollution if not carefully designed and developed. Other States, which have joined the environmentally destructive rare-earth mineral exploration movement include India, Canada, Tanzania, Australia, Brazil and Vietnam., There is accordingly much competition and exploration for rare-earth minerals which could result in significant exploitation of untouched areas like the PEEZ seabed and Mongolia.125 Other regions which may soon be targeted for mineral and hydrological resources include Antarctica and the Arctic. With the advent of technological advances, environmentally destructive practices such as refining may soon occur in outer space, sparing the Earth of pollution. 126 Accordingly, NEA mining is a viable technology for preserving the Earth's environment by curbing atmospheric and marine pollution, enhancing water supply and quality and mitigating the effects of climate change; all while allowing humankind to maintain and even improve their standard of living through increased technologies, consumption and population growth. B. THE ENVIRONMENTAL CONSEQUENCES OF NEAR EARTH ASTEROID MINING

Warming causes extinction, escalatory conflicts, and mass suffering Melton 19 [Michelle Melton is a 3L at Harvard Law School. Before law school, she was an associate fellow in the Energy and National Security Program at the Center for Strategic and International Studies, where she focused on climate policy. Climate Change and National Security, Part II: How Big a Threat is the Climate? January 7, 2019. https://www.lawfareblog.com/climate-change-and-national-security-part-ii-how-big-threat-climate]

At least until 2050, and possibly for decades after, climate change will remain a creeping threat that will exacerbate and amplify existing, structural global inequalities. While the developed world will be negatively affected by climate change through 2050, the consequences of climate change will be felt most acutely in the developing world. The national security threats posed by climate change to 2050 are likely to differ in degree, not kind, from the kinds of threats already posed by climate change. For the next few decades, climate change will exacerbate humanitarian crises—some of which will result in the deployment of military personnel, as well as material and financial assistance. It will also aggravate natural resource constraints, potentially contributing to political and economic conflict over water, food and energy.

The question for the next 30 years is not "can humanity survive as a species with 1.5°C or 2°C of warming," but, "how much will the existing disparities between the developed and developing world widen, and how long (and how successfully) can these widening political/economic disparities be sustained?" The urgency of the climate threat in the next few decades will depend, to a large degree, on whether and how much the U.S. government perceives a widening of these global inequities as a threat to U.S. national security.

By contrast, if emissions continue to creep upward (or if they do not decline rapidly), by 2100 climate-related national security threats could be existential. The question for the next hundred years is not, "are disparities politically and economically manageable?" but, "can the global order, premised on the nation-state system, itself based on territorial sovereignty, survive in a world in which substantial swathes of territory are potentially uninhabitable?"

National Security Consequences of Climate Change to 2050

Scientists can predict the consequences of climate change to 2050 with some measure of certainty. (Beyond that date, the pace and magnitude of climate change—and therefore, the national security threat posed by it—depend heavily on the level of emissions in the coming years, as I have explained.) There is relative agreement across modeled climate scenarios that the world will likely warm, on average, at least 1.5°C above pre-industrial levels by about 2050—but perhaps as soon as 2030. This level of warming is likely to occur even if the world succeeds in dramatically reducing greenhouse gas emissions, as even the recent Intergovernmental Panel on Climate Change (IPCC) report implicitly admits. In other words, a certain amount of additional warming—at least 1.5°C, and probably more than that—is presumptively unavoidable.

Looking ahead to 2050, it can be said with relative confidence that the national security consequences of climate change will vary in degree, not in kind, from the national security threats already facing the United States. This is hardly good news. Even small differences in global average temperatures result in significant environmental changes, with attendant social, economic and political consequences. By 2050, climate change will wreak increasing havoc on human and natural systems—predominantly, but not exclusively, in the developing world—with attenuated but profound consequences for national security.

In particular, changes in temperature, the hydrological cycle and the ranges of insects will impact food availability and food access in much of the world, increasing food insecurity. Storms, flooding, changes in ocean pH and other climate-linked changes will damage infrastructure and negatively impact labor productivity and economic growth in much of the world. Vector-borne diseases will also become more prevalent, as climate change will expand the geographic range and intensity of transmission of diseases like malaria, West Nile, Zika and dengue fever, and cholera. Rising public health challenges, economic devastation and food insecurity will translate into an increased demand for humanitarian assistance provided by the military, increased migration—especially from tropical and subtropical regions—and geopolitical conflict.

Long-term trends such as declining food security, coupled with short-term events like hurricanes, could sustain unprecedented levels of migration. The 2015 refugee crisis in Europe portends the kinds of population movements that will only accelerate in the coming decades: people from Africa, Southwest and South Asia and elsewhere crossing land and water to reach Europe. For the United States, this likely means greater numbers of people seeking entry from both Central America and the Caribbean. Such influxes are not unprecedented, but they are unlikely to abate and could increase in volume over the next few decades, driven in part by climate change-related food insecurity, climate change-related storms and also by economic and political instability. Food insecurity, economic losses and loss of human life are also likely to exacerbate existing political tensions in the developing world, especially in regions with poor governance and/or where the climate is particularly vulnerable to warming (e.g., the Mediterranean basin). While the Arab Spring had many underlying causes, it also coincided with a period of high food prices, which arguably contributed to the protests. In some situations, food insecurity, economic losses and public health crises, combined with weak and ineffectual governance, could precipitate future conflicts of this kind—although it will be difficult to know where and when without more precise local studies of both underlying political dynamics and the regionally-specific impacts of climate change.

2100 and Beyond

While the national security impacts of climate change to 2050 are likely to be costly and disruptive for the U.S. military—and devastating for many people around the world—at some point after 2050, if warming continues at its current pace, changes to the climate could fundamentally reshape geopolitics and possibly even the current nation-state basis of the current global order.

To be clear, both the ultimate level of warming and its attendant political consequences is highly speculative, for the reasons I explained in my last post. Nonetheless, we do know that the planet is currently on track for at least 3-4°C of warming by 2100. The "known knowns" of higher levels of warming—say, 3°C—are frightening. At that 3°C of warming, for example, scientists project that there will be a nearly 70 percent decline in wheat production in Central America and the Caribbean, 75 percent of the land area in the Middle East and more than 50 percent in South Asia will be affected by highly unusual heat, and sea level rise could displace and imperil the lives hundreds of millions of people, among other consequences.

But even higher levels of warming are physically possible within this century. At these levels of warming, some regions of the world would be literally uninhabitable, likely resulting in the depopulation of the tropics, to say nothing of the consequences of sea-level rise for economically important cities such as Amsterdam and New York. Even if newly warmed regions of the far north could theoretically accommodate the resulting migrants, this presumes that the political response to this unprecedented global displacement would be orderly and conflict-free borders on fantasy.

The geopolitical consequences of significant levels of warming are severe, but if these changes occur in a linear way, at least there will be time for human systems to adjust. Perhaps more challenging for national security is the possibility that the until-now linear changes give way to abrupt and irreversible ones. Scientists forecast that, at higher levels of warming—precisely what level is speculative—humanity could trigger catastrophic, abrupt and unavoidable consequences to the ecosystem. The IPCC has considered nine such abrupt changes; one example is the potential shutting down of the Indian summer monsoon. Over a billion people are dependent upon the Indian monsoon, which provides parts of South Asia with about 80 percent of its annual rainfall; relatively minor changes in the monsoon in either direction can cause disasters. In 2010, a wetter monsoon led to the catastrophic flooding in Pakistan, which directly affected 20 million people; a drier monsoon in 2002 led to devastating drought. Studies suggest that the Indian summer monsoon has two stable states: wet (i.e., the current state) and dry (characterized by low precipitation over the subcontinent). At some point, if warming continues, the monsoon could abruptly shift into the second, "dry" state, with catastrophic consequences for over a billion people dependent on monsoon-fed agriculture. The IPCC suggests that such a state-shift is "unlikely"—that is, there is a 10 to 33 percent chance that a state-shift will happen in the 21st century—but scientists also have relatively low confidence in their understanding of the underlying mechanisms in this and other large-scale natural systems.

The consequences of abrupt, severe warming for national security are obvious in general, if unclear in the specifics. In 2003, the Defense Department asked a contractor to explore such a scenario. The resulting report outlined the offensive and defensive national security strategies countries may adopt if faced with abrupt climate change, and highlighted the increased risk of inter- and intra-state conflict over natural resources and immigration. Although the report may be off in its imagined timeframe (positing abrupt climate change by 2020), the world it conjures is improbable but not outlandish. If the Indian monsoon were to switch to dry state, and a billion people were suddenly without reliable food sources, for example, it is not clear how the Indian government would react, assuming it would survive in its current form. Major wars or low-intensity proxy conflicts seem likely, if not inevitable, in such a scenario.

This is not to say that a parade of climate horribles is certain—or even likely—to come to pass. Scientific understanding of the sensitivities in the climate system are far from perfect. It is also possible that emissions will decline more rapidly than anticipated, averting the worst consequences of climate change. But this outcome is far from guaranteed. And even if global emissions decline precipitously, humanity cannot be sure when or whether the planet has crossed a climate tipping point beyond which the incremental nature of the current changes shifts from the current linear, gradual progression to a non-linear and abrupt process.

Within the next few decades, the most likely scenario involves manageable, but costly, consequences on infrastructure, food security and natural disasters, which will be borne primarily by the world's most impoverished citizens and the members of the military who provide them with humanitarian assistance and disaster relief. But while the head-turning national security impacts of climate change are probably several decades away, the nature of the threat is such that waiting until these changes manifest is not a viable option. By the time the climate consequences are severe enough to compel action, there is likely to be little that can be done on human timescales to undo the changes to environmental systems and the human societies dependent upon them.

Indig CP

CP: The appropriation of outer space ought to be managed by indigenous people, including at least the establishment of an international cultural ethics office including all indigenous nations at the forefront of decision-making regarding the appropriation of outer space by private entities

[1] Appropriation needs to be grounded in indigenous voices. That's key to ensure space is maintained as a cultural heritage, rather than a final frontier, and meets their role of the ballot.

Vidaurri et al. '20 [Monica, Department of Physics and Astronomy, Howard University, NASA Goddard Space Flight Center; Aparna Venkatesan, Department of Physics and Astronomy, University of San Francisco; James Lowenthal, Department of Astronomy, Smith College; Parvathy Prem, Johns Hopkins University Applied Physics Laboratory;. Nature Astronomy, "The impact of satellite constellations on space as an ancestral global commons," https://www.nature.com/articles/s41550-020-01238-3] brett

Most students of astrophysics learn early in their careers that we, and what we consume or use daily, have been in the cores of stars multiple times or created in the death throes of stars. When we analyse the data of galaxies from billions of light years away, we know we are looking at our cosmic past. This perspective—knowing that the Universe is within us and that we and the Sun will recycle back into future generations of stars and planets—is not as removed as some may believe from the relational view of many Indigenous cultures rooted in 'Space and Place', or cultural views of the night sky. Space is our past and our future; we are united in this ancestry and this ultimate fate.

We advocate for a radical shift in the policy framework of international regulatory bodies towards the view of **space as** an ancestral global commons that contains the heritage and future of humanity's scientific and cultural practices. We do not use the term radical lightly; this shift requires a profound change in attitude towards what space means to all of us and our inherent beliefs about human ownership of space. Such an attitude contradicts the policies of many nations and actors in space today; for example, as recently as April 2020, the White House issued an Executive Order asserting that "Outer space is a legally and physically unique domain of human activity, and the United States does not view it as a global commons".

We also urge **federal** and **private space agencies** and corporations to immediately establish a **cultural ethics** office that can offer an integrative approach for cultural intelligence, supporting scientific progress and cultural protocols from a shared ethical space rather than artificially siloed perspectives, and that the reports and findings of such offices be **at the forefront of decision-making**. This will begin the long overdue process of involving all the stakeholders for dark skies and near-Earth space, especially historically marginalized and **Indigenous communities**, as we develop new policies for space treaties and **planetary protection** that avoid replicating the costly mistakes of the past. The exhilaration of space exploration must be grounded in long-term thinking, centring of **Indigenous voices**, and sustainability.

[2] Constellations are key to ensure indigenous access to broadband, ecological sustainability, and bridge the rural broadband gap.

Vidaurri et al. '20 [Monica, Department of Physics and Astronomy, Howard University, NASA Goddard Space Flight Center; Aparna Venkatesan, Department of Physics and Astronomy, University of San Francisco; James Lowenthal, Department of Astronomy, Smith College; Parvathy Prem, Johns Hopkins

University Applied Physics Laboratory;. Nature Astronomy, "The impact of satellite constellations on space as an ancestral global commons," https://www.nature.com/articles/s41550-020-01238-3] brett

Satellite constellations could greatly improve communications and ongoing monitoring of Earth phenomena ranging from weather and climate to disaster management. Such large constellations also have the potential to offer global connectivity through low-cost high-speed broadband internet. In principle, this could be the critical leap needed to bridge the very real digital divide2, especially for the world's most minoritized populations, including Indigenous communities. This divide has been exposed as a chasm during this pandemic year, affecting many millions of students and low-income workers. Broadband internet has become essential for daily life, especially during a pandemic year when remote forms of learning, teaching, work and even health (for example, telemedicine) have become the norm. In 2019, the FCC offered US$20 billion in subsidies over ten years to address the digital divide in rural communities in the United States, which was quickly followed by a number of filings for LEOsats. LEOsat broadband may benefit rural communities more than urban areas—these 'last mile' connections are still challenging to complete relative to concentrated (urban) populations where ground-based cable/fibre internet infrastructure is cheaper. Large satellite constellations thus have the potential to bridge the digital chasm, but time will tell whether the promise of low-cost high-speed internet worldwide is achieved, and what the financial costs to customers are. This potential democratization of space is worth noting, even if it may not lead to fair participation in space.

[3] Only ensuring large scale access to rural broadband can enable adoption of precision agriculture.

USDA '19 [US department of agriculture, April 2019, A Case For Rural Broadband, accessed 8/12/21, https://mobroadband.org/wp-content/uploads/sites/44/2020/07/case-for-rural-broadband.pdf] brett

Across the agricultural production cycle, farmers and ranchers can implement digital technologies as other modern businesses are doing, enhancing agriculture by driving decision-making based on integrated data, automating processes to increase operational efficiency, improving productivity with tasks driven by real-time insights, augmenting the role of management in the business of farming, and creating new markets with extended geographic reach. These patterns of digital transformation **create fundamental shifts in agricultural production, developing new ways of working that make the industry more productive, attractive, and financially sustainable for farmers and ranchers**. Tech companies which stand to benefit from industry transformation continue to capitalize on these shifts by developing new technologies, which according to one recent study, may help position themselves to capture a portion of an estimated $254 billion to $340 billion in global addressable digital agriculture market.13 Business Management shifts decision making from instinct to integrated data Precision Agriculture is transforming the way producers collect, organize, and rely on information to make key decisions. Traditionally, producers' long-term experiences have created a competitive advantage: years of experiments have produced insights and instincts about the land they have farmed and the animals they have raised. But the volume of data that is possible to collect today can accelerate that learning curve, helping producers learn faster and more rapidly adapt to market shifts—particularly on new fields and with new animals—and creating more nuanced insights, enabling them to act on leading indicators. This **creates a disparity between producers who can utilize high-speed Internet service and those who cannot**. Examples include the ability to do the following: • create decision tools to help farmers and ranchers estimate the potential profit and economic risks associated with growing one particular crop over another • decide which fertilizer is best for current soil conditions • apply pesticides in targeted areas of the field, to control pests rather than applying pesticides over the entire field • use limited water resources more effectively • respond to findings of sensors that monitor animal health and nutrition Better choices about what, where, and when to plant, fertilize, and harvest—or breed, feed, and slaughter—can drive above-average returns by removing unrecognized inefficiencies and scaling insights. Digitization shifts supply chain management and resource allocation from generic to precise. Precision Agriculture helps make the business of farming more efficient by minimizing inputs— such as raw materials and labor—and maximizing outputs. For example, previous research has found that 40 percent of fields are over-fertilized, which not only inflates the cost of inputs but also results in 15 percent–20 percent yield loss suffered from improper fertilizer application.14

Precise application of inputs, such as fertilizer, herbicides, and pesticides, allows farmers to adjust inputs to location-based characteristics and use exact amounts needed, which saves money and increases sustainability due to more efficient resource stewardship. Improved fertilizer, soil, and water use can significantly improve water quality with less runoff and reduce climate gas emissions, which is important since agriculture accounts for 10-15 percent of worldwide emissions.15 Despite reductions in necessary inputs, Next Generation Precision Agriculture helps maintain or increase yields, leading to significant gains in efficiency14. Real-time insights also improve logistics. When growing melons, for instance, real-time data can help farmers overcome challenges in storing and shipping their products. Melons should be stored in an optimal refrigeration environment to minimize spoilage, and real-time precision sensors can reduce spoilage by alerting staff to suboptimal variations in temperature and humidity, allowing the execution of remedies before major losses occur. When refrigerated storage is full or the market price is at a peak, the "Internet of Things" can provide real-time information about where trucks are located and locating customers to market products to help make the sale. LABOR EFFICIENCY boosts productivity by automating routine processes and enabling real-time response Connected devices equip farmers with a clear picture of their operations at any moment, making it possible to prioritize tasks more effectively and triage the most pressing issues. While routine inspection and scouting has typically been a regular part of farm management and has increased farm profitability14, connected technologies can track, sense, and flag where a producer should focus their time and attention that day. Similarly, e-connectivity has allowed rural farms to access new training resources and high-skilled labor that has not been previously available. Real-time data and automation can radically improve a producer's peace of mind and performance under time constraints, especially because of reduced physical and mental stress (no longer struggling to keep the machine on a row line between 6 and 10 hours in the field during harvest or planting). On dairy farms, for example, automated devices that milk and feed animals can also track each cow's activity and alert producers to potential problems. Because these tasks are traditionally done by the producer and farm personnel, e-connectivity can substantially reduce the amount of time and effort necessary to run farms. This leads to dramatic increases in flexibility, enabling time and talent to be directed to more advanced tasks. Farmers can use newly found time to re-invest in more high-value tasks like long-term planning and management of the operation. This shift towards farm management opens new possibilities for the way that farms conduct business. GEOGRAPHIC ACCESS extends the reach of the supply chain and shifts marketing from standard to differentiated As explained in the previous section, as Precision Agriculture unlocks additional time and resources to explore new ways of doing business farmers are re-investing their time into identifying options to improve inputs, including better-trained labor and more effective types of inputs. New customers and markets can also be explored to increase sales volume and revenues.

[4] Precision ag is key to solve ag runoff, a unique form of colonial dispossession.

Ling 17, Geoffrey Ling, a retired U.S. Army colonel, is an expert in technology development and commercial transition. He is a professor of neurology at Johns Hopkins University and the Uniformed Services University of the Health Sciences and a partner of Ling and Associates. Scientific American, June 26, 2017. "Precision Farming Increases Crop Yields" https://www.scientificamerican.com/article/precision-farming/ brett

As the world's population grows, farmers will need to produce **more** and more food. Yet arable acreage cannot keep pace, and the looming food security threat could easily devolve into regional or even global instability. To adapt, large farms are increasingly exploiting precision farming to increase yields, reduce waste, and mitigate the economic and security risks that inevitably accompany agricultural uncertainty.

Traditional farming relies on **managing entire fields**—making decisions related to planting, harvesting, irrigating, and applying pesticides and fertilizer—based on **regional conditions** and historical data. **Precision farming**, by contrast, combines sensors, robots, GPS, mapping tools and data-analytics software to customize the care that plants receive without increasing labor. Stationary or robot-mounted sensors and camera-equipped drones wirelessly send images and data on individual plants—say, information about stem size, leaf shape and the moisture of the soil around a plant—to a computer, which looks for signs of health and stress. Farmers receive the feedback in real time and then deliver water, pesticide or fertilizer in calibrated doses to only the areas that need it. The technology can also help farmers decide when to plant and harvest crops.

As a result, **precision farming** can improve **time management**, **reduce water and chemical use**, and produce healthier crops and **higher yields**—all of which benefit farmers' bottom lines and conserve resources while **reducing chemical runoff.**

Many start-ups are developing new software, sensors, aerial-based data and other tools for precision farming, as are large companies such as Monsanto, John Deere, Bayer, Dow and DuPont. The U.S. Department of Agriculture, NASA and the National Oceanic and Atmospheric Administration all support precision farming, and many colleges now offer course work on the topic.

In a related development, seed producers are applying technology to improve plant "phenotyping." By following individual plants over time and analyzing which ones flourish in different conditions, companies can correlate the plants' response to their environments with their genomics. That information, in turn, allows the companies to produce seed varieties that will thrive in specific soil and weather conditions. Advanced phenotyping may also help to generate crops with enhanced nutrition.

Growers are not universally embracing precision agriculture for various reasons. The up-front equipment costs—especially the expense of scaling the technology to large row-crop production systems—pose a barrier. Lack of broadband can be an **obstacle** in some places, although the USDA is trying to ameliorate that problem. Seasoned producers who are less computer-literate may be wary of the technology. And large systems will also be beyond the reach of many small farming operations in developing nations. But less expensive, simpler systems could potentially be applied. Salah Sukkarieh of the University of Sydney, for instance, has demonstrated a streamlined, low-cost monitoring system in Indonesia that relies on solar power and cell phones. For others, though, cost savings down the road may offset the financial concerns. And however reticent some veteran farmers may be to adopt new technology, the next generation of tech-savvy farmers are likely to warm to the approach.

[5] Gulf hypoxia is growing because of ag runoff---it'll collapse whole oceans---extinction

Dr. Ian **Hendy 17**, PhD in Trophic Marine Biology, Research and Communication Officer and Senior Scientific Researcher in Marine Ecology at the University of Portsmouth, Institute of Marine Sciences Laboratories, Gulf of Mexico 'Dead Zone' Is Already A Disaster – But It Could Get Worse, Phys Org, 8-14, https://phys.org/news/2017-08-gulf-mexico-dead-zone-disaster.html

Each summer, a large part of the Gulf of Mexico "dies". This year, the Gulf's **"dead zone"** is the largest on record, stretching from the mouth of the Mississippi, along the coast of Louisiana to waters off Texas, hundreds of miles away. Around 8,776 square miles of ocean, an area the size of New Jersey or Wales, is almost lifeless.

John Muir, the famed naturalist and early conservation campaigner, once said that: "When we try to pick out anything by itself, we find it hitched to everything else in the Universe." His point was that everything in nature is connected, and that no part of our ecosystem exists entirely independently from any other.

It is perhaps no surprise then that ultimate cause of the Gulf of Mexico's dead zone can be found many miles inland. Fertilisers used by farmers then wash into the Mississippi River and eventually into the sea, where nutrients such as nitrogen and phosphorus stimulate an explosion in microscopic algae, creating huge "algal blooms". The algae then die and sink to the bottom, where they decompose. But the same bacteria which decompose the algae also use the sea's oxygen during the process, leaving an **"anoxic" ocean**.

Fish and other mobile sea creatures are able to escape the suffocating dead zone. Less lucky however are the sponges, corals, sea squirts and other animals who live their lives fixed in one place on the sea bed. Low oxygen levels place them under great stress and we have seen **huge mortalities**. Such losses will of course **ripple up the food web**, creating a **negative chain reaction** of increasing mortality rates in larger and larger animals.

The "dead zone" has grown this year due to increased rainfall in America's Midwest washing ever greater amounts of nutrients into the Mississippi, which ultimately end up in the Gulf. Not only is this a huge conservation issue – the Gulf contains **key nursery**

habitats such as mangrove forests, sea grass beds and coral reefs that benefit adjacent fisheries – but it also has huge consequences for the local fishing economy, particularly the shrimp industry.

Steps are under way to slow down the ecological disaster. Some farmers in the Mississippi basin are using large grassy zones along waterways in order to soak up the agricultural fertilisers and filter out many of the nutrients before they make their way down the Mississippi to pollute the Gulf. However, it remains to be seen whether such measures are effective – and US farmers certainly need to **greatly reduce** the nitrogen and phosphates they use.

In the century since Muir's death, things have **sped up**. A larger population demands more food which means more deforestation, **more farmland** and **more fertiliser**. The increase demand placed on our land is **ultimately affecting the marine environment**.

These losses are **unsustainable**. The marine environment is **integral for all life on earth**, from an ecological and economic point of view. If we keep losing ecosystem services such as coastal nursery habitats and spawning grounds at this current rate, it will not just be an area the size of a state that is a dead zone, but the whole Gulf, or even **whole oceans**.

[6] Normal means is your aff says mega-constellations of satellites are a form of appropriation.

Johnson 20 [Chris, Space Law Advisor for Secure World Foundation, 9 years of professional experience in international space law and policy. J.D. from New York Law School; 2020; "The Legal Status of MegaLEO Constellations and Concerns About Appropriation of Large Swaths of Earth Orbit," https://swfound.org/media/206951/johnson2020_referenceworkentry_thelegalstatusofmegaleoconstel.pdf] brett *Yes this author is against constellations but they only exist to prove the link.

The **constellations** above, because they seem to so overwhelmingly possess particular orbits through the use of multiple satellites to occupy orbital planes, and in a manner that **precludes other actors** from using those exact planes, constitute an **appropriation** of those orbits. While the access to outer space is nonrivalrous – in the sense that anyone with the technological capacity to launch space objects can therefore explore space – it is also true that **orbits closer to Earth are unique**, and when any actor utilizes that orbit to such an extent to these proposed **constellations** will, it means that other actors simply cannot go there.

To allow **SpaceX**, for example, to so overwhelmingly occupy a **number of altitudes** with so many of their spacecraft, essentially means that SpaceX will henceforth be the **sole owner** and user of that orbit (at least until their satellites are removed). No other actors can realistically expect to **operate** there until that time. No other operator would dare run the risk of possible collision with so many other spacecraft in that orbit. Consequently, the sole occupant will be SpaceX, and if "possession is 9/10th of the law," then SpaceX appears to be the owner of that orbit.

Done Without Coordination

Additionally, SpaceX and other operators of megaconstellations are doing so without any real international conversation or agreement, which is especially egregious and transgressive of the norms of outer space. Compared to the regime for GSO, as administered by the ITU and national frequency administrators, Low Earth Orbit is essentially ungoverned, and SpaceX and others are attempting to seize this lack of authority to claim entire portions of LEO for itself; and before any international agreement, consensus, or even discussion is had. They are operating on a purely "first come, first served" basis that smacks of unilateralism, if not colonialism.

Governments Are Ultimately Implicated

As we know, under international space law, what a nongovernmental entity does, a State is responsible for. Article VI of the Outer Space Treaty requires that at least one State authorize and supervise its nongovernmental entities and assure their continuing compliance with international law. As such, the prohibition on nonappropriation imposed upon States under Article II of the Outer Space Treaty **applies equally to nongovernmental private entities such as SpaceX**.

Nevertheless, through the launching and bringing into use of the Starlink constellation, SpaceX will be the sole occupant, and thereby, possessor, both fact and in law, of 550 km, 1100 km, 1130 km, 1275 km, and 1325 km above our planet (or whatever orbits they finally come to occupy). The same is true for the other operators of these large constellations which will be solely occupying entire orbits.

Long-Term Occupation Constitutes Appropriation

These altitudes are additionally significant, as nonfunctional spacecraft in orbits lower than around 500 km will re-enter the Earth's atmosphere in months or a few years, but the altitudes selected for the Starlink constellation, while technologically desirable for their purposes, also mean that any spacecraft which are not de-orbited from these regions may be there for **decades**, or possibly even hundreds of years. By comparison, the granting of rights for orbital slots at GSO is in 15-year increments, a length of time much less than what the altitudes of the megaconstellations threaten. Such long spans of time at these altitudes by these megaconstellations further bolster the contention that this occupation rises to the level of **appropriation** of these orbits.

Prevents Others from Using Space

Article I of the Outer Space Treaty establishes that the exploration and use of outer space is "the province of all mankind." It further requires that this exploration and use shall be by all States "without discrimination of any kind, on a basis of equality and in accordance with international law..." However, when one private corporation so overwhelmingly possesses entire portions of outer space, their use is discriminatory to other potential users and interferes with their freedom to access, explore, and use outer space. So long as these actors are so dominantly possessing and occupying those orbits, their actions exclude others from using them. What other operator would dare use orbits where there are already hundreds of satellites operating as part of a constellation? It would be an extremely unwise and risky decision to try to share these orbits with a mega constellation, so they will likely choose other altitudes and orbits. This **massive occupation** of particular orbits effectively defeats others from enjoying the use of outer space. While a State can issue permits for one of its corporations allowing them to launch and operate satellites to this extent, that does not automatically mean that their activities in outer space, an area beyond national sovereignty, are therefore in perfect accordance with the strictures of international law. Indeed, national permissions offer no such guarantee.

No Due Regard for Others

That these megaconstellations violate the prohibition on appropriation in Article II is additionally supported by Article IX of the Outer Space Treaty. Article IX requires that in the exploration and use of outer space, States "shall be guided by the principle of cooperation and mutual assistance and shall conduct all their activities in outer space... with due regard to the corresponding interests of other States..." There is hardly any way to view this deployment of megaconstellations as showing any type of due regard to the corresponding interests of others. This lack of regard further supports the notion of their unilateral transgressive violations of the purposes of space law norms.

Harmful Contamination

The impacts of the spacecraft on the pressing issue of space debris need not be gone into detail here. Suffice it to say, megaconstellations threaten mega-debris. The failure rate of these comparatively cheap satellites should give pause, because if 5% of a constellation of 100 satellites fails, this is 5 guaranteed new pieces of debris intentionally introduced to the fragile space domain. Article IX of the Outer Space Treaty warns of harmful contamination of the space environment and requires States to take appropriate measures to prevent this harmful contamination. A responsible government could not, in all seriousness, permit the intentional release of such amounts of space debris, especially in the already fraught orbits that many megaconstellations are headed towards. While the threat of space debris is not directly relevant to the accusation of appropriation of outer space, it goes towards the argument that these actors are conducting activities in a manner lacking in regard to others, and in fact, amounts to excluding others from using the space domain. By excluding others, this has the effect of taking orbits for themselves, which IS occupation.

If This Isn't Appropriation, Then What Is?

Arguing in the alternative, if these megaconstellations – in their dominant occupation of entire orbits in orbital planes with numerous satellites – could be considered (merely for the sake of argument) to not be appropriation, we must therefore ask: what would be appropriation? What use of **void space**, including orbits of the Earth, would **constitute actual appropriation**? What further, additional fact of these uses of space, if added to the scenario, would cause that constellation to cross over the line into clearly prohibited appropriation? Perhaps the exact same scenario, but supplemented with an actual, formal claim of sovereignty, issued by a government, is the only element which could be added to megaconstellations which would then cross the threshold into appropriation. However, a formal claim of sovereignty would be merely an act occurring on Earth and would not change any actual facts in the space domain. Consequently, the lack of a **formal** claim of **sovereignty** should not be the deciding criteria in arriving at the conclusion that megaconstellations constitute appropriation of orbits.

Conclusion

In conclusion, these megaconstellations effectively occupy entire orbital regions with their vast fleet of spacecraft and in so doing effectively preclude other actors from sharing those domains. They have done so, or are attempting to do so, without any international consensus or discussion, which is most egregious for a domain outside of State sovereignty and which no State can own. Governments will ultimately be responsible for this appropriation, and both are prohibited from appropriating space. In distinction to GSO, their permission to go there means that they could occupy these regions for incredibly long periods — which again shows their appropriation. These constellations significantly prevent others from using those regions, which therefore interferes with others' right to explore and use space. And ultimately, this reckless ambition shows absolutely no due regard (as per Article IX) for the corresponding rights of others. As such, these **megaconstellations** constitute an impermissible appropriation of **particular regions** of **outer space**, regardless of any formal, official claim of such **by a responsible, authorizing government**.