# 1NC

## OFF

#### Interpretation: The affirmative must defend that appropriation of outer space as a whole by private entities is unjust.

**US District Court of Massachusetts ‘3**

Opinion written by Saris, District Judge. 238 F.Supp.2d 347 (2003) VLT CORPORATION and Vicor Corporation, Plaintiffs v. LAMBDA ELECTRONICS, INC., Defendant No. 01-CV-10957-PBS. United States District Court, D. Massachusetts. January 3, 2003.

1. It Depends On What the Word "The" Means

The first skirmish involves the word "the." The claim language states "circuitry for recycling *the* magnetizing energy stored in said transformer to reset it." (Emphasis added). Lambda asserts that the word "the" means all of the magnetizing energy in the transformer. **Vicor** contends that the claim allows for the possibility that some of the energy may be recycled to reset the core while other energy is delivered to the load. In other words, it **argues that** the word **"the" can mean "some of the,"** and explains that the word "the" was used to distinguish "the magnetizing" energy from the more general term "energy" that is used earlier in the preamble. **Nice linguistic jousting**, **but** the use of the word "magnetizing" alone would have been an adequate adjective to single out the kind of energy intended for recycling. **If only some of the transformer's energy needed to be recycled, the word "the" would not have been used.**

Lambda's argument that **the word "the" connotes all** the magnetizing energy is persuasive because **it gives ordinary and common sense effect to the word "the"** in the claim language. **See Merriam-Webster's 352\*352 Collegiate Dictionary 1221 (10th ed.1993) (giving one definition of "the" as: "used as a function word before a noun ... to indicate reference to a group as a whole")**. This claim thus describes an invention that recycles all of the magnetizing energy to reset the transformer core.

#### Violation— the word “appropriation” is only qualified by the words “outer space” – no other specification is permitted

**Ellis 53** Judge Advocate in the United States Army, “United States. v. Private Frank Taylor, Jr.”, United States Army Board of Review, 11 C.M.R. 428; 1953 CMR LEXIS 1428, 7-31, Lexis

Appellate defense counsel argued orally that many facts indicated the United States was not at war, for example: there has been no declaration of war; the Coast Guard is still under the supervision of the Treasury Department instead of the Navy Department as it usually is during war; here in the United States, Armed Forces personnel are allowed to wear civilian clothes during off-duty hours; it is not the policy to try Department of the Army civilians serving with the Army in the field in the United States by courts-martial; the various Army posts throughout the United States are still open to public visitation; many reservists and National Guard units are not on active service; and the Table of Maximum Punishments had not been suspended for offenses committed in the United States. He contended that the ratio of the cases cited in support of the war status of the United States was limited to the locale of the hostilities, Korea and its adjacent [\*\*6]  waters, and was inoperative on offenses committed in the United States. Finally, he anchored his argument on the interpretation to be given the language in Article 43f(1) (post) of the Code. He conceded arguendo that the offense at bar fell within the purview of this language, being a fraud against a United States agency, the Army, but reasoned that the subject language contemplated and embraced only "hostilities as proclaimed by the President or by a Joint Resolution of Congress." With this interpretation the board of review cannot agree. The preposition "of" before the word "hostilities" shows plainly that the phrase "of hostilities" is adjectival, qualifying and limiting the word "termination". The phrase "termination of hostilities" is in turn modified by the participial phrase "as proclaimed." In our interpretation it is the "termination of hostilities" that must be proclaimed, and such proclamation provides the initial date of a three-year period in which the suspension of the statute of limitations continues to operate rather than determines the date of the beginning of the original suspension (emphasis supplied).

#### Vote Neg:

#### 1] Predictable Limits – there’s hundreds of ways in which the affirmative can restrict appropriation in outer space – they can make fines, penalize companies, or make CEOs do a notes app apology on twitter.

#### 2] Topic ed – Bans are one of the most common and is most germane to the literature – increases the amount of ground and ability to have deep debates on the model which the majority of the literature is centered around as opposed to an irrelevant and vague model that kills critical thinking abilities.

#### Voters:

#### 1] DTD and comes before 1AR theory since the abuse was in the 1ac and affected all speeches after it

#### 2] Competing interps a) race to the bottom b) arbirtrary and judge intervention c) collapses to an offense defense paradigm

## OFF

#### Interpretation—The affirmative must defend the appropriation of outer space by private entities be unjust, or a subset.

#### Two violations:

#### 1] Appropriation means to take as property in the exclusion of others – not to put into space

Leon 18 (Amanda M., Associate, Caplin & Drysdale, JD UVA Law) "Mining for Meaning: An Examination of the Legality of Property Rights in Space Resources." Virginia Law Review, vol. 104, no. 3, May 2018, p. 497-547. HeinOnline.

Appropriation. The term "appropriation" also remains ambiguous. Webster's defines the verb "appropriate" as "to take to oneself in exclusion of others; to claim or use as by an exclusive or pre-eminent right; as, let no man appropriate a common benefit."16 5 Similarly, Black's Law Dictionary describes "appropriate" as an act "[t]o make a thing one's own; to make a thing the subject of property; to exercise dominion over an object to the extent, and for the purpose, of making it subserve one's own proper use or pleasure."166 Oftentimes, appropriation refers to the setting aside of government funds, the taking of land for public purposes, or a tort of wrongfully taking another's property as one's own. The term appropriation is often used not only with respect to real property but also with water. According to U.S. case law, a person completes an appropriation of water by diversion of the water and an application of the water to beneficial use.167 This common use of the term "appropriation" with respect to water illustrates two key points: (1) the term applies to natural resources-e.g., water or minerals-not just real property, and (2) mining space resources and putting them to beneficial use-e.g., selling or manufacturing the mined resources could reasonably be interpreted as an "appropriation" of outer space. While the ordinary meaning of "appropriation" reasonably includes the taking of natural resources as well as land, whether the drafters and parties to the OST envisioned such a broad meaning of the term remains difficult to determine with any certainty. The prohibition against appropriation "by any other means" supports such a reading, though, by expanding the prohibition to other types not explicitly described.168

#### 2] The word ‘through’ means by means of so the 1ac plan is defending space debris as a means of appropriation which it isn’t (since you can’t own debris)

7th Circuit Court of Appeals 77 (United States v. Nerone, 563 F. 2d 836 - Court of Appeals, 7th Circuit 1977) EE

Appellants Seppi and Nerone formulate the second prong of their argument by first noting that the Government could have drafted the indictment by charging the "enterprise" consisting of Fox, Nerone, and Seppi to the exclusion of Maple Manor, Inc. They assert that the Government had a two-fold purpose in including the corporate entity. First, the Government wanted to bring the conduct of Fox within the scope of § 1962. Second, the Government wanted to secure a forfeiture of the property of Maple Manor, Inc. under 18 U.S.C. § 1963. The appellants further contend that the Congressional use of the word "through" in § 1962(c) was not intended to be meaningless. They submit, correctly we think, that the most logical definitions to ascribe to that word as used in the statute are "by means of, in consequence of, by reason of." See Black's Law Dictionary 1652 (Rev. 4th ed. 1968). Their fundamental contention, although we have somewhat paraphrased it, is that if the word "through" is to have operative meaning, the Government must offer some proof that the affairs of the charged enterprise were conducted through a pattern of racketeering activity or through collection of unlawful debt.

#### Standards:

#### 1] Precision- Their model incentivizes arbitrarily doing away with words in the resolution- outer space is a term of the art that requires a specific distinction.

#### 2] Neg Prep- Their model explodes the amount of potential affs because there’s thousands of different types of private satellites—in combination with the million of other things they can spec, neg prep becomes impossible since there’s no universal DA because each action has a different situation.

## OFF

#### CP: States ought to:

#### --Announce that appropriation of outer space through the production of space debris by private actors violates the Outer Space Treaty 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

#### 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.

#### Bolstering CIL regime fills Outer Space Treaty gaps and solves international space conflict

**Koplow 09** (David Koplow is a professor and the co-director of the Center on National Security and the Law at the Law Center. He joined the Georgetown faculty in 1981. His government service has included stints as Special Counsel for Arms Control to the General Counsel of the Department of Defense (2009-2011); as Deputy General Counsel for International Affairs at the Department of Defense (1997-1999); and as Attorney-Advisor and Special Assistant to the Director of the U.S. Arms Control and Disarmament Agency (1978-1981). He is a graduate of Harvard College and Yale Law School and a Rhodes Scholar. “ASAT-isfaction: Customary International Law and the Regulation of Anti-Satellite Weapons”. 2009.)

Remarkably, the **CIL** version of the law **of outer space** **would achieve even more comprehensive** geographic **coverage than the treaty** version. **Half of the** countries in the **world have not** yet **gotten** around **to ratify**ing **the OST**; even larger cohorts have not acted to affiliate themselves with the other important space-related instruments. **In contrast, all countries would be bound by the CIL of outer space**; it is hard to imagine any "persistent objectors" who have exempted themselves from any aspect of the now-entrenched custom, and any **new States** that emerge onto the world scene **would automatically be covered by the body of space-related CIL, even if they do not affirmatively join the treaties**. Third, outer space also illustrates the law-making role of the UNGA. When the legal regime for space was first emerging, many countries opted to employ the UNGA as the most apt mechanism for expressing themselves about the putative rules for exo-atmospheric interaction; their statements in this "global town meeting" carry weight in the evaluation of emerging CIL. Successive UNGA resolutions, especially the 1963 Outer Space Declaration' 153 (which initiated and expressed many of the principles that were later cast into treaty vocabulary in the OST) were prepared with a solemnity (and adopted via unanimous vote) suggesting a conscious legislative function. As the Restatement notes, [t]he Outer Space Declaration, for example, might have become law even if a formal treaty had not followed, since it was approved by all, including the principal "space powers." ... A spokesman for the United States stated that his Government considered that the Declaration "reflected international law as accepted by the members of the United Nations," and both the United States and the U.S.S.R. indicated that they intended to abide by the Declaration.154 Of course, not every enactment of the UNGA (still less, the actions of the CD) is automatically entitled to the status of CIL, but **the elusive mechanisms of customary law**-making sometimes **do repose special respect to the weightiest resolutions of those global instrumentalities.** 155

#### CIL is critical to solve climate change threats. Relying only on treaty commitments fails.

**Clark 18** (Kayla Clark is a lawyer at Morgan Lewis. Education: University of Notre Dame Law School, 2018, J.D. California Polytechnic State University, 2015, B.A. “The Paris Agreement: Its Role in International Law and American Jurisprudence”. 5-10-2018.)

Moreover, the long-term nature of the Paris Agreement has the additional benefit of potentially creating **c**ustomary **i**nternational **l**aw **regarding** international **environmental norms** and development. Customary international law, **recognized to be legally binding** on participating nations,65 **can** be shaped when a custom, such as a commitment to **consistently reduce** greenhouse gas **emissions**, becomes regarded as law. Evidence of customary international law can include: general acceptance by the participants; adherence for a sufficient duration; consistent understanding of the terms and stable enforcement; and a finding of opinio juris––evidence that the terms are seen as law.66 If it can be shown throughout the Paris Agreement’s implementation that the terms, including participants’ commitments and implementation of goals, transitioned from mere statutory obligations to **c**ustomary **i**nternational **l**aw, then the Paris Agreement **stands a credible chance at recognition beyond the limits of** the **treaty**’s **text.** The architecture of the Agreement, with an aspirational goals of temperature reduction and evaluation periods every five years beginning in 2023, leaves ample time for the already binding international treaty to take on another stable and well-recognized form—customary international law.67 In addition to the aspirational goals of the Paris Agreement, the nuanced form of differentiation between nations is a feature that positions the pact for success. The differentiation is meant to be both inclusive and empowering to all participants.68 Beginning with the preamble of the Agreement, “one finds in a condensed manner carefully crafted expressions of the main tensions underpinning the entire text, between developed and developing countries, between more vulnerable countries and the rest, between countries that expect to suffer from measures that ‘respond’ to climate change and the rest . . .”69 The Agreement is facilitated by each state voluntarily committing to reduce its emissions reductions. All states are asked to commit to some amount of emissions reduction, but no states are assigned a mandatory reductions target, as they were in Kyoto. **Under** Paris, “[s]tates thus choose their level of ambition subject to two requirements, namely the regular updating––at least every five years . . . and **a**n obligation of non-regression . . . .”70 The Paris Agreement’s **voluntary contribution scheme** seeks to diffuse the sharply divisive Annex 1 and non-Annex 1 strategy of the Kyoto Protocol, as well as reduce the coercive effect of mandatorily assigned targets. The Annex strategy not only excluded many developing countries, chief of which included high carbon emitters like China and India, but also disheartened developed countries that felt that even a good faith attempt at meeting their target emissions would make only a marginal impact on overall climate change efforts.71 Additionally, the distinction between Annex 1 and non-Annex 1 under the Kyoto Protocol restricted the ability or motivation of developing countries to reduce their greenhouse gas emissions, as they were not required to participate.72 Now, developing **countries like China or India cannot shirk participation merely because of their developing status**.73 The Paris Agreement reflects the principle of common but differentiated responsibilities, but implements this international law doctrine more effectively. Though all participating nations must voluntarily assume and be accountable for their emission reduction goals, accommodations for developing countries are also included. To offset the cost on now-included developing countries, the Paris Agreement incorporates adaptation by developing countries as a goal, and urges developed countries to provide developing states with financial and logistical support. Including mechanisms to support adaptation is a new way to address climate change, responsive to the reality that, as Vinuales writes, “[i]t may be that climate change is no longer a matter of precaution but one of prevention – preventing acknowledged risk.”74 Creating infrastructure and advancing technology in developing nations, via funding from developed nations, recognizes the different capacities of different countries, reflects the common but differentiated responsibilities doctrine, and focuses on adaptation. However, the Agreement still expects developing nations to contribute throughout the adaptation process. The third promising feature of the Paris Agreement is the innovative approach to oversight and enforcement. Compared to the Kyoto Protocol’s mandatory and legally-binding emissions reductions, the Paris Agreement takes a less coercive, information-based approach.75 Through the construction of **i**nternational **law**, the Paris Agreement hopes to use both official and unofficial sources of pressure in its information-based enforcement. As Falkner writes, the Paris Agreement **relies on a “two-level game” logic that unites domestic climate politics with strategic international interaction**.76 Though the Paris Agreement does not impute a legal obligation for states to actually reduce their emissions per their commitments, it does require periodic reports to be disclosed to the participants of the Agreement. These reports will occur every five years, beginning in 2023, and will provide the international community with a transparent look into the efforts of other states to combat climate change.77 The information garnered from these periodic reports, and their subsequent review, may facilitate the “naming and shaming” of states that have not succeeded in meeting their goals.78 **The peer pressure function should work effectively** between nations, as they may easily identify **and** call out those that have failed to make a good faith effort to meet their voluntary contributions. The mandatory reporting serves to make the Agreement transparent and legitimate to the international community.79 The naming and shaming also **anticipates pressure on the contributing parties from civil society**, as governments of underperforming countries may experience naming and shaming by environmental groups, the media, and other interested parties.80 Domestically, after nations choose their emission reduction contribution, they will likely face some pressure from groups in their country regarding their performance under the contribution. Internationally, the Agreement is also designed to create peer pressure among states, which could be exerted on states that are failing to meet their commitments. The naming and shaming function between states delivers the brunt of the Agreement’s enforcement mechanism. Though the enforcement tools of the Paris Agreement do not create actual legal liability for states that neglect their commitments, the enforcement strategies should not be seen as toothless.81 By **operating with multiple kinds of enforcement**, and engaging with both domestic and international paradigms over a long period of time, the Paris Agreement consciously **increases the** likelihood of **immediate enforcement** and **of** transitioning from mere statute to **binding customary international law**.82

#### 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 categorizations (vertical dashed lines).

## OFF

#### CP: Unilaterally, states ought to ban the appropriation of outer space through the production of space debris.

#### No aff offense applies here since individual states can take their satellites down. And they don’t get a perm since the shah 20 ev defends multilateral action through the OST

#### The plan requires [clarifying international space law]—but that causes strategic bargaining to extract concessions.

Salter 16 [Alexander William Salter is an Assistant Professor of Economics at the Rawls College of Business at 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 12-24-2021](https://law.stanford.edu/wp-content/uploads/2017/11/19-2-2-salter-final_0.pdf%2012-24-2021) recut amrita]

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 and China will *absolutely* use negotiations to push for the PPWT—that allows for US satellites to go kaput.

Bowman + Thompson 3-31 [Bradley Bowman is the senior director of the Center on Military and Political Power at the Foundation for Defense of Democracies, Jared Thompson is a U.S. Air Force major and visiting military analyst at the Foundation for Defense of Democracies, Russia and China Seek to Tie America’s Hands in Space, 03-31-2021,Foreign Policy,https://foreignpolicy.com/2021/03/31/russia-china-space-war-treaty-demilitarization-satellites/, 12-24-2021 amrita]

Saying one thing and doing the opposite is, unfortunately, common in international diplomacy. Beijing and Moscow, however, seem to have a unique proclivity for the practice. Consider the actions of the United States’ two great-power adversaries when it comes to anti-satellite weapons. China and Russia have sprinted to develop and deploy both ground-based and space-based weapons targeting satellites while simultaneously pushing the United States to sign a treaty banning such weapons. To protect its vital space-based military capabilities—including communications, intelligence, and missile defense satellites—and effectively deter authoritarian aggression, Washington should avoid being drawn into suspect international treaties on space that China and Russia have no intention of honoring. The Treaty on the Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects (PPWT), which Beijing and Moscow have submitted at the United Nations, is a perfect example. PPWT signatories commit “not to place any weapons in outer space.” It also says parties to the treaty may not “resort to the threat or use of force against outer space objects” or engage in activities “inconsistent” with the purpose of the treaty.On the surface, that sounds innocuous. Who, after all, wants an arms race in space? The reality, however, is that China and Russia are already racing to field anti-satellite weapons and have been for quite some time. “The space domain is competitive, congested, and contested,” Gen. James Dickinson, the head of U.S. Space Command, said in January. “Our competitors, most notably China and Russia, have militarized this domain.” Beijing already has an operational ground-based anti-satellite missile capability. People’s Liberation Army units are training with the missiles, and the U.S. Defense Department believes Beijing “probably intends to pursue additional [anti-satellite] weapons capable of destroying satellites up to geosynchronous Earth orbit.” That is where America’s most sensitive nuclear communication and missile defense satellites orbit and keep watch. Similarly, Moscow tested a ground-based anti-satellite weapon in December that could destroy U.S. or allied satellites in orbit. That attack capability augments a ground-based laser weapon that Russian President Vladimir Putin heralded in 2018. In a moment of candor, Russia’s defense ministry admitted the system was designed to “fight satellites.” To make matters worse, both countries are also working to deploy space-based—or so-called “on-orbit”—capabilities to attack satellites. Meanwhile, at the United Nations and other international forums, **China and Russia are pushing the PPWT and advocating for a “no first placement” resolution—saying all governments should commit not to be the first to put weapons in space.** Yet more than two years ago, the U.S. Defense Intelligence Agency noted that both China and Russia were already putting in space capabilities that could be used as weapons. **The PPWT would thus protect their weapons while tying Washington’s hands.** In a thinly veiled attempt to mask their intentions, the two countries claim that their on-orbit capabilities are simply for peaceful purposes—for assessing the condition of broken satellites and conducting repairs as needed**. This “dual-use” disguise permits Beijing and Moscow to put into orbit ostensibly peaceful or commercial capabilities that those countries can actually use to disable or destroy U.S. military and intelligence satellites.** China, for example, has tested several so-called scavenger satellites, which use grappling arms to capture other satellites. China has also demonstrated the capability to maneuver a satellite around the geosynchronous belt, allowing its satellites to sidle up to other satellites in space. Not to be outdone, Russia deployed a pair of “nesting doll” satellites that shadowed a U.S. satellite in space. One Russian satellite birthed another, with Russia’s defense ministry claiming its purpose was to assess the “technical condition of domestic satellites.” But later, the second satellite conducted a weapons test, firing what appeared to be a space torpedo. The Kremlin never explained how a fast-moving one-time projectile provided superior inspection benefits compared with the other Russian satellite flying persistently nearby. A well-crafted treaty that clearly defines acceptable and unacceptable actions in space and includes tough and realistic inspection and verification mechanisms could promote security and stability. But **the PPWT is** decidedly **not that** kind of **treat**y. For starters, the proposed treaty **does not** explicitly **prohibit the ground-based anti-satellite weapons** that China and Russia have already fielded. **Nor does the proposed treaty prevent the deployment of space-based weapons under the cloak of civilian or** **commercial capabilities**. The PPWT also does not prohibit the development, testing, or stockpiling of weapons on Earth that could be quickly put into orbit. Even if these deficiencies were addressed, **the PPWT lacks** any **verification plan to ensure compliance**. Instead, the treaty calls for “transparency and confidence-building measures” implemented on a “voluntary basis.” In other words, Beijing and Moscow want **the U**nited **S**tates **to trust but never verify**.

#### 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

#### Escalates—extinction.

Shanahan 19[Patrick M. Shanahan is an 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.

## OFF

#### The private sector in space is growing and investors have poured hundreds of millions into the industry based on projected growth – the aff reverses that and crashes investment

Davenport 21 – covers NASA and the space industry for The Washington Post's Financial desk. He joined The Post in 2000 and has a bachelors degree from Colby College. [Christian, “Investors are placing big bets on a growing space economy. But can they reach orbit?”, Washington Post, 9/05/21, [https://www.washingtonpost.com/technology/2021/09/05/space-finance-bubble-investors/]//AV](https://www.washingtonpost.com/technology/2021/09/05/space-finance-bubble-investors/%5d//AV)

Space is hot. The billionaire “space barons” — Elon Musk, Jeff Bezos and Richard Branson — [have given the industry a cachet](https://www.washingtonpost.com/technology/2020/11/11/nasa-spacex-crew1-launch-space-station/?itid=lk_inline_manual_3) not seen since the Apollo era of the 1960s and ’70s, with Branson and Bezos flying to the edge of space on their own spacecraft and Musk’s SpaceX becoming the dominant supplier of people and cargo to the International Space Station. Investors are fearful of missing out. That’s turned out to be great news for the space companies hoping to get a piece of the satellite-launch business. But it’s also caused analysts to warn that space is still a nascent and risky business, one rocket explosion away from disaster. Hundreds of millions of dollars are now flowing to an industry long viewed as too risky for serious investment. New start-ups are blossoming in an explosion reminiscent of the early days of tech, when money poured into Silicon Valley start-ups at the beginning of the Internet age. Gen. John “Jay” Raymond, the chief of space operations for the U.S. Space Force, even predicted during a recent speech that investment in the commercial space sector would drive “a second Golden Age of space.” Over the past decade, investors pumped $200 billion into 1,500 space companies around the world, according to an analysis done by [Space Capital, a space investment firm](https://www.spacecapital.com/). Investment in start-up space companies reached $7.6 billion last year, a 16 percent increase from 2019, [according to Bryce Space and Technology](https://brycetech.com/download.php?f=Bryce_Start_Up_Space_2021.pdf), a consulting firm. “This level of investment is consistent with the 6-year trend beginning in 2015 of unprecedented levels of venture capital driven investment flowing into the space industry,” the company said. That has helped drive a $447 billion global space economy that grew 4.4 percent last year, [according to the Space Foundation](https://spacefoundation.org/), an advocacy group. Over the past 10 years, the space economy has grown 55 percent, according to the Foundation, which said the commercial space products and services market is valued at $219 billion. In addition to those investments, several space ventures have gone public over the past year through special purpose acquisition companies, or SPACs. Branson’s Virgin Galactic space tourism company [was one of the first high-profile space ventures](https://www.washingtonpost.com/business/2019/07/09/virgin-galactic-announces-plans-become-first-publicly-listed-space-company/?itid=lk_inline_manual_16) to go public through a SPAC when it merged with a New York hedge fund in 2019. Since then, SPACs have “exploded in popularity,” [according to a report by analysts at Avascent and Jefferies](https://www.avascent.com/news-insights/avascent-apogee/space-spacs-valuation-in-zero-g/), a financial advisory firm specializing in aerospace, which found that the mergers across all industries raised $83 billion in 2020 compared to $14 billion the year before. But the stocks can be volatile. In the last couple of weeks, for example, the stocks of two space companies took hits when they suffered problems. Shares of Virgin Galactic dipped after the Federal Aviation Administration said it was investigating the company after its flight, with Branson on board, went off course. The probe was first reported by the [New Yorker](https://www.newyorker.com/news/news-desk/the-red-warning-light-on-richard-bransons-space-flight). Astra, a start-up rocket company based outside of San Francisco, saw its stock drop after a launch attempt failed to reach orbit last month. Still, more than a dozen companies have gone public, or announced they would in recent months. They include Planet, which has built a constellation of satellites to take images of the Earth, and Astra. [Rocket Lab, which has launched dozens of small satellites](https://www.washingtonpost.com/news/innovations/wp/2017/11/09/ready-to-book-your-satellite-launch-online-the-rocket-industry-looks-to-run-more-like-an-airline/?itid=lk_inline_manual_21) on its Electron rocket, started trading on the Nasdaq last month. And Virgin Orbit, [which “air launches” a rocket](https://www.washingtonpost.com/technology/2021/01/17/richard-branson-virgin-orbit-launch-success/?itid=lk_inline_manual_21) designed to fly satellites by dropping it from the wing of a 747 airplane, announced that it would go public through a SPAC and that it had raised $100 million in another funding round backed by Boeing and AE Industrial Partners. International companies also are driving growth, analysts said. “Going forward, I would expect to see it becoming increasingly international,” said Nickolas Boensch, a program manager at Bryce. “China, Japan, the U.K. have been huge players here, and there is something attractive to having a domestic capability.”

#### The future of the economy is based on the private-sector driven success of space exploration – 1AC muelhapt talks about how commercial private activity releases debris and its true since rocket launches detach in space

Clark 20 – President of U.S. Chamber of Commerce with an MBA from Georgetown University. [Suzanne, “Space is our new economic frontier. The US can’t afford to lose out”, CNN Business, 3/02/20, [https://www.cnn.com/2020/03/02/perspectives/space-economic-frontier/index.html]//AV](https://www.cnn.com/2020/03/02/perspectives/space-economic-frontier/index.html%5d//AV)

President Trump's budget, which was released last month, outlines several moonshots that are unlikely to pass a divided Congress. But there's one in particular that both Republicans and Democrats should support wholeheartedly: the $25.2 billion request to fund NASA, a 12% boost [over the prior year](https://www.cnn.com/2020/02/10/tech/nasa-budget-moon-landing-artemis-scn/index.html). The future of our economy depends on the vigorous pursuit of space exploration. And with NASA leading the way, the potential for growth — like space itself — has no limits. Since NASA's launch, American space exploration has always been a bipartisan venture. It was President Kennedy who announced our goal of going to the moon, but it was President Nixon who brought that goal to fruition. Reaching the next milestone in interplanetary travel requires a commitment from our leaders that spans political parties and administrations. And with a new space race getting underway — one that could prove even more consequential than the last — NASA needs bipartisan support from Congress today more than ever. Space is the most promising industry to arise since the birth of the tech sector, with growth projected to skyrocket in the coming years led by companies such as Boeing and Northrop Grumman, and new entrants, such as Virgin Galactic, SpaceX and Blue Origin. [According to US Chamber of Commerce economists](https://www.uschamber.com/series/above-the-fold/the-space-economy-industry-takes), the industry will be worth at least $1.5 trillion by 2040. While no one can fully grasp what our economy will look like 20 years from now, one thing is certain: the private sector space industry will transform how societies across the globe live, communicate and do business. In fact, it already has. Nearly every company depends on space-enabled technologies for day-to-day operations — whether they use satellite communications, remote sensing or location-based services. Businesses across multiple sectors are leveraging these and other technologies to stake their claim in this new economic frontier. Pharmaceutical companies such as Merck and Sanofi, for example, are conducting experiments in low-Earth orbit [aboard the International Space Station](https://www.issnationallab.org/research-on-the-iss/areas-of-research/life-sciences/) to evaluate the potential advantages of microgravity in developing new drug treatments that will help people live longer, healthier lives. Companies, such as Bigelow, are committed to making [off-Earth habitation](https://www.cnn.com/2016/05/05/tech/way-up-there-where-will-we-live-space/index.html) a reality. Even retailers are getting in on the action, with companies like Target [funding research](https://www.iss-casis.org/cottonsustainabilitychallenge/) on the International Space Station to produce more sustainable forms of cotton. Lunar colonies, asteroid mining and interplanetary travel — once the stuff of science fiction — could become a reality. But for any of that to happen, we need sustained and meaningful action from members of Congress. They can start by meeting the president's request for NASA funding. Included in the White House budget is [$12.4 billion](https://www.cnn.com/2020/02/10/tech/nasa-budget-moon-landing-artemis-scn/index.html) specifically for lunar exploration that would include landing systems, continued development of the Space Launch System (SLS) and the Orion crew module. These spacecraft will allow us to shuttle people and equipment to the moon and back. They will take us not only beyond Earth's orbit but also into the next phase of commercial space development. Most importantly, they will ensure that the United States continues to outpace competitors like China and Russia in the space race. Our country must be the vanguard in exploring these new economic frontiers. Planting the American flag in the private sector space industry will help create the jobs of the future and allow the United States to lead the formation of best practices that will govern the industry for decades to come. Some might ask if returning to the moon is worth the expense. The answer is undeniably yes. Providing NASA with the resources it needs to succeed is a small investment that will yield tremendous dividends over time. To start, it would help secure American commercial dominance in a fast-growing industry. It also would be a catalyst for innovation and scientific discovery, with salutary effects that would benefit the entire economy.

#### Econ decline results in nuclear war.

Tønnesson 15 [Tønnesson is a research professor at the Peace Research Institute Oslo (PRIO) in Norway and the leader of the East Asia Peace program at Uppsala University in Sweden.] “Deterrence, interdependence and Sino–US peace.” International Area Studies Review, volume 18, number 3, pgs. 297-311. 2015.

Several recent works on China and Sino–US relations have made substantial contributions to the current understanding of how and under what circumstances a combination of nuclear deterrence and economic interdependence may reduce the risk of war between major powers. At least four conclusions can be drawn from the review above: first, those who say that interdependence may both inhibit and drive conflict are right. Interdependence raises the cost of conflict for all sides but asymmetrical or unbalanced dependencies and negative trade expectations may generate tensions leading to trade wars among inter-dependent states that in turn increase the risk of military conflict (Copeland, 2015: 1, 14, 437; Roach, 2014). The risk may increase if one of the interdependent countries is governed by an inward-looking socio-economic coalition (Solingen, 2015); second, the risk of war between China and the US should not just be analysed bilaterally but include their allies and partners. Third party countries could drag China or the US into confrontation; third, in this context it is of some comfort that the three main economic powers in Northeast Asia (China, Japan and South Korea) are all deeply integrated economically through production networks within a global system of trade and finance (Ravenhill, 2014; Yoshimatsu, 2014: 576); and fourth, decisions for war and peace are taken by very few people, who act on the basis of their future expectations. International relations theory must be supplemented by foreign policy analysis in order to assess the value attributed by national decision-makers to economic development and their assessments of risks and opportunities. If leaders on either side of the Atlantic begin to seriously fear or anticipate their own nation’s decline then they may blame this on external dependence, appeal to anti-foreign sentiments, contemplate the use of force to gain respect or credibility, adopt protectionist policies, and ultimately refuse to be deterred by either nuclear arms or prospects of socioeconomic calamities. Such a dangerous shift could happen abruptly, i.e. under the instigation of actions by a third party – or against a third party. Yet as long as there is both nuclear deterrence and interdependence, the tensions in East Asia are unlikely to escalate to war. As Chan (2013) says, all states in the region are aware that they cannot count on support from either China or the US if they make provocative moves. The greatest risk is not that a territorial dispute leads to war under present circumstances but that changes in the world economy alter those circumstances in ways that render inter-state peace more precarious. If China and the US fail to rebalance their financial and trading relations (Roach, 2014) then a trade war could result, interrupting transnational production networks, provoking social distress, and exacerbating nationalist emotions. This could have unforeseen consequences in the field of security, with nuclear deterrence remaining the only factor to protect the world from Armageddon, and unreliably so. Deterrence could lose its credibility: one of the two great powers might gamble that the other yield in a cyber-war or conventional limited war, or third party countries might engage in conflict with each other, with a view to obliging Washington or Beijing to intervene.

## Case

#### No escalation – the beauchamp ev is about debris from a chinese test so that’s a public sector alt cause the aff can’t solve

#### AND they can’t solve for increased debris by public entities which is something they can’t prevent

Their ev

Bernat 20 – Pawel, 2020, Military University of Aviation, [“ORBITAL SATELLITE CONSTELLATIONS AND THE GROWING THREAT OF KESSLER SYNDROME IN THE LOWER EARTH ORBIT,” SAFETY ENGINEERING OF ANTHROPOGENIC OBJECTS, Volume 4, PDF] Justin

The second decade of the 21st century has brought a dynamic and somewhat surprising development of the space industry. Since 1972 – the Apollo 17 crew mission to the Moon, the humankind has not left the safe environment of Earth’s orbit, and for years the global space sector has been progressing in slow but steady pace run by a few largest space agencies like American NASA, European ESA, Japanese JAXA, and Chinese CNSA. The most significant achievement of the “old ways” of managing outer space exploration is the International Space Stations (ISS) that has facilitated more than 20 years of continuous crewed operations. The situation started to change at the turn of the century when new generations of private entrepreneurs began to invest in and develop space technologies like rocket boosters, spaceships, and what most important for the subject of the paper – satellites and their constellations. This new shift is known among the space industry as “Space 2.0”, and its emergence is dated around 2000-2002 when the companies like SpaceX, Blue Origin, and Virgin Galactic were established. (Pyle, 2019). The real change, however, came in 2012 when the first SpaceX commercial mission was successfully launched to the ISS (NASA, 2012). Since then, the participation of the private sector in the space industry has skyrocketed, especially in the United States. Today, SpaceX is the only entity that provides reusable rockets (first stage and fairings) that is capable of vertical launch and landing. Their current flagship rocket – Falcon 9 has carried out 23 successful missions in 2020 (SpaceX, 2020) and another four are planned for December of that year (Weitering, 2020). Moreover, thanks to Crew Dragon spaceship developed by the company, Americans have regained this year the capacity of sending astronauts from their own soil after nine years of buying the seats on Russian Soyuz capsule. SpaceX is now in the process of building a communication satellites constellation that will be addressed and analyzed in the paper. Nowadays, in the space industry, we witness a very productive cybernetic feedback look between the development of space technologies, the democratization of those technologies, and a substantial reduction of prices. The latter is even more significant if we compare the cost of launching cargo into orbit now and 20 years ago – Falcon 9 is over ten times cheaper than Space Shuttle (Jones, 2018). This, of course, directly translates into the mass and number of objects that we are able to put in the orbit viably. Once the constellations consisting of thousands of satellites were unthinkable, but in the current environment, they become a reality. Space 2.0 also has brought new threats and challenges in the sphere of national and international security. The increase in launch capacity, among other factors, has led to progressive militarization and weaponization of space and new arms race (Bernat, 2019), which has also contributed to the growing numbers of orbiting objects. The goal of the paper is to present the argumentation that the threat posed by the cascading collisions in the Earth’s orbit (Kessler syndrome) is becoming more severe due to the construction of orbital satellite constellations; the threat that presents a real danger for people during their EVAs and orbital infrastructure, which may bare immediate consequences for safety and security systems on Earth. In order to provide the theoretical context for the above claim, the following issues will be presented and discussed: (1) space debris, (2) the Kessler syndrome, (3) orbital debris models, (4) the legal issues related to space debris and mitigation actions against their proliferation, and (5) the planned and being currently developed orbital satellite constellations and how they contribute to the growing threat of the Kessler syndrome.

Can’t solve all of satellites because only some would be hit which mitigates the risk of that impact

#### Public sector mining thumps.

NASA 19 [NASA, 6-11-2019, "NASA Invests in Concepts Aimed at Exploring Craters, Mining Asteroids," <https://www.nasa.gov/press-release/nasa-invests-in-tech-concepts-aimed-at-exploring-lunar-craters-mining-asteroids/>] //DDPT

NASA Invests in Tech Concepts Aimed at Exploring Lunar Craters, Mining Asteroids

Robotically surveying lunar craters in record time and mining resources in space could help NASA establish a sustained human presence at the Moon – part of the agency’s broader [Moon to Mars exploration](https://www.nasa.gov/specials/moon2mars/) approach. Two mission concepts to explore these capabilities have been selected as the first-ever Phase III studies within the [NASA Innovative Advanced Concepts](https://www.nasa.gov/niac) (NIAC) program.

“We are pursuing new technologies across our development portfolio that could help make deep space exploration more Earth-independent by utilizing resources on the Moon and beyond,” said Jim Reuter, associate administrator of NASA’s Space Technology Mission Directorate. “These NIAC Phase III selections are a component of that forward-looking research and we hope new insights will help us achieve more firsts in space.”

#### Collisions highly unlikely.

Salter 16 [Alexander William Salter, Space Debris: a Law and Economics Analysis of the Orbital Commons, 19 Stanford Technology Law Review 221 (2016).] //DDPT

The probability of a collision is currently low. Bradley and Wein estimate that the maximum probability in LEO of a collision over the lifetime of a spacecraft remains below one in one thousand, conditional on continued compliance with NASA’s deorbiting guidelines.3 However, the possibility of a future “snowballing” effect, whereby debris collides with other objects, further congesting orbit space, remains a significant concern.4 Levin and Carroll estimate the average immediate destruction of wealth created by a collision to be approximately $30 million, with an additional $200 million in damages to all currently existing space assets from the debris created by the initial collision.5 The expected value of destroyed wealth because of collisions, currently small because of the low probability of a collision, can quickly become significant if future collisions result in runaway debris growth.

#### There’s no space debris impact

Park 18

Ye Joo Park, citing NASA studies on orbital debris, How Dangerous is Space Debris?, Research Association for Interdisciplinary Studies, RAIS Conference Proceedings, November 19-20, 2018, DOI: 10.5281/zenodo.1572516, <https://ssrn.com/abstract=3303541>

Other factors to consider concerning collisions in Space

While it’s true that there are thousands of space objects directly above Earth in an 800-kilometer band, space is so vast that it’s helpful to pause for a moment and reflect... in the area directly above the entire continental U.S., there are typically only three or four items orbiting above 3.1 million square miles. Therefore, the likelihood of collisions between satellites, spacecraft and orbiting objects is very small (NASA 2018).

In fact, in 2013 it was reported that the probability of a collision between an orbiting asset and space debris larger than 1 cm (0.4in.) will be once every 1.5-2 years, according to the Head of the Russian Hall/ History of Space Debris 8 Figure 5 [NASA] Space Agency. This compares with a 2010 estimate giving the likelihood of once every 5 years (Sorokin 2013).

The Feasibility of Practically Reducing Space Debris

Reducing orbital debris is incredibly difficult. Therefore, the most important action that space experts and policy makers currently recommend is to prevent the unnecessary creation of additional orbital debris. This can be done through prudent vehicle design and operations ((UNOOSA 2014).

The International Academy of Astronautics or IAA is a significant, global organization of scientists and space experts from many countries who meet regularly to discuss the importance of space debris as a policy issue. The subject-matter experts of the IAA published their fifth update Situation Report on Space Debris in August 2017 (Bonnal and McKnight 2017). In the executive summary, the IAA reported that if an orbiting satellite impacts with small bits of debris - even as small as 5 mm - the result will be grave, e.g. the collision would likely disrupt or terminate a satellite’s operations (Bonnal and McKnight 2017, 5).

The serious warnings expressed in this conclusion are offset by the positive findings of the IAA that there has been a reduction of the space debris created from the two extraordinary satellite destruction events (2007 and 2009) cited earlier in this paper. According to the IAF report, a large amount of debris from the satellite explosions were frictionally burned when reaching the Earth’s atmosphere after gradually sinking due to the scientific principle of atmospheric drag (in the science of Physics), which is a deterioration in the strength of an orbit because of an object hitting gas molecules in space. Small bits of space junk sink as the orbit gets weaker... then they burn. This is a positive trend “for keeping the short-term collision hazard under control at the lower altitudes (i.e., less than 650 km)” (Bonnal and McKnight 2017, 7).

#### Debris crashes and Kessler syndrome is mere hype.

**Fange 17** [Daniel von Fange, 5-21-2017, "Kessler Syndrome is Over Hyped”, http://braino.org/essays/kessler\_syndrome\_is\_over\_hyped/]//DDPT

In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment.

Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely.

Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner.

Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided.

The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler.

Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting)

So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect.

I’m removing Kessler Syndrome from my list of things to worry about.

#### **Military space satellites have already been broken up by space debris – their escalation scenario is absurd**

Wall 21’ Home News Spaceflight Space collision: Chinese satellite got whacked by hunk of Russian rocket in March By Mike Wall published August 17, 2021 We may see more and more of these orbital smashups in the coming years. //RD Debatedrills

Yunhai 1-02's wounds are not self-inflicted. In March, the U.S. Space Force's 18th Space Control Squadron (18SPCS) reported the breakup of Yunhai 1-02, a Chinese military satellite that launched in September 2019. It was unclear at the time whether the spacecraft had suffered some sort of failure — an explosion in its propulsion system, perhaps — or if it had collided with something in orbit. We now know that the latter explanation is correct, thanks to some sleuthing by astrophysicist and satellite tracker Jonathan McDowell, who's based at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts. Sponsored Links Cupertino: Startup Is Changing the Way People Retire SmartAsset Related: The worst space debris events of all time Click here for more Space.com videos... CLOSE On Saturday (Aug. 14), McDowell spotted an update in the Space-Track.org catalog, which the 18SPCS makes available to registered users. The update included "a note for object 48078, 1996-051Q: 'Collided with satellite.' This is a new kind of comment entry — haven't seen such a comment for any other satellites before," McDowell tweeted on Saturday. He dove into the tracking data to learn more. McDowell found that Object 48078 is a small piece of space junk — likely a piece of debris between 4 inches and 20 inches wide (10 to 50 centimeters) — from the Zenit-2 rocket that launched Russia's Tselina-2 spy satellite in September 1996. Eight pieces of debris originating from that rocket have been tracked over the years, he said, but Object 48078 has just a single set of orbital data, which was collected in March of this year. "I conclude that they probably only spotted it in the data after it collided with something, and that's why there's only one set of orbital data. So the collision probably happened shortly after the epoch of the orbit. What did it hit?" McDowell wrote in another Saturday tweet. Yunhai 1-02, which broke up on March 18, was "the obvious candidate," he added — and the data showed that it was indeed the victim. Yunhai 1-02 and Object 48078 passed within 0.6 miles (1 kilometer) of each other — within the margin of error of the tracking system — at 3:41 a.m. EDT (0741 GMT) on March 18, "exactly when 18SPCS reports Yunhai broke up," McDowell wrote in another tweet. Thirty-seven debris objects spawned by the smashup have been detected to date, and there are likely others that remain untracked, he added. Despite the damage, Yunhai 1-02 apparently survived the violent encounter, which occurred at an altitude of 485 miles (780 kilometers). Amateur radio trackers have continued to detect signals from the satellite, McDowell said, though it's unclear if Yunhai 1-02 can still do the job it was built to perform (whatever that may be). Space Junk Clean Up: 7 Wild Ways to Destroy Orbital Debris Click here for more Space.com videos... McDowell described the incident as the first major confirmed orbital collision since February 2009, when the defunct Russian military spacecraft Kosmos-2251 slammed into Iridium 33, an operational communications satellite. That smashup generated a whopping 1,800 pieces of trackable debris by the following October. However, we may be entering an era of increasingly frequent space collisions — especially smashups like the Yunhai incident, in which a relatively small piece of debris wounds but doesn't kill a satellite. Humanity keeps launching more and more spacecraft, after all, at an ever-increasing pace. "Collisions are proportional to the square of the number of things in orbit," McDowell told Space.com. "That is to say, if you have 10 times as many satellites, you're going to get 100 times as many collisions. So, as the traffic density goes up, collisions are going to go from being a minor constituent of the space junk problem to being the major constituent. That's just math." We may reach that point in just a few years, he added. The nightmare scenario that satellite operators and exploration advocates want to avoid is the Kessler syndrome — a cascading series of collisions that could clutter Earth orbit with so much debris that our use of, and travel through, the final frontier is significantly hampered. RELATED STORIES — Who's going to fix the space junk problem? — Space junk removal is not going smoothly — The world needs space junk standards, G7 nations agree Our current space junk problem is not that severe, but the Yunhai event could be a warning sign of sorts. It's possible, McDowell said, that Object 48078 was knocked off the Zenit-2 rocket by a collision, so the March smashup may be part of a cascade. "That's all very worrying and is an additional reason why you want to remove these big objects from orbit,"