## 1 (150)

#### Counterplan:

#### Property rights for asteroids should be governed by the doctrine of appropriation. Private appropriation of non-asteroid celestial bodies should be prohibited.

* Resources mined should be distributed democratically as per 1ac levine

#### No link turns -- rules of appropriation solve waste and abstract claims and alternative approaches don’t

Myers 16 -- Ross Myers (J.D. candidate at the University of Oregon Law School.), The Doctrine of Appropriation and Asteroid Mining: Incentivizing the Private Exploration and Development of Outer Space, 2016, Oregon Review of International Law, https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/19850/Meyers.pdf?sequence=1 WJ

Like water during the expansion of the American West, the exploration of space can be financed and incentivized by granting rights in resources to those who secure new resources and put them to beneficial use. Some legal scholars have suggested the traditional rule of capture be applied to asteroids,69 or that rights to asteroids be purchased directly from an international agency and owned as chattel.70 However, like water during America’s westward expansion, asteroids are not easily classified under traditional property regimes. Thus, a doctrine of appropriation would be more appropriate for asteroids than a traditional rule of capture or a chattel system, because a system based on the traditional rule of capture or chattel would result in waste, abstract claims, and complicated legal issues.

First, asteroid claims cannot be adjudicated under the traditional rule of capture, or as chattel, because such systems would be incredibly wasteful. As of now, scientists have observed approximately 450,000 asteroids in our solar system.71

But only a fraction of the observable bodies will be cost effective to mine. While it might one day be possible for a single entity to finance several mining missions at once, current costs associated with such a venture would limit almost any space-mining program to one or two asteroids, at least initially.72 The traditional rule of capture could allow an entity to quickly claim multiple asteroids merely by landing on them and planting a flag, without requiring the entity to show it can reasonably use the resources they have claimed.

Even worse would be a system where the same corporation could claim asteroids simply by discovering their existence and registering the claim. Allowing this type of unregulated claim would incentivize larger corporations capable of space travel to quickly claim reachable asteroids, but the claims could easily outpace those entities’ realistic expectations on what they could use. Under a traditional rule of capture system, the solar system could be divvied up long before the resources could conceivably be mined. A rule similar to the doctrine of appropriation used for water claims in the United States would alleviate this concern by limiting claims to those where a claimant can show a reasonable beneficial use for the resource.

Another concern posed by the traditional rule of capture or chattel system would be the creation of abstract claims. Some legal scholars have advocated for a system where asteroids would be categorized as chattel, and rights in asteroids would be granted to an entity that could identify an asteroid and register ownership of it with an international agency.73 The advantage of such a system would be that it would allow an international agency to keep track of asteroids, and it would allow for the mapping of the reachable solar system. The problem with this approach, however, is that it would result in abstract claims. If an entity could claim the rights to an asteroid without actual possession, there is nothing to prevent that company from claiming ownership long in advance of any real possibility of landing on it. One of the reasons for creating the doctrine of appropriation was to limit abstract claims over resources that were not being used in any reasonable way. Just as the plaintiffs in Hague had no recourse against the third party who wasted the natural gas reserve, there would be no cause of action against an entity that has the rights to an asteroid, but chooses not to exercise them.74 This may be particularly harmful to society because asteroids contain volatiles that may be essential to creating rocket fuel in space, which, in turn, may be crucial to deep space exploration.

Using asteroid-bound volatiles to make rocket fuel would reduce the cost and increase the range of space exploratory missions, possibly improving the human race’s ability to explore and develop space. Under a system were entities could claim asteroids without actual possession, those entities could exclude others from landing on the asteroids and using such resources, even when such resources are languishing unused in space. To prevent the creation of such abstract claims over asteroids, the doctrine of appropriation could be modified as to only grant rights only to entities who are able to demonstrate both actual possession and beneficial use. This would ensure that asteroids claims are limited to those where the resources are actually being used, thus, maximizing the utility of such celestial bodies to society.

Finally, asteroids cannot be adjudicated under the traditional rule of capture or a chattel system because their unique propensity to collide with other celestial bodies would result in vexing legal issues. Pop culture has popularized the notion of an asteroid crashing into the surface of Earth in movies and books, but interspace collisions may be a real concern. Asteroids are constantly moving through space, and they often crash into other asteroids or space debris, and sometimes onto the surface of planets. So real is the concern that space agencies regularly keep track of NEOs, or Near Earth Objects, which include around 10,000 asteroids large enough to be tracked in space.75 Imagine the scenario in the popular movie Armageddon, where society wrestles with the mechanics of destroying a huge asteroid that is headed straight for Earth.76 It would be strange, indeed, if the situation were further complicated by an entity owning the asteroid. Would the Earth have to compensate the company for the loss of resources, or would the company be forced to assume liability for the damage caused by the collision? What if the asteroid, rather than crashing into Earth, crashed instead into another asteroid owned by different entity? It makes sense that a company with actual possession of an asteroid should have a claim for actual mining equipment destroyed, but it seems unreasonable to treat the entire rock as the entity’s chattel. By limiting asteroid claims under a doctrine of appropriation-like system, society will be saved the headache of attempting to adjudicate such absurd situations.

Because the traditional rule of capture or a chattel system for the ownership of asteroids would result in waste, abstract claims, and absurd legal dilemmas, a modified doctrine of appropriation should replace existing outdated international space law relating to asteroids.’

#### Squo private companies are willing to invest, but the plan crosses a perception barrier which destroys investment

Shaw 13 - Lauren E, J.D. from Chapman University School of Law, ”Asteroids, the New Western Frontier: Applying Principles of the General Mining Law of 1872 to Incentive Asteroid Mining”, JOURNAL OF AIR LAW AND COMMERCE, Volume 78, Issue 1, Article 2, <https://scholar.smu.edu/cgi/viewcontent.cgi?article=1307&context=jalc> // recut MNHS NL

To some, the mining of asteroids might sound like the premise of a science fiction novel' or the solution to the heartwrenching, fictional scenario depicted in the film Armageddon.2 To others, it evokes a fantastical idea that may come to fruition in a distant reality. However, impressively funded companies have plans to send spacecraft to begin prospecting on asteroids within the next two years.' The issues associated with the mining of asteroids should be addressed before these plans are set in motion. Much has been written about the issues that might arise from allowing nations to own these space bodies and the minerals they contain; one such issue is the impact on international treaties.4 However, little has been written about the applicability of preexisting mining laws-which provide a basic property right scheme for the private sector-such as the General Mining Law of 1872 (Mining Law) to the management of asteroid mining.' The literature to date on how to legally address asteroid mining is minimal.' The articles that do address it propose the creation of different systems, such as a "property rights-based system that relies on the doctrine of first possession"7 or an international authority that would regulate mining operations.' Implementing a scheme that offers ownership of extracted resources without bestowing complete sovereignty is necessary to avoid an impending legal limbo-that is, an outer space "Wild West" equivalent where there is neither certainty nor security in who owns what.9 If private sector miners of asteroids know this right already exists, they will have more incentive to extract resources.' 0 This, in turn, would increase the chances of successful missions, resulting in numerous scientific and explorative benefits, along with the potential replenishment of key elements that are becoming increasingly depleted on Earth yet are still needed for modern industry. Scientists speculate that key elements needed for modern industry, including platinum, zinc, copper, phosphorus, lead, gold, and indium, could become depleted on Earth within the next fifty to sixty years." Many of these metals, such as platinum, are chemical elements that, unlike oil or diamonds, have no synthetic alternative.12 Once the reserves on Earth are mined to complete depletion, industries will be forced to recycle the existing supply of minerals, which will result in increased costs due to increased scarcity.' 3 However, evidence is accumulating that asteroids only a few hundred thousand miles away from Earth may be composed of an abundance of natural resources-including many of the minerals being mined to depletion on Earth-that could lead to vast profits." Most of the minerals

#### Public sector space innovation falls continues to fall short – . The private sector is key to space research/innovation. (Redistribution)

Follett 21 [Andrew Follett- previously space and science reporter for Daily Caller News Foundation, researcher for the Congressional Committee on Science, Space and Technology, the National Aeronautics and Space Administration, the Cato Institute, and the Competitive Enterprise Institute. currently conducts research analysis for nonprofit in Washington, D.C., area.. “Private Firms Are the Key to Space Exploration.” 8/21/21. National Review. https://www.nationalreview.com/2021/08/private-firms-are-the-key-to-space-exploration/]

America’s public-sector space program recently had a rough couple of weeks that perfectly exemplify why it desperately needs a free-market overhaul. On July 29, the International Space Station (ISS) suffered a serious loss of control after a Russian spacecraft docked with it, accidentally causing the station to make a full 540-degree rotation and a half before coming to a stop upside down, when the astronauts got it under control. Like most NASA programs, the ISS is massively over budget. Costs were initially projected at $12.2 billion, but the bill ultimately reached a stunning $150 billion. American taxpayers paid around 84 percent of that. What happened to the American dream of human space exploration? Put simply, the government happened. NASA devolved into a jobs program to bring home the space bacon. Then, on August 10, NASA’s inspector general released a report deeming plans to send astronauts back to the moon in 2024 unfeasible because of significant delays in developing the mission’s spacesuits. Right now the suits are being built by 27 different companies that successfully lobbied the government for a piece of the action. SpaceX’s Elon Musk has rightly noted that NASA has “too many cooks in the kitchen.” The difference between NASA’s cumbersome designed-by-committee suits and SpaceX’s suits — created by a single contractor — is remarkable, even to the naked eye. The report unconvincingly blames NASA’s failure to develop a new spacesuit over the last 14 years solely on shifting technical requirements. It recommends “ensuring technical requirements for the next-generation suits are solidified before selecting the acquisition strategy to procure suits for the ISS and Artemis programs.” Instead of dealing with the problem, the Biden administration is trying to distract attention from the space agency’s mismanagement by announcing plans to land the first person of color on the moon . . . even though NASA has been incapable of sending astronauts of any color into space under its own power since July 2011. NASA has been reduced to begging the Russians for a ride. The agency’s troubled Constellation program, meant to replace the Space Shuttle fleet, was canceled after tens of billions of dollars had already been spent. But NASA’s troubles are, depressingly, likely to get even worse. In November the James Webb Space Telescope (JWST) will finally launch, after taxpayers have forked over $9.7 billion. It was originally supposed to launch in 2007 on a budget of $500 million. That means the project is over a decade behind schedule and costing almost 20 times its initial budget. Perhaps the telescope, meant to locate potentially habitable planets around other stars and perhaps even extraterrestrial life, could instead search for a calendar . . . or fiscal sanity . . . in the stars? JWST isn’t the first NASA space telescope to suffer cost overruns and setbacks. The Hubble Space Telescope (HST) was originally intended to launch in 1983, but technical issues delayed the launch until 1990 because the main mirror was incorrectly manufactured. JWST is very likely to fail because it is supposed to unfold itself “origami style” in space in an extremely technically complicated process. If difficulties arise, JWST lacks HST’s generous margin for error because of its location far beyond earth’s orbit at the Sun-Earth L2 LaGrange point. NASA currently lacks the capability to send a team of astronauts out that far to fix any problems. Even if NASA could get out to JWST, the telescope doesn’t have a grappling ring for an astronaut to grab onto and thus could potentially kill astronauts attempting to fix it. It is hard to imagine a better example of the private sector’s amazing ability to outcompete government bureaucracy and mismanagement than NASA’s planned Shuttle replacement, the Space Launch System. It is estimated to cost more than $2 billion per flight. That’s on top of the $20 billion and nine years the agency has already spent developing the vehicle. Contrast that with the comparatively inexpensive $300 million spent by SpaceX to develop the Falcon 9 in a little over four years, and the fact that each Falcon 9 costs around $62 million. One SLS launch could pay for over 32 SpaceX launches. Private ventures such as SpaceX are more efficient because they have a lot more incentive to avoid excessive costs and focus on solutions: Their own money is at stake, and people spend their own money more carefully than they spend taxpayer dollars collected from others. Multiple private American space firms are currently pursuing accomplishments beyond those of NASA, and they are more advanced and ambitious than the entire government space programs of China and the European Union combined. So one possible solution to NASA’s woes would be to greatly increase its reliance on commercial launch providers. And one way to do that would be to return to the system that made civil aviation great: prizes to reward private-sector innovation

#### Asteroid mining is an unqualified good – it’s essential to advanced asteroid deflection, deep space travel, and fighting climate change

Heise 18 -- Jack Heise (Judicial Law Clerk at U.S. Courts of Appeals), Space, the Final Frontier of Enterprise: Incentivizing Asteroid Mining Under a Revised International Framework, 40 Mich. J. Int'l L. 189 (2018). https://repository.law.umich.edu/mjil/vol40/iss1/5 WJ

Asteroid mining has the potential to facilitate space travel, an outcome the OST holds to be in the interest of humanity as a whole.39 The potential of asteroid mining to reduce the cost of spaceflight, moreover, could facilitate the growth of the space economy. Asteroid mining thus aligns with another stated purposes of the OST in the sense that an expanded space econ- omy could provide substantial benefits to all mankind.40 First, in seeking to face the challenges posed by space travel, the public sector space race gave rise to numerous technological innovations, ranging from LEDs to emergency blankets to memory foam.41 It seems likely that the private space race would result in a similar degree of innovation, the products of which could benefit people across the globe.

Second, a successful mission to Mars could provide benefits beyond a mere sense of interplanetary accomplishment. NASA suggests that, given the parallels between the formation and evolution of Mars and Earth, a voyage there could help “us learn more about our own planet’s history and future.”42 The scientific advancements from such a mission cannot currently be anticipated and are difficult to predict, but “expand[ing] the frontiers of knowledge” in this manner could well bring benefits to all mankind.43

Third, the development of asteroid mining technology could also help advance asteroid diversion tactics. The development of the technology required to conduct successful asteroid mining operations could “help us to divert any incoming asteroids.”44 This is of great importance since NASA recently eliminated its Asteroid Redirect Mission due to funding cuts;45 NASA’s project was hailed by some scientists as a “critical step in demonstrating we can protect our planet from a future asteroid impact . . . .”46 Asteroid mining could step in and fill an important void. While the probability of an Armageddon-causing impact is low, the effects of an impact would be extremely severe.47 Even some mitigation of this risk as a byproduct of as- teroid mining would be a benefit to humanity as a whole.

Finally, reduced launch costs could facilitate measures to combat global climate change. One proposed solution for canceling out predicted increases in average worldwide temperature is to “prevent[] . . . about 1% of incoming solar radiation—insolation—from reaching the Earth. This could be done by scattering into space from the vicinity of Earth an appropriately small frac- tion of total insolation.”48 Asteroid mining could facilitate such measures in that “[t]echnologies that could greatly decrease the cost of space-launch could make a telling difference in the practicality of all types of space- deployed scattering systems of scales appropriate to insolation modulation.”49 There are certainly intermediate measures to combat climate change that ought to be taken first, but asteroid mining would facilitate this expedited solution. While some of the benefits of asteroid mining would doubtless accrue primarily to those nations with asteroid mining companies within their borders, the benefits noted in this section—space exploration as a gen- eral proposition, technological and scientific development, improvement of asteroid diversion technology, and facilitated means of swiftly countering climate change—would inure substantially to the benefit of all mankind.

#### Asteroids have no significance beyond their finite resources – property rights for asteroids are necessary for deep space travel and rare metals

Myers 16 -- Ross Myers (J.D. candidate at the University of Oregon Law School.), The Doctrine of Appropriation and Asteroid Mining: Incentivizing the Private Exploration and Development of Outer Space, 2016, Oregon Review of International Law, https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/19850/Meyers.pdf?sequence=1 WJ

Asteroids are “metallic, rocky bodies without atmospheres that orbit the sun and are too small to be classified as planets.”33 Like water, asteroids are limited resources that are unconnected to any form of real property. Asteroids vary greatly in size, and are believed to consist primarily of metals and water, sometimes in staggering quantities.34 As such, asteroids may contain significant resources that would help serve to incentivize and facilitate the exploration of space.

Asteroids can be divided into classes, the three most commercially relevant being C-type, M-type, and S-type.35 C-type asteroids (carbonaceous) are the most common variety, and approximately half of the near Earth asteroids that are at least 1km large are C-type asteroids.36 These asteroids have a high content of water, hydrogen, and methane, all of which could potentially be mined to create rocket fuel on-site.37 Rocket fuel storage provides a limit on how far space vessels can be sent into deep space, so the creation of rocket fuel on asteroids would allow missions to probe deeper into space without having to bring enough fuel for a return trip. This could reduce the cost and difficulty of such endeavors significantly, allowing for more efficient exploration and development of deep space.

M-type asteroids (metallic) have the high radar reflectivity characteristic of metals,38 and are probably the most economically attractive targets for mining missions because of the commercial value of the metals in an Earth market. S-type asteroids (stony) are rocky mixtures of silicates, sulphides, and metals,39 but the metals they contain may not be as valuable as those found in M-type asteroids, so they will probably not be the target of initial space mining missions.

Recent scientific reports have suggested a single asteroid may contain staggering quantities of rare metals.40 One report estimated that a moderately sized (1 km) M-type asteroid with a fair enrichment in platinum group metals may contain twice the tonnage of platinum group metals already harvested on Earth combined with economically viable platinum group metal resources still in the ground.41 Put simply, it is believed a single asteroid could contain more platinum than has ever been mined or ever will be mined on Earth. While the economic gain from a mining mission on such an asteroid would be offset by the huge initial cost of reaching the asteroid and capturing the metals, this figure suggests mining missions to asteroids could be extremely profitable. Planetary Resources, a fledgling asteroid mining company, has already targeted a metallic asteroid for a possible future mining mission.42 According to Planetary Resources, this single asteroid may contain more platinum than has ever been mined on Earth.43

Scientific reports have also suggested asteroids may contain large quantities of volatiles, such as hydrogen and methane, which could potentially be broken down and used to synthesize rocket fuel and transport spacecraft between space environments.44 Several companies are already researching how to successfully mine the metals contained in asteroids by using frozen water contained in the asteroid to produce rocket fuel for a return journey.45

Asteroids are similar to water in many respects: both have economic and practical importance and limited availability; both exist as floating objects unconnected to land; and both are practically and commercially important to society and many different industries both in the context of space travel, and in the context of natural resource acquisition. However, unlike water, under the current international treaties regarding space, claims by either private or government entities on celestial objects are prohibited.46

#### Space mining is the only way to solve climate change

Duran 21, (Paloma Duran is a journalist and industry analyst at Mexico Business News, “Is Space Mining the Best Option to Face Climate Change?”), 11-03-21, Mexico Business News, https://mexicobusiness.news/mining/news/space-mining-best-option-face-climate-change // MNHS NL

Going to net zero means that more mining is needed. Experts have said that the current supply cannot support the necessary metals demand for the green transition. As a result, new mining alternatives have gained greater relevance, among them is space mining. Several countries, including Mexico, have shown their interest in this alternative, creating a new space race. “The solar system can support a billion times greater industry than we have on Earth. When you go to vastly larger scales of civilization, beyond the scale that a planet can support, then the types of things that civilization can do are incomprehensible to us … We would be able to promote healthy societies all over the world at the same time that we would be reducing the environmental burden on the Earth,” said Dr. Phil Metzger, Planetary Scientist at the University of Central Florida. Currently, there are several attempts to address global warming and transition to a net zero carbon economy. There has been an increasing interest in renewable energy and infrastructure, which has increased demand for various minerals, especially lithium, cobalt, nickel, copper and rare earth elements. However, according to experts, the world is close to entering a metals supercycle, where demand will exceed available supply, causing prices to skyrocket. Consequently, the mining industry has sought alternatives to achieve the required supply. Options include recycling and improved mine waste management, sea mining and space mining. The latter is considered one of the alternatives with the greatest potential. However, a regulatory framework is still lacking and there is almost no experience in this regard. Despite the lack of knowledge regarding space mining, it has become a very attractive option since the planet is running out of resources. While some people believe that land-based mining is cheaper than space mining, experts believe this may change in the long term. Furthermore, within the solar system there are countless bodies rich in minerals, ores and elements that will accelerate the fight against climate change. “There will come a point when there is nothing left to mine on the surface, prompting mines to reach even further below. But even those resources are destined to run out and so we will aim toward ocean mining, which already has specific technologies that are being developed. Nevertheless, even those mines are limited as well. The mine of the future, which today may seem unlikely, will no longer be on our planet. There will be a time when space mining will be as common as an open leach mine,” Eder Lugo, Minerals Head at Siemens, told MBN. More than 150 million asteroids measuring approximately 100m are believed to be in the inner solar system alone. In addition, astronomers have also identified abundant minerals near the Earth’s space and the Main Asteroid Belt. There are three main groups into which asteroids are divided: C- type, S- type, and M- type. The last two groups are the most abundant in minerals such as gold, platinum, cobalt, zinc, tin, lead, indium, silver, copper and rare earth metals. "Energy is limited here. Within just a few hundred years, you will have to cover all of the landmass of Earth in solar cells. So, what are you going to do? Well, what I think you are going to do is you are going to move out in space … all of our heavy industry will be moved off-planet and Earth will be zoned residential and light-industrial,” said Jeff Bezos, Founder of Amazon and the Space Launch Provider Blue Origin.

#### Warming causes extinction

Yangyang Xu 17, Assistant Professor of Atmospheric Sciences at Texas A&M University; and Veerabhadran Ramanathan, Distinguished Professor of Atmospheric and Climate Sciences at the Scripps Institution of Oceanography, University of California, San Diego, 9/26/17, “Well below 2 °C: Mitigation strategies for avoiding dangerous to catastrophic climate changes,” Proceedings of the National Academy of Sciences of the United States of America, Vol. 114, No. 39, p. 10315-10323

We are proposing the following extension to the DAI risk categorization: warming greater than 1.5 °C as “dangerous”; warming greater than 3 °C as “catastrophic?”; and warming in excess of 5 °C as “unknown??,” with the understanding that changes of this magnitude, not experienced in the last 20+ million years, pose existential threats to a majority of the population. The question mark denotes the subjective nature of our deduction and the fact that catastrophe can strike at even lower warming levels. The justifications for the proposed extension to risk categorization are given below.

From the IPCC burning embers diagram and from the language of the Paris Agreement, we infer that the DAI begins at warming greater than 1.5 °C. Our criteria for extending the risk category beyond DAI include the potential risks of climate change to the physical climate system, the ecosystem, human health, and species extinction. Let us first consider the category of catastrophic (3 to 5 °C warming). The first major concern is the issue of tipping points. Several studies (48, 49) have concluded that 3 to 5 °C global warming is likely to be the threshold for tipping points such as the collapse of the western Antarctic ice sheet, shutdown of deep water circulation in the North Atlantic, dieback of Amazon rainforests as well as boreal forests, and collapse of the West African monsoon, among others. While natural scientists refer to these as abrupt and irreversible climate changes, economists refer to them as catastrophic events (49).

Warming of such magnitudes also has catastrophic human health effects. Many recent studies (50, 51) have focused on the direct influence of extreme events such as heat waves on public health by evaluating exposure to heat stress and hyperthermia. It has been estimated that the likelihood of extreme events (defined as 3-sigma events), including heat waves, has increased 10-fold in the recent decades (52). Human beings are extremely sensitive to heat stress. For example, the 2013 European heat wave led to about 70,000 premature mortalities (53). The major finding of a recent study (51) is that, currently, about 13.6% of land area with a population of 30.6% is exposed to deadly heat. The authors of that study defined deadly heat as exceeding a threshold of temperature as well as humidity. The thresholds were determined from numerous heat wave events and data for mortalities attributed to heat waves. According to this study, a 2 °C warming would double the land area subject to deadly heat and expose 48% of the population. A 4 °C warming by 2100 would subject 47% of the land area and almost 74% of the world population to deadly heat, which could pose existential risks to humans and mammals alike unless massive adaptation measures are implemented, such as providing air conditioning to the entire population or a massive relocation of most of the population to safer climates.

Climate risks can vary markedly depending on the socioeconomic status and culture of the population, and so we must take up the question of “dangerous to whom?” (54). Our discussion in this study is focused more on people and not on the ecosystem, and even with this limited scope, there are multitudes of categories of people. We will focus on the poorest 3 billion people living mostly in tropical rural areas, who are still relying on 18th-century technologies for meeting basic needs such as cooking and heating. Their contribution to CO2 pollution is roughly 5% compared with the 50% contribution by the wealthiest 1 billion (55). This bottom 3 billion population comprises mostly subsistent farmers, whose livelihood will be severely impacted, if not destroyed, with a one- to five-year megadrought, heat waves, or heavy floods; for those among the bottom 3 billion of the world’s population who are living in coastal areas, a 1- to 2-m rise in sea level (likely with a warming in excess of 3 °C) poses existential threat if they do not relocate or migrate. It has been estimated that several hundred million people would be subject to famine with warming in excess of 4 °C (54). However, there has essentially been no discussion on warming beyond 5 °C.

Climate change-induced species extinction is one major concern with warming of such large magnitudes (>5 °C). The current rate of loss of species is ∼1,000-fold the historical rate, due largely to habitat destruction. At this rate, about 25% of species are in danger of extinction in the coming decades (56). Global warming of 6 °C or more (accompanied by increase in ocean acidity due to increased CO2) can act as a major force multiplier and expose as much as 90% of species to the dangers of extinction (57).

#### The bodily harms combined with climate change-forced species destruction, biodiversity loss, and threats to water and food security, as summarized recently (58), motivated us to categorize warming beyond 5 °C as unknown??, implying the possibility of existential threats. Fig. 2 displays these three risk

#### Delaying space colonization by even a second is worth 100 trillion lives -- most conservative estimate

Bostrom 3 -- Nick Bostrom (Needs no further introduction), Astronomical Waste: The Opportunity Cost of Delayed Technological Development, Utilitas Vol. 15, No. 3 (2003): pp. 308-314, https://www.nickbostrom.com/astronomical/waste.html WJ

As I write these words, suns are illuminating and heating empty rooms, unused energy is being flushed down black holes, and our great common endowment of negentropy is being irreversibly degraded into entropy on a cosmic scale. These are resources that an advanced civilization could have used to create value-structures, such as sentient beings living worthwhile lives.

The rate of this loss boggles the mind. One recent paper speculates, using loose theoretical considerations based on the rate of increase of entropy, that the loss of potential human lives in our own galactic supercluster is at least ~10^46 per century of delayed colonization.[1] This estimate assumes that all the lost entropy could have been used for productive purposes, although no currently known technological mechanisms are even remotely capable of doing that. Since the estimate is meant to be a lower bound, this radically unconservative assumption is undesirable.

We can, however, get a lower bound more straightforwardly by simply counting the number or stars in our galactic supercluster and multiplying this number with the amount of computing power that the resources of each star could be used to generate using technologies for whose feasibility a strong case has already been made. We can then divide this total with the estimated amount of computing power needed to simulate one human life.

As a rough approximation, let us say the Virgo Supercluster contains 10^13 stars. One estimate of the computing power extractable from a star and with an associated planet-sized computational structure, using advanced molecular nanotechnology[2], is 10^42 operations per second.[3] A typical estimate of the human brain’s processing power is roughly 10^17 operations per second or less.[4] Not much more seems to be needed to simulate the relevant parts of the environment in sufficient detail to enable the simulated minds to have experiences indistinguishable from typical current human experiences.[5] Given these estimates, it follows that the potential for approximately 10^38 human lives is lost every century that colonization of our local supercluster is delayed; or equivalently, about 10^29 potential human lives per second.

While this estimate is conservative in that it assumes only computational mechanisms whose implementation has been at least outlined in the literature, it is useful to have an even more conservative estimate that does not assume a non-biological instantiation of the potential persons. Suppose that about 10^10 biological humans could be sustained around an average star. Then the Virgo Supercluster could contain 10^23 biological humans. This corresponds to a loss of potential equal to about 10^14 potential human lives per second of delayed colonization.

What matters for present purposes is not the exact numbers but the fact that they are huge. Even with the most conservative estimate, assuming a biological implementation of all persons, the potential for one hundred trillion potential human beings is lost for every second of postponement of colonization of our supercluster.[6]

## 2 (80)

#### CP: Aff actors ought to

#### -- Announce that appropriation of outer space by private actors violates the global commons and that this is a settled matter of customary international law Announce that this action is taken pursuant to *opinio juris* (the belief that the action is taken pursuant to a legal obligation) and that non-compliant actors are in violation of international law

#### --Fully comply, not appropriating outer space in a manner inconsistent with these proclamations

Prove that it is unjust certain instances – goes against any rez trick

#### Solves the Aff.

[Fabio](https://kluwerlawonline.com/journalarticle/Air+and+Space+Law/33.3/AILA2008021) **Tronchetti 8**. Dr. Fabio Tronchetti works as a Co-Director of the Institute of Space Law and Strategy and as a Zhuoyue Associate Professor at Beihang University, “The Non–Appropriation Principle as a Structural Norm of International Law: A New Way of Interpreting Article II of the Outer Space Treaty,” Air and Space Law, Volume 33, No 3, 2008, <https://kluwerlawonline.com/journalarticle/Air+and+Space+Law/33.3/AILA2008021>, RJP, **DebateDrills**.

The non–appropriation principle represents the fundamental rule of the space law system. Since the beginning of the space era, it has allowed for the safe and orderly development of space activities. Nowadays, however, the principle is under attack. Some proposals, arguing the need for abolishing it in order to promote commercial use of outer space are undermining its relevance and threatening its role as a guiding principle for present and future space activities. This paper aims at safeguarding the non–appropriative nature of outer space by suggesting a new interpretation of the non–appropriation principle that is based on the view that this principle should be regarded as a customary rule of international law of a special character, namely ‘a structural norm’ of international law.

#### That competes ---

#### ] Widespread support for OST overhaul means a new treaty is likely---top military leaders are pushing it.

Theresa **Hitchens 21**. Theresa Hitchens is the Space and Air Force reporter at Breaking Defense. The former Defense News editor was a senior research associate at the University of Maryland’s Center for International and Security Studies at Maryland (CISSM). Before that, she spent six years in Geneva, Switzerland as director of the United Nations Institute for Disarmament Research (UNIDIR). “US Should Push New Space Treaty: Atlantic Council,” Breaking Defense, April 12, 2021, <https://breakingdefense.com/2021/04/us-should-push-new-space-treaty-atlantic-council/>, RJP, **DebateDrills**

WASHINGTON: The US should push hard to overhaul the entire international legal framework for outer space — including replacing the foundational [1967 Outer Space Treaty (OST),](https://breakingdefense.com/tag/outer-space-treaty/) a new report from the Atlantic Council says.

As it moves to do so, the US also should more aggressively court allies with an eye to establishing a “collective security alliance for space” among likeminded countries to “deter aggression” and defend “key resources and access.”

“The 1967 Treaty is dated. It was written, literally, in a different era,” said former Air Force Secretary Deborah Lee James in an Atlantic Council briefing today. “At present it is too broad, and in some cases it’s probably overly specific.”

The year-long study, [“The Future of Security In Space: A Thirty-Years US Strategy”](https://www.atlanticcouncil.org/wp-content/uploads/2021/04/TheFutureofSecurityinSpace.pdf)was co-chaired by James and retired Marine Corps Gen. Hoss Cartwright, former vice chair of the Joint Chiefs of Staff. In essence, it argues that the US needs to lead international efforts to craft a new rules-based regime to govern all space activities — from exploration to commercial ventures to military interactions. As the two argued in a recent [op-ed in Breaking D,](https://breakingdefense.com/2021/03/the-space-rush-new-us-strategy-must-bring-order-regulation/) “Great-power competition among the United States, China, and Russia has launched into outer space without rules governing the game.”

“The international law of space, centered on the 1967 Outer Space Treaty, is outdated and insufficient for a future of space in which economic activity is primary. The international community needs a new foundational space treaty, and the United States should precipitate its negotiation,” the study argues.

James elaborated that the idea would be to craft a more expansive treaty that covers emerging issues like debris mitigation and removal and [commercial extraction of resources](https://breakingdefense.com/tag/space-resource-extraction/) from the Moon and/or asteroids. That said, she stressed that the US should not abandon the OST — which has been signed by 193 nations — unless and until something new is there to replace it.

#### 2] Space law is typically treaty-based---Russian and Chinese proposals prove.

Stephanie **Nebehay 8**. Reporter, Reuters, “China, Russia to Offer Treaty to Ban Arms in Space,” Reuters, January 26, 2008, <https://www.reuters.com/article/us-arms-space/china-russia-to-offer-treaty-to-ban-arms-in-space-idUSL2578979020080125>, RJP, **DebateDrills**

GENEVA (Reuters) - China and Russia will submit a joint proposal next month for an international treaty to ban the deployment of weapons in outer space, a senior Russian arms negotiator said on Friday.

Valery Loshchinin, Russia’s ambassador to the United Nations-sponsored Conference on Disarmament, said the draft treaty would be presented to the 65-member forum on February 12.

Russian Foreign Minister Sergei Lavrov is due to address the Geneva forum, which constitutes the world’s main disarmament negotiating body, on that day. Loshchinin gave no details on the proposal which has been circulated to some senior diplomats.

Tensions between Russia and the United States have deepened in recent years over U.S. plans to revive its stalled “Star Wars” program from the 1980s with a new generation of missile defense shields.

Nuclear and other weapons of mass destruction are banned from space under a 1967 international treaty. But Washington’s plans have stirred concerns about non-nuclear arms in space.

#### 3] Treaties are the foundation of space law.

Sophie **Goguichvili et. al 21**. Program Associate, the Wilson Center, “The Global Legal Landscape of Space: Who Writes the Rules on the Final Frontier?” The Wilson Center, October 1, 2021, <https://www.wilsoncenter.org/article/global-legal-landscape-space-who-writes-rules-final-frontier>, RJP, **DebateDrills**

As previously mentioned, a series of treaties adopted by the U.N. General Assembly (UNGA) form the foundation of the global space governance system. The first and most significant of these treaties is the “Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies,” more commonly known as the **Outer Space Treaty**or**OST** for short (1967). The Outer Space Treaty is considered the most comprehensive space treaty and provides the basic framework for international space law, namely: the exploration and use of outer space for peaceful purposes by all States for the benefit of mankind (Art. I); the outlaw of national appropriation or claims of sovereignty of outer space or celestial objects (Art. II); a ban on the placement of weapons of mass destruction in orbit or on celestial bodies (Art. IV); that astronauts should be regarded as the envoys of mankind (Art. V); and that States are required to supervise the activities of their national entities (Art. VI).

#### We solve better, since CIL is far superior to treaties for space AND causes follow-on.

Koplow, 9 – Professor of Law, Georgetown University Law Center.

David A. Koplow, “ASAT-isfaction: Customary International Law and the Regulation of Anti-Satellite Weapons,” Michigan Journal of International Law. Volume 30, Summer 2009. <http://scholarship.law.georgetown.edu/cgi/viewcontent.cgi?article=1452&context=facpub>

Finally, the Article concludes with some policy recommendations, suggesting mechanisms for the world community to press forward with autonomous efforts to promote stability and security in outer space, even in the face of recalcitrance from the leading space powers. I would certainly support the negotiation and implementation of a comprehensive new treaty to prevent an arms race in outer space, and a carefully drafted, widely accepted accord could accomplish much, well beyond what customary law alone could create. But the treaty process, too, has costs and disadvantages, and the world need not pursue just one of these alternatives in isolation.

If the absence of global consensus currently inhibits agreements that countries could already sign, perhaps the world community can nevertheless get some "satisfaction" via the operation of CIL, constructing a similar (although not completely equivalent) edifice of international regulation of ASATs based simply on what countries do.

## 3 (120)

#### The plan requires clarifying international space law---causes strategic bargaining to extract concessions

Alexander William Salter 16, Assistant Professor of Economics, Rawls College of Business, Texas Tech University, "SPACE DEBRIS: A LAW AND ECONOMICS ANALYSIS OF THE ORBITAL COMMONS", 19 STAN. TECH. L. REV. 221 (2016), https://law.stanford.edu/wp-content/uploads/2017/11/19-2-2-salter-final\_0.pdf

V. MITIGATION VS. REMOVAL

Relying on international law to create an environment conducive to space debris removal initially seems promising. The Virginia school of political economy has convincingly shown the importance of political-legal institutions in creating the incentives that determine whether those who act within those institutions behave cooperatively or predatorily.47 In the context of space debris, the role of nation-states, or their space agencies, would be to create an international legal framework that clearly specifies the rules that will govern space debris removal and the interactions in space more generally. The certainty afforded by clear and nondiscriminatory48 rules would enable the parties of the space debris “social contract” to use efficient strategies for coping with space debris. However, this ideal result is, in practice, far from certain. To borrow a concept from Buchanan and Tullock’s framework,49 the costs of amending the rules in the case of international space law are exceptionally high. Although a social contract is beneficial in that it prevents stronger nation-states from imposing their will on weaker nation-states, it also creates incentives for the main spacefaring nations to block reforms that are overall welfare-enhancing but that do not sufficiently or directly benefit the stronger nations.

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 (more commonly known as the Outer Space Treaty) is the foundation for current international space law.50 All major spacefaring nations are signatories. Article VIII of this treaty is the largest legal barrier to space debris removal efforts. This article stipulates that parties to the treaty retain jurisdiction over objects they launch into space, whether in orbit or on a celestial body such as the Moon. This article means that American organizations, whether private firms or the government, cannot remove pieces of Chinese or Russian debris without the permission of their respective governments. Perhaps contrary to intuition, consent will probably not be easy to secure.

A major difficulty lies in the realization that much debris is valuable scrap material that is already in orbit. A significant fraction of the costs associated with putting spacecraft in orbit comes from escaping Earth’s gravity well. The presence of valuable material already in space can justifiably be claimed as a valuable resource for repairs to current spacecraft and eventual manufacturing in space. As an example, approximately 1,000 tons of aluminum orbit as debris from the upper stages of launch vehicles alone. Launching those materials into orbit could cost between $5 billion and $10 billion and would take several years.51 Another difficulty lies in the fact that no definition of space debris is currently accepted internationally. This could prove problematic for removal efforts, if there is disagreement as to whether a given object is useless space junk, or a potentially useful space asset. Although this ambiguity may appear purely semantic, resolving it does pose some legal difficulties. Doing so would require consensus among the spacefaring nations. The negotiation process for obtaining consent would be costly.

Less obvious, but still important, is the 1972 Convention on International Liability for Damage Caused by Space Objects, normally referred to as the Liability Convention. The Liability Convention expanded on the issue of liability in Article VII of the Outer Space Treaty. Under the Liability Convention, any government “shall be absolutely liable to pay compensation for damage caused by its space objects on the surface of the Earth or to aircraft, and liable for damage due to its faults in space.”52 In other words, if a US party attempts to remove debris and accidentally damages another nation’s space objects, the US government would be liable for damages. More generally, because launching states would bear costs associated with accidents during debris removal, those states may be unwilling to participate in or permit such efforts. In theory, insurance can partly remediate the costs, but that remediation would still make debris removal engagement less appealing.

A global effort to remediate debris would, by necessity, involve the three major spacefaring nations: the United States, Russia, and China.53 However, any effort would also require—at a minimum—a significant clarification and—at most —a complete overhaul of existing space law.54 One cannot assume that parties to the necessary political bargains would limit parleying to space-related issues. Agreements between sovereign nation-states must be self-enforcing.55 To secure consent, various parties to the change in the international legal-institutional framework may bargain strategically and may hold out for unrelated concessions as a way of maximizing private surplus. The costs, especially the decision-making costs, of changing the legal framework to secure a global response to a global commons problem are potentially quite high.

#### Russia uses negotiations to push the PPWT---erodes US space dominance---unilat solves

Michael Listner 18, JD, Regent University School of Law, the founder and principal of the legal and policy think-tank/consultation firm Space Law and Policy Solutions, Sept 17 2018, "The art of lawfare and the real war in outer space", The Space Review, www.thespacereview.com/article/3571/1

A battle for primacy in outer space took place on August 14, 2018, among the Russian Federation, the United States, and, indirectly, the People’s Republic of China. This battle did not involve the exotic technology of science fiction, antisatellite weapons (ASATs), or the incapacitation of satellites; it was not part of a hot war and did not even occur in outer space. Rather, it took place in the halls of the Conference of Disarmament in Geneva, Switzerland, and concerned the interdiction of the hypothetical deployment of instrumentalities of a hot war in outer space. The carefully orchestrated arena for this battle by the proponents of banning so-called space weapons involved methodologies, institutions, and agents of international law but was undermined by a vigorous counterattack by the United States using the same forum and suite of instruments so skillfully levied against it.1 This battle, of course, is not a single instance but the latest skirmish of a much larger conflict involving real war in space.

There’s been significant attention—and overstatem­ent— about the effect of a proposed Space Force by the United States, including an arms race and dominance as articulated by the United States,2 yet little attention has been given to the contest that continues to be fought over outer space using the tools of international law and policy, both of which are instruments of “lawfare.” Maj. General Charles N. Dunlap, Jr. (retired)3 first defined lawfare in the paper “Law and Military Interventions: Preserving Humanitarian Values in 21st Conflicts,” as “a method of warfare where law is used as a means of realizing a military objective.”4 This definition can be expanded to the use of hard law, soft law, and non-governmental organizations and institutions within the international arena to achieve a national objective and geopolitical end that would otherwise require the use of hard power. As observed by General Dunlap, lawfare imputes the teachings of Sun Tzu in particular this teaching: “The supreme art of war is to subdue the enemy without fighting.”5

Lawfare is not a new concept and has been used in many domains, but the tools brought to bear have become more prolific, and the domain of outer space has been and continues to be a theater where it is applied. The earliest example of lawfare (even though the term was not yet coined) in outer space occurred pre-Sputnik with Soviet Union attempting to use customary law to make claims of sovereignty extending beyond the atmosphere to the space above its territory. This claim was preempted by the launch of Sputnik 1 and the act of the satellite flying over the territory of other nations.6 The Eisenhower Administration saw this as an opportunity to meet a national space policy goal and likewise used customary law as an implement of lawfare and successfully created the principle of free access to outer space, which it utilized for photoreconnaissance activities in lieu of overflights of another nation’s sovereign airspace.7 The Soviet Union unsuccessfully attempted to defeat this move using lawfare in the United Nations through a proposal that would have prohibited the use of outer space for the purpose of intelligence gathering.8

Since that setback, the art of lawfare in outer space has settled on the objective ascribed to another teaching of Sun Tzu:

“With regard to precipitous heights, if you proceed your adversary, occupy the raised and sunny spots, and there wait for him to come up. Remember, if the enemy has occupied precipitous heights before you, do not follow him, but retreat and try to entice him away.”9

The second part of this teaching exemplifies the role of lawfare in the present war in outer space: to employ the tools and institutions of international law as a means to legally corner an adversary and gain geopolitical advantage in soft power, with the aim of slowing and eroding the advantage that adversary has attained through preeminence in the domain of outer space, and replace it with their own. This objective is accomplished by two general means: legally-binding measures, most commonly in the form of treaties, and so-called non-binding measures couched as sustainability.

Lawfare in space continued in the intervening years between Sputnik-1 and the signature and ratification of the Outer Space Treaty and afterward. The weapon of choice: disarmament proposals for outer space. Provisions for banning so-called space weapons in the Outer Space Treaty were rejected by the Soviet Union in favor of separate arms control measures.10 These measures included proposals, some of which related to the proscription of ASATs, designed to not only gain an advantage in outer space but to gauge political intent and resolve.11

The lawfare offensive escalated after the proposed Strategic Defense Initiative with an effort curtail space-based missile defense technology through a ban on so-called space weapons and a proverbial arms race in outer space. The Prevention of an Arms Race in Outer Space (PAROS), introduced in 1985, continues to seek a legally binding measure to place any weapon in outer space, including those designed for self-defense. It spawned measures such as the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects (PPWT), co-sponsored by Russia and China. This and other measures have met resistance as unverifiable and certainly are not likely to gain the advice and consent of the US Senate for ratification. The end game of the use of lawfare in the form of efforts like PAROS—the latest attempt at which was defeated in Geneva—is to propose legally binding measures that proponents would ignore to their advantage in any event. The sponsors and advocates of these hard-law measures recognize they will not come to fruition but, in the process of promoting them, will enhance their soft power and moral authority, which can be applied to entice their adversary down.

Non-binding resolutions and measures in the form of political agreements and guidelines are being used concurrently in the lawfare engagement in outer space, where proposals for legally binding measures alone fall short of the goal of creating hard law and challenging dominance in outer space. These resolutions and measures, which emphasize sustainability, are designed to perform an end run around the formalities of a treaty to entice agreement on issues that would otherwise be unacceptable in a hard-law agreement. These measures have the dual effect to create soft-power support on the one hand and hard law on the other. This tool of lawfare, which uses clichés of cooperation and sustainability, is a ploy that applies the ambiguous nature of customary international law to achieve what cannot be done through treaties: to “entice the adversary away” and create legal and political constraints to bind and degrade its use of outer space or prevent it from maintaining its superiority, all the while allowing others to play catchup and replace one form of dominance with another. While lawfare is by nature asymmetric, this indirect approach could be considered a subset an irregular tactic of lawfare, as opposed to the use of formal treaties in lawfare.

The crux is that, like space objects used in outer space, international law and its implements are dual-use in that they can be used for proactive ends or weaponized, with those using the appliances of lawfare to encourage cession of the high ground choosing the latter rather than the former. The decision to weaponize international law and its institutions to prosecute this war in space brings into question the efficacy of new rules or norms. Indeed, the idea of expanding the jurisprudence of outer space through custom, as being suggested by the United States, and more recently gap-filling rules being suggested by academia that could become custom, presents the real chance that, rather than the creation of the ploughshare of sustainability, new and more effective swords for lawfare will be forged.

To paraphrase Sun Tzu, “all war is deception.” In the case of outer space, the pretext in the current war in space is that an arms race and a hot war in outer space is inevitable, and can only be avoided by formal rules or international governance. Conversely, a hot war can be prevented in no small part by using lawfare to engage in the contemporary war in space using the tools of, and the abundant resources found in, the experience of attorneys and litigators in particular to supplement and support diplomats to extend the velvet glove when applicable, and bare knuckles when necessary. If the August 14 statement in Geneva is any indicator, the United States may have just done that and begun the shift from light-touch diplomacy to bringing its legal warriors to bear in full-contact lawfare to engage and win the current war in outer space and help deter a more serious hot war from occurring without sacrificing the superiority it possesses in outer space.

#### The PPWT prohibits space-based missile defense

Jack M. Beard 16, Associate Professor of Law at the University of Nebraska College of Law, Feb 15 2016, "Soft Law ’s Failure on the Horizon: The International Code of Conduct for Outer Space Activities", University of Pennsylvania Journal of International Law, Vol. 38, No. 2, 2016, <https://digitalcommons.unl.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1086&context=spacelaw>

B. Avoid Arms Control Traps in Space

Any successful effort to achieve legally binding restrictions on military activities or weapons in space must focus on specific, definable, and limited objectives or run afoul of issues that have historically ensured deadlock among suspicious and insecure adversaries.306 Some seemingly desirable goals, however, are likely to ensure failure.

The first such problematic goal involves attempting to use arms control agreements or other instruments to comprehensively ensure peace in space. Unfortunately, the integration of modern military systems on earth, sea, air and space guarantees that at some point states seeking to disrupt or deny the ability of an adversary (such as the United States) to project power will find space capabilities to be a particularly appealing target, especially in the early stages of a crisis or conflict.307 The presence of so many things of military value in space thus makes actions by an adversary to neutralize, disrupt or destroy these things likely during a major conflict on earth.308

The second problematic arms control goal in space that seems certain to ensure stalemate involves attempting to define and prohibit military technologies with a view to broadly prevent the weaponization of space. Clearly defining a space weapon for purposes of any legally binding arms control agreement is a daunting task, one which is made particularly challenging by the “essentially military nature of space technology.”309 As noted, space technologies are routinely viewed as dual-use in nature, meaning that they can be readily employed for both civilian and military uses. Determining the ultimate purpose of many space technologies may thus depend on discerning the intentions of states, a process perhaps better suited for psychological than legal evaluation. 310

Further complicating the classification of space military technologies is the inherent difficulty in distinguishing most space weapons on the basis of their offensive and defensive roles or even their specific missions.311 For example, this problem lies at the heart of debates over the status and future of ballistic missile defense (BMD) programs, since the technology underlying BMD systems and offensive ASAT weapons is often indistinguishable.312 Vague and broad soft law instruments do not resolve this problem, but create instead their own confusion and insecurity. Vague and broad provisions in legally binding agreements that do not or cannot distinguish between these missions are similarly problematic.

These issues, particularly difficulties in distinguishing ASAT and BMD systems, have figured prominently in complicating negotiations on space weapons over previous decades.313 Similarly, these concerns were a significant factor in initial U.S. opposition to the arms control measure proposed by China and Russia (the PPWT) since it prohibits states from placing any type of weapon in outer space (regardless of its military mission), thus effectively prohibiting the deployment of ballistic missile defense systems. 314 Furthermore, even if clear legal restrictions could be developed, verifying compliance with respect to technology in orbit around Earth would be very difficult (a point conceded even by China with respect to its own proposed PPWT).315

#### Causes rogue state missile threats---that escalates

Patrick M. Shanahan 19, Acting Secretary of Defense from January to June 2019, previously vice president and general manager of Boeing Missile Defense Systems, Jan 2019, "2019 MISSILE DEFENSE REVIEW", US Department of Defense, https://media.defense.gov/2019/Jan/17/2002080666/-1/-1/1/2019-MISSILE-DEFENSE-REVIEW.PDF

U.S. Homeland Missile Defense will Stay Ahead of Rogue States’ Missile Threats

Technology trends point to the possibility of increasing rogue state missile threats to the U.S. homeland. Vulnerability to rogue state missile threats would endanger the American people and infrastructure, undermine the U.S. diplomatic position of strength, and could lead potential adversaries to mistakenly perceive the United States as susceptible to coercive escalation threats intended to preclude U.S. resolve to resist aggression abroad. Such misperceptions risk undermining our deterrence posture and messaging, and could lead adversaries to dangerous miscalculations regarding our commitment and resolve.

It is therefore imperative that U.S. missile defense capabilities provide effective protection against rogue state missile threats to the homeland now and into the future. The United States is technically capable of doing so and has adopted an active missile defense force-sizing measure for protection of the homeland. DoD will develop, acquire, and maintain the U.S. homeland missile defense capabilities necessary to effectively protect against possible missile attacks on the homeland posed by the long-range missile arsenals of rogue states, defined today as North Korea and Iran, and to support the other missile defense roles identified in this MDR.

This force-sizing measure for active U.S. missile defense is fully consistent with the 2018 NPR, and in order to keep pace with the threat, DoD will utilize existing defense systems and an increasing mix of advanced technologies, such as kinetic or directed-energy boost-phase defenses, and other advanced systems. It is technically challenging but feasible over time, affordable, and a strategic imperative. It will require the examination and possible fielding of advanced technologies to provide greater efficiencies for U.S. active missile defense capabilities, including space-based sensors and boost-phase defense capabilities. Further, because the related requirements will evolve as the long-range threat posed by rogue states evolves, it does not allow a static U.S. homeland defense architecture. Rather, it calls for a missile defense architecture that can adapt to emerging and unanticipated threats, including by adding capacity and the capability to surge missile defense as necessary in times of crisis or conflict.

In coming years, rogue state missile threats to the U.S. homeland will likely expand in numbers and complexity. There are and will remain inherent uncertainties regarding the potential pace and scope of that expansion. Consequently, the United States will not accept any limitation or constraint on the development or deployment of missile defense capabilities needed to protect the homeland against rogue missile threats. Accepting limits now could constrain or preclude missile defense technologies and options necessary in the future to effectively protect the American people.

As U.S. active defenses for the homeland continue to improve to stay ahead of rogue states’ missile threats, they could also provide a measure of protection against accidental or unauthorized missile launches. This defensive capability could be significant in the event of destabilizing domestic developments in any potential adversary armed with strategic weapons, and as long-range missile capabilities proliferate in coming years.

U.S. missile defense capabilities will be sized to provide continuing effective protection of the U.S. homeland against rogue states’ offensive missile threats. The United States relies on nuclear deterrence to address the large and more sophisticated Russian and Chinese intercontinental ballistic missile capabilities, as well as to deter attacks from any source consistent with long-standing U.S. declaratory policy as re-affirmed in the 2018 NPR.

## Case

#### Extinction o/ws majority of people would die, total collapse is an entirely different ethical category

Baum 15

Seth D. Baum, PhD in geography from Pennsylvania State University, is Executive Director of the Global Catastrophic Risk Institute, “Winter-Safe Deterrence: The Risk of Nuclear Winter and Its Challenge to Deterrence, Contemporary Security Policy, 36(1): 123-14, http://www.tandfonline.com/10.1080/13523260.2015.1012346

Here it is important to bring in the ethics of global catastrophic risk. A global catastrophe is an event that causes great harm to the entirety of global human civilization. Catastrophes of this magnitude take on a special ethical significance. Carl Sagan was perhaps the first to recognize this in his own discussion of nuclear winter. The astronomer saw the big picture: Human extinction means the loss of all people who could ever exist into the distant future. Contemporary scholars further understand that even without total human extinction, a permanent collapse of human civilization is of comparable significance. Ultimately what is at stake is the long-term trajectory of human civilization, its success or its failure. Ethical obligations to future generations are fundamentally different from those to people alive today, for two reasons. First, future generations vastly outnumber the current population. Barring catastrophe, humanity could survive for millions or even billions of years into the future. Thus anything that affects the long-term trajectory of human civilization is of much greater consequence than things that only affect people today. Second, despite their great number, future generations are utterly helpless. They cannot vote in today’s elections or trade in today’s markets, and they certainly cannot deter today’s countries with any weapons. This is absolutely unfair, but that is just how it is. The only reason people mu

#### Kessler’s Syndrome wrong and super long timeframe---he’s adjusted it recently

Kurt 15 – JD-William & Mary

Joseph Kurt, JD- William & Mary School of Law, BA-Marquette University, NOTE: TRIUMPH OF THE SPACE COMMONS: ADDRESSING THE IMPENDING SPACE DEBRIS CRISIS WITHOUT AN INTERNATIONAL TREATY, 40 Wm. & Mary Envtl. L. & Pol'y Rev. 305 (2015)

A. Practical Considerations: Feasible Solutions to the Space Debris Problem Are on Their Way

One key question in assessing whether an international treaty is a requisite for solving the space debris problem is just how difficult it will be to fashion a remedy. The more complex and costly are feasible solutions, the more likely it is that a comprehensive regime is necessary to bind the various actors together. 93Link to the text of the note

A good place to begin is to determine just how imminent is the onset of the cascade of exponentially more frequent debris-creating collisions, known as the Kessler Syndrome. 94Link to the text of the note To be certain, no one can be sure--this phenomenon being subject to highly complex probabilities. 95Link to the text of the note Indeed, experts' estimates of when such a cascade will become irreversible vary [\*316] widely. 96Link to the text of the note The National Research Council produced a report in 2011 that suggested that "space might be just 10 or 20 years away from severe problems." 97Link to the text of the note In fact, the cascading effect has already begun, albeit at a modest pace. 98Link to the text of the note However, Donald Kessler, who first described the eponymous effect in 1978, has significantly recalibrated his own outlook over the years. 99Link to the text of the note Originally, Kessler predicted that catastrophe would result by the year 2000. 100Link to the text of the note That date long passed, Kessler now speaks of a century-long process that "we have time to deal with." 101Link to the text of the note

#### Squo tracking, shielding, and removal plans solve

Dr. Brian Koberlein 16, Professor of Physics at the Rochester Institute of Technology and PhD in Astrophysics from the University of Connecticut, “Cascade Effect”, 5-4, https://archive.briankoberlein.com/2016/05/04/cascade-effect/index.html

In the movie Gravity the driving force of the plot is a catastrophic cascade of space debris. An exploding satellite sends high speed debris into the path of other satellites, and the resulting collisions create more space debris until everything from a space shuttle to the International Space Station faces an eminent threat of destruction. Not unexpectedly, the movie portrayal of such a situation is not particularly accurate, but the risk of a debris cascade is very real.

It’s known as the Kessler syndrome, after Donald Kessler, who first imagined the scenario in the 1970s. The problem comes down to the fact that small objects in Earth orbit can stay in orbit for a very long time. If an astronaut drops a bolt, it can stay in orbit for decades or centuries. Because the relative speed of two objects in orbit can be quite large, it doesn’t take a big object to pose a real threat to your spacecraft. On the highway a small pebble can chip your car windshield. In space it can be done by a chip of paint traveling at thousands of kilometers per hour. In the history of the space shuttle missions, there were more than 1,600 debris strikes. Because of such strikes, more than 90 space shuttle windows had to be replaced over the lifetime of shuttle missions.

While that might sound alarming, it’s actually quite manageable. Upgrades and maintenance were quite common on the shuttle missions, and we tend to err on the side of caution when it comes to replacing parts. Modern spacecraft also have ways to mitigate the risk of small impacts, such as Whipple shields made of thin layers of material spaced apart so that objects disintegrate when hitting the shield rather than the spacecraft itself. We also have a tracking system that currently tracks more than 300,000 objects bigger than 1 cm, so we can make sure that most spacecraft avoid these objects.

But the risk of big collisions isn’t negligible. In 2009 the Iridium 33 and Kosmos-2251 satellites collided at high speed, destroying both spacecraft and creating more dangerous debris. It wouldn’t take many collisions like this for the debris numbers to rise dramatically, and more debris means a greater risk of collisions. In Gravity the cascade happens very quickly, triggered by a single event. The reality is not quite so grave. Instead of happening overnight, Kessler syndrome would occur gradually, raising collision risks to the point where certain orbits become logistically impractical. It could occur so gradually that we might not notice it early on, and there are some that argue it’s already underway.

The good news is that we’re aware of the threat. And, as the old saying goes, knowing is half the battle. Already we take steps to limit the amount of debris created. New spacecraft include end of life plans to remove them from orbit, either by sending them into Earths atmosphere to burn up, or sending them to a “graveyard orbit” that poses little risk to other spacecraft. There are also plans on the drawing board to clear orbits of debris, particularly in low-Earth orbit where the risk is greatest. The cascade effect is a real risk, but it’s also one we can likely manage with a bit

Can’t solve global capitalism -