### T [0:50]

#### Interp: On this resolution, the aff debater must specify how they clarify the Non-Appropriation principle of the Outer Space Treaty.

Pershing 19  (Abigail D., “Interpreting the Outer Space Treaty¶s NonAppropriation Principle: Customary International Law from 1967 to Today”, Yale Law Review, Vol. 44: 1; 2019, <https://digitalcommons.law.yale.edu/cgi/viewcontent.cgi?article=1697&context=yjil>)

Given these trends, the international community would do well to rethink the Outer Space Treaty—and soon. Without a clearer articulation of what the international community agrees is the meaning and scope of the nonappropriation principle, it is entirely possible that States will use legal arguments like the ones outlined above to reinterpret Article II to serve the commercial interests of their domestic companies. Even in this new era of extraterrestrial enterprise, many of the norms underlying the Outer Space Treaty, such as equitable access and peaceful use, would remain important goals shared by members of the international community. Without an internationally agreed upon principle to guide State and private practice, however, these norms could become unobtainable and the fundamental spirit of the Treaty would again be violated. As Fabio Tronchetti puts it: [I]f any subject was allowed to appropriate parts of outer space, the basic aim of the drafters of the Treaty, namely to prevent a colonial competition in outer space and to create the conditions and premises for an exploration and use of outer space carried out for the benefit of all States, would be betrayed.122 But this outcome is not inevitable. Although economic pressures may make this second shift unavoidable, the international community still has the chance to orchestrate the manner in which this change occurs and work to set up a legal order to preserve the original goals and purposes of the Outer Space Treaty. This Part first examines various proposals in the literature for property rights allocation systems then proposes a new leasing system modeled on the U.N. Convention on the Law of the Sea (UNCLOS). A. Proposals in the Literature for a Space Property Rights Allocation System In clarifying the Outer Space Treaty and the non-appropriation principle, the international community will have several options. One solution legal theorists have proposed is to simply restate in clear terms that all in situ property rights to land in space are illegal under Article II.123 However, denying all access to property rights across the board is an inadequate solution for several reasons. First, as a practical matter, States (at least the ones with space-faring capabilities) are unlikely to sign off on something so restrictive. Second, although colonizing and appropriating space could result in significant negative outcomes if not undertaken carefully (including currently unknown environmental impacts both on Earth and in space), exploration and exploitation could lead to significant benefits, such as advances in medicine and energy technology. It would be better to work to reap these benefits in an organized way rather than to allow the scramble for control of space that will likely result if the international community does not allow an outlet for this ambition. But the exact nature of the appropriate solution is less clear.

#### They violate – they don’t explain how they clarify the treaty.

#### 1] Topic lit – the OST is the most influential and formative treaty on this topic, and Pershing is one of the most prominent authors on debates about this topic.

#### 2] Ground – politics disads and solvency indicts are core neg ground that require aff specification to have stable links.

#### 3] Clash – aff can duck offense by shifting their solvency, and delink disads by ignoring the OST. That encourages shiftiness over clash, and kills depth of argumentation.

#### The voters are

#### 1] Fairness b/c debate is a game, if it’s unfair no-one will want to play.

#### 2] Education b/c it’s the only takeaway and the constitutive purpose of debate.

#### Drop-the-debater, k2 deterring further abuse and substance is skewed b/c I had to spend time on theory.

#### Regardless, they have no solvency because states just interpret the OST to favor private entities.

#### Competing interpretations, a) reasonability is bad it requires judge intervention and b) arguing about the norms is the only way to get to the best norms possible.

#### And don’t give them an RVI on T. You don’t win for being topical and it incentivizes the aff to be purposefully abusive to bait out theory and win on RVI.

### SOP [1:00]

#### First, the value must be justice, defined as giving each their due, as per the word ‘unjust’ in the resolution.

#### That’s distinct from ethics – what’s just is what arises out of just history of transfers.

Nozick 74 [Robert Nozick, Renowned American Philosopher, “Anarchy, State and Utopia,” Part II, Section I, ]/ lm

If the hypothetical just history involves each person's consenting to the institutional structure and to any limitations on his rights (specified by the moral side constraints on the behavior of others) it embodies, then if some actual person would not consent, one must view the institutional structure as unjust (unless it counts as just via some other hypothetical history). Similarly, one must hold the institutional structure unjust if the hypothetical just history involves some people's consenting who didn't, and some now would not assent to those others having done so. If the institutional structure could arise by some hypothetical just history which does not involve anyone's consent to that structure, then one's evaluation of the structure will depend upon one's evaluation of the process which would give rise to it. If that process is viewed as better (along dimensions other than justice where, by hypothesis, it excels) than the actual history, this probably will improve one's evaluation of the structure. That a just process would have led to the institutional structure, but only if manned by despicable individuals, will not enhance one's evaluation of that institutional structure.

The entitlement principles of justice in holdings that we have sketched are historical principles of justice. To better understand their precise character, we shall distinguish them from another subclass of the historical principles. Consider, as an example, the principle of distribution according to moral merit. This principle requires that total distributive shares vary directly with moral merit; no person should have a greater share than anyone whose moral merit is greater. (If moral merit could be not merely ordered but measured on an interval or ratio scale, stronger principles could be formulated.) Or consider the principle that results by substituting “usefulness to society” for “moral merit” in the previous principle. Or instead of “distribute according to moral merit,” or “distribute according to usefulness to society,” we might consider “distribute according to the weighted sum of moral merit, usefulness to society, and need,” with the weights of the different dimensions equal. Let us call a principle of distribution patterned if it specifies that a distribution is to vary along with some natural dimension, weighted sum of natural dimensions, or lexicographic ordering of natural dimensions. And let us say a distribution is patterned if it accords with some patterned principle. (I speak of natural dimensions, admittedly without a general criterion for them, because for any set of holdings some artificial dimensions can be gimmicked up to vary along with the distribution of the set.) The principle of distribution in accordance with moral merit is a patterned historical principle, which specifies a patterned distribution. “Distribute according to I.Q.” is a patterned principle that looks to information not contained in distributional matrices. It is not historical, however, in that it does not look to any past actions creating differential entitlements to evaluate a distribution; it requires only distributional matrices whose columns are labeled by I.Q. scores. The distribution in a society, however, may be composed of such simple patterned distributions, without itself being simply patterned. Different sectors may operate different patterns, or some combination of patterns may operate in different proportions across a society. A distribution composed in this manner, from a small number of patterned distributions, we also shall term “patterned.” And we extend the use of “pattern” to include the overall designs put forth by combinations of end-state principles.

Whether or not Locke’s particular theory of appropriation can be spelled out so as to handle various difficulties, I assume that any adequate theory of justice in acquisition will contain a proviso similar to the weaker of the ones we have attributed to Locke. A process normally giving rise to a permanent bequeathable property right in a previously unowned thing will not do so if the position of others no longer at liberty to use the thing is thereby worsened. It is important to specify this particular mode of worsening the situation of others, for the proviso does not encompass other modes. It does not include the worsening due to more limited opportunities to appropriate (the first way above, corresponding to the more stringent condition), and it does not include how I “worsen” a seller’s position if I appropriate materials to make some of what he is selling, and then enter into competition with him. Someone whose appropriation otherwise would violate the proviso still may appropriate provided he compensates the others so that their situation is not thereby worsened; unless he does compensate these others, his appropriation will violate the proviso of the principle of justice in acquisition and will be an illegitimate one.\* A theory of appropriation incorporating this Lockean proviso will handle correctly the cases (objections to the theory lacking the proviso) where someone appropriates the total supply of something necessary for life.\*

#### The standard is consistency with the Self Ownership Proviso.

Feser 05 [Edward C. Feser is an American philosopher. He is Associate Professor of Philosophy at Pasadena City College in Pasadena, California, Social Philosophy and Policy Foundation, “There is no such thing as unjust initial acquisition,” Section II]/ lm

If what I have argued so far is correct, then the way is opened to the following revised case for strongly libertarian Lockean-Nozickian prop erty rights: We are self-owners, having full property rights to our body parts, powers, talents, energies, etc. As self-owners, we also have a right, given the SOP, not to have our self-owned powers nullified—we have the right, that is, to act within the extra-personal world and thus to acquire rights to extra-personal objects that the use of our self-owned powers requires.39 This might involve the buying or leasing of certain rights or bundles of rights and, correspondingly, the acquiring of lesser or greater degrees of ownership of parts of the external world, but as long as one is able to exercise one’s powers to some degree and is not rendered incapable of acting within that world, the SOP is satisfied. In any case, such rights can only be traded after they are first established by initial acquisition. In initially acquiring a resource, an agent does no one an injustice (it was unowned, after all). Furthermore, he has mixed his [their] labor with the resource, significantly altering it and/or bringing it under his control, and is himself solely responsible for whatever [the] value or utility the resource has come to have. Thus, he has a presumptive right to it, and, if his control and/or alteration (and thus acquisition) of it is (more or less) complete, his ownership is accordingly (more or less) full. The system of strong private property rights that follows from the acts of initial acquisition performed by countless such agents results, as a matter of empirical fact, in a market economy that inevitably and dramatically increases the number of resources available for use by individuals, and these benefited individuals include those who come along long after initial acquisition has taken place. (Indeed, it especially includes these latecomers, given that they were able to avoid the hard work of being the first to “tame the land” and draw out the value of raw materials.)40 The SOP is thus, in fact, rarely, if ever, violated. The upshot is that a system of Lockean-Nozickian private property rights is morally justified, with a strong presumption against tampering with existing property titles in general. In any case, there is a strong presumption against any general egalitarian redistribution of wealth, and no case whatsoever to be made for such redistribution from the general theory of property just sketched, purged as it is of the Lockean proviso, with all the egalitarian mischief-making the proviso has made possible.

This outcome has the virtue of restoring to Nozick’s system the theoretical simplicity and elegance that his (rather unsystematically articulated) commitment to the Lockean proviso threatened to distort. At the same time, replacement of the Lockean proviso with the self-ownership proviso allows us to sidestep the (arguably) counterintuitive consequences of rejecting the former. Still, since there is no such thing as an unjust initial acquisition, very strong property rights to unowned external objects come to be quite easy to obtain; and they, together with the thesis of self-ownership, give us Nozick’s principle of justice in transfer, with all its highly anti-egalitarian and anti-redistributionist consequences. The picture that results is very much a libertarianism with foundations.

#### Prefer additionally –

#### 1] Self Ownership is a pre-req to debate itself.

Kinsella 11 [Stephan Kinsella, Stephan Kinsella is an attorney in Houston, director of the Center for the Study of Innovative Freedom, and editor of Libertarian Papers., Mises Institute, "Argumentation Ethics and Liberty: A Concise Guide," 05/23/11, https://mises.org/library/argumentation-ethics-and-liberty-concise-guide]

In essence, Hoppe's view is that argumentation, or discourse, is by its nature a conflict-free way of interacting, which requires individual control of scarce resources. In genuine discourse, the parties try to persuade each other by the force of their argument, not by actual force: Argumentation is a conflict-free way of interacting. Not in the sense that there is always agreement on the things said, but in the sense that as long as argumentation is in progress it is always possible to agree at least on the fact that there is disagreement about the validity of what has been said. And this is to say nothing else than that a mutual recognition of each person's exclusive control over his [their] own body must be presupposed as long as there is argumentation (note again, that it is impossible to deny this and claim this denial to be true without implicitly having to admit its truth). ([TSC](http://mises.org/resources/431/A-Theory-of-Socialism-and-Capitalism), p. 158) Thus, self-ownership is presupposed by argumentation. Hoppe then shows that argumentation also presupposes the right to own homesteaded scarce resources as well. The basic idea here is that the body is "the prototype of a scarce good for the use of which property rights, i.e., rights of exclusive ownership, somehow have to be established, in order to avoid clashes" ([TSC](http://mises.org/resources/431/A-Theory-of-Socialism-and-Capitalism), p. 19). As Hoppe explains, “The compatibility of this principle with that of nonaggression can be demonstrated by means of an argumentum a contrario. First, it should be noted that if no one had the right to acquire and control anything except his own body … then we would all cease to exist and the problem of the justification of normative statements … simply would not exist. The existence of this problem is only possible because we are alive, and our existence is due to the fact that we do not, indeed cannot, accept a norm outlawing property in other scarce goods next and in addition to that of one's physical body. Hence, the right to acquire such goods must be assumed to exist.

#### 2] Justice is intrinsic to institutions, not based off consequences – it’s not just to punish a wrongly accused person just because it will deter others.

#### Now negate –

#### Appropriation in initial acquisition of space is never unjust.

Feser 05 [Edward C. Feser is an American philosopher. He is Associate Professor of Philosophy at Pasadena City College in Pasadena, California, Social Philosophy and Policy Foundation, “There is no such thing as unjust initial acquisition,” Section II]/ lm

There is a serious difficulty with this criticism of Nozick, however. It is just this: There is no such thing as an unjust initial acquisition of resources; therefore, there is no case to be made for redistributive taxation on the basis of alleged injustices in initial acquisition.

Giving what I shall call “the basic argument” for this audacious claim will be the task of Section II of this essay. The argument is, I think, compelling, but by itself it leaves unexplained some widespread intuitions to the effect that certain specific instances of initial acquisition are unjust and call forth as their remedy the application of a Lockean proviso, or are otherwise problematic. (A “Lockean proviso,” of course, is one that forbids initial acquisitions of resources when these acquisitions do not leave “enough and as good” in common for others.) Thus, Section III focuses on various considerations that tend to show how those intuitions are best explained in a way consistent with the argument of Section II. Section IV completes the task of accounting for the intuitions in question by considering how the thesis of self-ownership itself bears on the acquisition and use of property. Section V shows how the results of the previous sections add up to a more satisfying defense of Nozickian property rights than the one given by Nozick himself, and considers some of the implications of this revised conception of initial acquisition for our understanding of Nozick’s principles of transfer and rectification.

The reason there is no such thing as an unjust initial acquisition of resources is that there is no such thing as either a just or an unjust initial acquisition of resources. The concept of justice, that is to say, simply does not apply to initial acquisition. It applies only after initial acquisition has already taken place. In particular, it applies only to transfers of property (and derivatively, to the rectification of injustices in transfer). This, it seems to me, is a clear implication of the assumption (rightly) made by Nozick that external resources are initially unowned. Consider the following example. Suppose an individual A seeks to acquire some previously unowned resource R. For it to be the case that A [them to] commits an injustice in acquiring R, it [there] would also have to be the case that there is some individual B (or perhaps a group of individuals) against whom A commits the injustice. But for B to have been wronged by A’s acquisition of R, B [they] would have to have had a rightful claim over R, a right to R. By hypothesis, however, B did not have a right to R, because no one had a right to it—it was unowned, after all. So B was not wronged and could not have been. In fact, the very first person who could conceivably be wronged by anyone’s use of R would be, not B, but A himself, since A is the first one to own R. Such a wrong would in the nature of the case be an injustice in transfer—in unjustly taking from A what is rightfully his—not in initial acquisition. The same thing, by extension, will be true of all unowned resources: it is only after someone has initially acquired them that anyone could unjustly come to possess them, via unjust transfer. It is impossible, then, for there to be any injustices in initial acquisition.7

### Mining DA [1:10]

#### Asteroid mining boosts the economy, solves resource scarcity, lowers costs of space exploration, and solves climate change.

Mallick 19 [Senjuti Mallick graduated from ILS Law College, Pune, in 2016. She was a Law Researcher at the High Court of Delhi from 2016 to 2018 and is currently pursuing LL.M in International Law at The Fletcher School of Law and Diplomacy, USA. She has been doing research on Outer Space Law since she was a student at ILS. Presently, she is working on different aspects of Space Law, in particular, Space debris mitigation and removal, and the law of the commons. She has published articles on Space Law in the All India Reporter Law Journal and The Hindu, Dr Rajeswari (Raji) Pillai Rajagopalan is the Director of the Centre for Security, Strategy and Technology (CSST) at the Observer Research Foundation, New Delhi.  Dr Rajagopalan was the Technical Advisor to the United Nations Group of Governmental Experts (GGE) on Prevention of Arms Race in Outer Space (PAROS) (July 2018-July 2019).  She was also a Non-Resident Indo-Pacific Fellow at the Perth USAsia Centre from April-December 2020.  As a senior Asia defence writer for The Diplomat, she writes a weekly column on Asian strategic issues, Observer Research Foundation, “If space is ‘the province of mankind’, who owns its resources?” January 24th 2019, <https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn8]/> lm

Indeed, the economic imperative for space mining is evident and analysts predict that these extraction activities could translate to a multibillion-dollar industry. NASA estimates, for example, that the [value of asteroids](https://metro.co.uk/2018/06/11/new-asteroid-gold-rush-earn-everyone-earth-75-billion-7622439/)out there could be in the vicinity of US$700 quintillion – that amount is roughly equivalent to US$95 billion for each of us here on Earth.[[iv]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn4)  Another major attraction for the prospective extraterrestrial mining companies is the availability of precious minerals in abundance on the Moon, on Mars and the asteroids (among them—lithium, cobalt, nickel, copper, zinc, niobium, molybdenum, lanthanum, europium, tungsten, and gold).[[v]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn5) After all, these metals and mineral resources have grown scarce on Earth, and both governments and commercial actors are pushing to look to celestial bodies for resources.[[vi]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn6)

Technological innovation—primarily brought about by commercial players such as Elon Musk[[2]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_ftn2) and Jeff Bezos[[3]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_ftn3)—is changing the landscape of space exploration. Leading the way in this new-era race are the startups including Planetary Resources, Deep Space Industries, Ispace, and Kleos Space.[[vii]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn7) Research into the feasibility of human and robotic missions to asteroids is being conducted by both governmental organisations, like NASA and JAXA (Japan Aerospace Exploration Agency), as well as private companies such as Planetary Resources.[[viii]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn8) However, for realising affordable space travel and space industrialisation, it is essential to find extraterrestrial materials such as metals, minerals and water that do not have to be transported from Earth. Thus, the first objective in carrying out asteroid mining activity is to obtain elements that are critical for basic sustenance on Earth. It has been identified that the asteroid belt in our solar system contains eight-percent metal-rich (M type) asteroids and 75-percent volatile-rich carbonaceous (C type) asteroids.[[ix]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn9)

The second incentive for celestial mining companies is to haul precious minerals and cargo raw materials to Earth to fuel its fast depleting resources. This would significantly increase the mining company’s valuation and greatly impact the global economy. According to a 2012 Reuters interview with Planetary Resources, a 30-meter-long (98-foot) asteroid can hold platinum worth somewhere from US$25 billion to US$50 billion.[[x]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn10)  These metals are highly useful and valuable, both on Earth and in space.[[xi]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn11)

Third, asteroids give humans the potential to create tools in space, since iron, nickel and cobalt are in abundance.[[xii]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn12) Chris Lewicki, Planetary Resources CEO, has said, “Using 3D printing technology one can grab material off asteroids and 3D print something that never has to be on a rocket. Tools, machines and even habitats can then be built off Earth, reducing the cost of exploration even further.[[xiii]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn13) Fourth, resource extraction is also becoming a focus for many Middle Eastern nations.[[xiv]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn14) The Middle Eastern oil States, such as Saudi Arabia and the United Arab Emirates are investing heavily in this industry as they are looking at space as a way to diversify out of the earthly benefits of fossil fuel.[[xv]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn15) Fifth, countries such as India and China are looking to mine the Moon for extracting Helium-3, which is considered a clean and efficient form of energy. It is thought that th[at]is isotope could provide safer nuclear energy in a fusion reactor, since it is not radioactive and would not produce dangerous waste products.[[xvi]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn16)

Finally, the water available in outer space could be used to make rocket propellants. According to scientists, since water is abundant in outer space, in some or the other form, it could be extracted and electrolysed to derive hydrogen and oxygen, the key ingredients of rocket fuel.[[xvii]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn17) Thus, instead of carrying one’s own fuel all the way, asteroids could serve as extraterrestrial/orbital “gas stations” for fuelling future deep space missions. This would simultaneously make space travel more cost-effective and productive. Such ventures are also seen to be intrinsic to further science and discovery, in addition to revolutionising commercial development in outer space. The mining of asteroids could also provide a near-infinite [supply of the precious resources for Earth to use.](https://www.telegraph.co.uk/finance/newsbysector/industry/mining/9222766/Planetary-Resources-unveils-cosmic-plan-to-boldly-go-and-mine-asteroids-for-gold-and-platinum.html)[[xviii]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn18)

#### That’s key to offsetting emissions from terrestrial mining and maintaining the tech advancements necessary to transitioning off fossil fuels and stopping species extinction.

**Bell 19** [Aidan Bell is the co-founder of EnviroBuild, a sustainable building materials company based in London. PhD from Manchester in Inorganic Chemistry. "The Conflict of Tech Innovation and Sustainability." TechNative, 22 Jan. 2019, technative.io/the-conflict-of-tech-innovation-and-sustainability]

The current technological dilemmas that we face today are similar to those of ancient time.  Overuse of a resource for immediate human benefit risks longer-term negative influence.  A report conducted by Greenpeace found that Internet data centres have incredibly large carbon footprints, accounting for 3% of global electricity use, much of it in locations that offer cheap, but dirty, electricity. Likewise, the minerals that are found in electronic devices like mobile phones, such as tantalum and gold, often originate from unregulated mining that releases harmful substances into the surrounding soil, air and water. Mining also contributes hugely to deforestation, which is responsible for 15% of global greenhouse gas emissions.

The negative impacts of technological innovation are increasing and action needs to be taken soon to resolve this crisis for the sake of future generations. The Intergovernmental Panel on Climate Change (IPCC) report last month warned that we have just 12 years to reduce the rate of global warming before widespread flooding and droughts become unavoidable. The demand for minerals and energy brought about by technological advancements shows no sign of slowing down, painting a worrying picture for the future of the planet.

Faced with the consequences of our intelligence, humanity now has to use its incredible versatility to overcome the challenges it has created for itself. For example, wind and solar power are increasingly becoming economically-viable sources of unlimited, free electricity and provide us with the opportunity to reduce our dependence on harmful fossil fuels. Bioengineering should help us protect surface soils and the ecosystems that depend on them by maintaining healthy levels of nutrients and soil salinity. Technological advancements will even help us prevent species extinction events that would otherwise destroy our Earth altogether, with NASA already developing spacecraft to push approaching asteroids out of our orbit.

#### That causes extinction.

Strona 18 Giovanni, Flinders University, Bradshaw, Corey J. A., Scientific Reports, Science Daily, “Climate Change risks ‘extinction domino effect,’” https://www.sciencedaily.com/releases/2018/11/181129122506.htm

New research reveals the extinction of plant or animal species from extreme environmental change increases the risk of an [leads to] 'extinction domino effect' that could annihilate all life on Earth. This would be the worst-case scenario of what scientists call 'co-extinctions', where an organism dies out because it depends on another doomed species, with the findings published today in the journal Scientific Reports. Think of a plant's flower pollinated by only one species of bee -- if the bee becomes extinct, so too will the plant eventually. "Even the most resilient species will inevitably fall victim to the synergies among extinction drivers as extreme stresses drive ecosystems to collapse." says lead author Dr Giovanni Strona of the European Commission's Joint Research Centre based in Ispra in northern Italy. Researchers from Italy and Australia simulated 2,000 'virtual earths' linking animal and plant species. Using sophisticated modelling, they subjected the virtual earths to catastrophic environmental changes that ultimately annihilated all life. Examples of the kinds of catastrophes they simulated included runaway global warming, scenarios of 'nuclear winter' following the detonation of multiple atomic bombs, and a large asteroid impact. "What we were trying to test is whether the variable tolerances to extreme global heating or cooling by different species are enough to explain overall extinction rates," "But because all species are connected in the web of life, our paper demonstrates that even the most tolerant species ultimately succumb to extinction when the less-tolerant species on which they depend disappear." "Failing to take into account these co-extinctions therefore underestimates the rate and magnitude of the loss of entire species from events like climate change by up to 10 times," says co-author Professor Bradshaw of Flinders University in South Australia Professor Bradshaw and Dr Strona say that their virtual scenarios warn humanity not to underestimate the impact of co-extinctions. "Not taking into account this domino effect gives an unrealistic and exceedingly optimistic perspective about the impact of future climate change," warns Professor Bradshaw. It can be hard to imagine how the demise of a small animal or plant matters so much, but the authors argue that tracking species up to total annihilation demonstrates how the loss of one can amplify the effects of environmental change on the remainder. "Another really important discovery was that in the case of global warming in particular, the combination of intolerance to heat combined with co-extinctions mean that 5-6 degrees of average warming globally is enough to wipe out most life on the planet," says Dr Strona. Professor Bradshaw further warns that their work shows how climate warming creates extinction cascades in the worst possible way, when compared to random extinctions or even from the stresses arising from nuclear winter.

### Regulation CP [0:35]

#### Counterplan: Establish an international body to regulate Commercial Space Activity.

**Iliopoulos 20** [Iliopoulos, Nikolaos [University of Tokyo], and Miguel Esteban [Waseda University]. "Sustainable space exploration and its relevance to the privatization of space ventures." Acta Astronautica 167 (2020): 85-92.]

The envisioned legal regime to encourage private firms to undertake the high risk and high cost involved in activities of space exploration would have to explicitly recognize extra-terrestrial property claims of individuals and corporations that meet specified conditions. As such, based on the conclusions made through this paper ,it is considered that with the right negotiation terms, the current treaties can be revised so as to become steppingstones for the advancement of space exploration that could potentially bring forth significant changes to the environment surrounding planet Earth. Finally, one way that such privatization efforts could be seen to benefit of [hu]mankind as a whole is that any taxation resulting from it should be paid directly to the United Nations, or that at least some fraction of the profits should fund this organization.

#### That solves space debris and asteroids risks with space mining.

Fladeland 19 [Fellow at the Outer Space Institute, Logan, Aaron C. Boley, Michael Byers, Meteoroid Stream Formation Due to the Extraction of Space Resources from Asteroids, Conference paper for the 1st International Orbital Debris Conference, December 2019, <https://arxiv.org/abs/1911.12840>, accessed 6-25-21]

Fortunately, it may be possible to establish simple measures that could mitigate some of these concerns, particularly the formation of debris streams with non-trivial mass fluxes. Examples include establishing an international body with the authority to grant mining permits, much like the International Seabed Authority established under the 1982 United Nations Convention on the Law of the Sea. In any scenario, safety and sustainability requirements should be part of the licensing regime. Some of these requirements could limit mining rates or require a company to produce a risk-to-Earth assessment plan. Some asteroids could even be deemed untouchable for safety or scientific reasons. As space law is redefined in the NewSpace era, it must be fully informed by the astrophysical context.

### Nukes CP [0:15]

#### Counterplan: State should eliminate their nuclear arsenals.

#### Yes, it’s feasible.

ICAN 17, ICAN, 9-19-2017, "Leaders voice support for nuclear ban treaty,"<https://www.icanw.org/leaders_voice_support_for_nuclear_ban_treaty> //rapunzel

During the general debate of the 72nd session of the UN General Assembly from 19 to 25 September in New York, presidents, prime ministers and foreign ministers from all regions of the world spoke in favour of the Treaty on the Prohibition of Nuclear Weapons, which opened for signature on 20 September. Here are some of the highlights. Austria H.E. Mr. Sebastian Kurz, Federal Minister for Foreign Affairs “The new Treaty on the Prohibition of Nuclear Weapons is an important achievement … It is a crucial step to get rid of all nuclear weapons. Today, we often hear that nuclear weapons are necessary for security. This narrative is not only wrong, it is dangerous. The new treaty provides a real alternative: a world without nuclear weapons, where everyone is safer. The overwhelming support of the international community in adopting this treaty demonstrates that many countries share this goal.”

#### Eliminating nuclear arsenals is k2 preventing nuke war.

Kreige 15 [David Kriege, 3-11-2015, "Nuclear Weapons and Possible Human Extinction: The Heroic Marshall Islanders," Nuclear Age Peace Foundation,[https://www.wagingpeace.org/nuclear-weapons-and-possible-human-extinction/]/](https://www.wagingpeace.org/nuclear-weapons-and-possible-human-extinction/%5d/) lm

The brilliant American author Jonathan Schell, who wrote The Fate of the Earth and was an ardent nuclear abolitionist, had this insight into the Nuclear Age, “We prepare for our extinction in order to assure our survival.”[[i]](https://www.wagingpeace.org/nuclear-weapons-and-possible-human-extinction/#_edn1) He refers to the irony and idiocy of reliance upon nuclear weapons to avert nuclear war. Nuclear deterrence is what the political, military and industrial leaders of the nuclear-armed and nuclear-dependent states call strategy. It involves the deployment of nuclear weapons on the land, in the air and under the oceans, and the constant striving to modernize and improve these weapons of mass annihilation. Nuclear deterrence strategy rests on the unfounded, unproven and unprovable conviction that the deployment of these weapons, including those on hair-trigger alert, will protect their possessors from nuclear attack. It rests on the further naïve beliefs that nothing will go awry and that humans will be able to indefinitely control the monstrous weapons they have created without incident or accident, without miscalculation or intentional malevolence. In truth, these beliefs are simply that, beliefs, without any solid basis in fact. They are tenuously based, on a foundation of faith as opposed to a provable reality. They are the conjuring of a nuclear priesthood in collaboration with pliable politicians and corporate nuclear profiteers. They are seemingly intent upon providing a final omnicidal demonstration of, in Hannah Arendt’s words, “the banality of evil.”[[ii]](https://www.wagingpeace.org/nuclear-weapons-and-possible-human-extinction/#_edn2) Nuclear strategists and ordinary people rarely consider the mythology that sustains nuclear deterrence, which is built upon a foundation of rationality. But national leaders are often irrational, and there are no guarantees that nuclear weapons will not be used in the future. There have been many close calls in the past, not the least of which was the 13-day Cuban Missile Crisis in October 1962. Does it seem even remotely possible that all leaders of all nuclear-armed countries will act rationally at all times under all circumstances? It would be irrational to think so. In nuclear deterrence strategies there are vast unknowns and unknowable possibilities. Our behaviors and those of our nuclear-armed opponents are not always knowable. We must expect the unexpected, but we cannot know in advance in what forms it will present itself. This means that we cannot be prepared for every eventuality. We do know, however, that human fallibility and nuclear weapons are a volatile mix, and this is particularly so in times of crisis, such as we are experiencing now in US-Russian relations over Ukraine.

Such volatility in a climate of crisis deepens the concern regarding the possibility of nuclear extinction. We can think of it as Nuclear Roulette, in which the nuclear-armed states are loading nuclear weapons into the metaphorical chambers of a gun and pointing that gun (or those several guns) at humanity’s head. No one knows how many nuclear weapons have been loaded into the gun. Are our chances of human extinction in the 21st century one in one hundred, one in ten, one in six, or one in two? The truth is that we do not know, but the odds of survival are not comforting. My colleague, physicist John Scales Avery, views the prospects of human survival as dim at best. He writes: “It is a life-or-death question. We can see this most clearly when we look far ahead. Suppose that each year there is a certain finite chance of a nuclear catastrophe, let us say 2 percent. Then in a century the chance of survival will be 13.5 percent, and in two centuries, 1.8 percent, in three centuries, 0.25 percent, in four centuries, there would only be a 0.034 percent chance of survival and so on. Over many centuries, the chance of survival would shrink almost to zero. Thus, by looking at the long-term future, we can see clearly that if nuclear weapons are not entirely eliminated, civilization will not survive.”[[iii]](https://www.wagingpeace.org/nuclear-weapons-and-possible-human-extinction/#_edn3) Here is what we know: First, nuclear weapons are capable of causing human extinction, along with the extinction of many other species. Second, nine countries continue to rely upon these weapons for their so-called “national security.” Third, these nine countries are continuing to modernize their nuclear arsenals and failing to fulfill their legal and moral obligations to achieve a Nuclear Zero world – one in which human extinction by means of nuclear weapons is not a possibility because there are no nuclear weapons. Given these knowable facts, we might ask: What kind of “national security” is it to rely upon weapons capable of causing human extinction? Or, to put it another way: How can any nation be secure when nuclear weapons threaten all humanity? Certainly, it requires massive amounts of denial to remain apathetic to the extinction dangers posed by nuclear weapons. There appears to be a kind of mass insanity – a detachment from reality. Such detachment seems possible only in societies that have made themselves subservient to the nuclear “experts” and officials who have become the high priests of nuclear strategy. Whole societies have developed a gambler’s addiction to living at the edge of the precipice of nuclear annihilation.

#### And that takes out the aff’s impacts because we can’t have nuke war without nukes.

### Underview

#### 1] Presumption negates – infinite ways for something to be false but only one way for them to be true.

#### 2] No 1ar theory, A] any response to my CI will be new in the 2ar which will require judge intervention and B] incentives friv theory dumps over substance debates.

### Case

#### Reject util –

#### 1] Util can’t explain justice.

Miller 17 [Miller, David, "Justice", The Stanford Encyclopedia of Philosophy (Fall 2017 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/fall2017/entries/justice/>.]/ lm

Yet despite these efforts to reconcile justice and utility, three serious obstacles still remain. The first concerns what we might call the currency of justice: justice has to do with the way that tangible benefits and burdens are assigned, and not with the happiness or unhappiness that the assignees experience. It is a matter of justice, for example, that people should be paid the right amount for the jobs that they do, but, special circumstances aside, it is no concern of justice that John derives more satisfaction from his fairly-earned income than Jane does from hers (but see Cohen 1989 for a different view). There is so to speak, a division of labour, under which rights, opportunities, and material benefits of various kinds are allocated by principles of justice, while the conversion of these into units of utility (or disutility) is the responsibility of each individual recipient (see Dworkin 2000, ch. 1). Utilitarians will therefore find it hard to explain what from their point of view seems to be the fetishistic concern of justice over how the means to happiness are distributed, rather than happiness itself.

The second obstacle is that utilitarianism judges outcomes by totalling up utility levels, and has no independent concern for how that utility is distributed between persons. So even if we set aside the currency issue, utilitarian theory seems unable to capture justice’s demand that each should receive what is due to her regardless of the total amount of benefit this generates. Defenders of utilitarianism will argue that when the conduct-guiding rules are being formulated, attention will be paid to distributive questions. In particular, when resources are being distributed among people we know little about individually, there are good reasons to favour equality, since in most cases resources have diminishing marginal utility – the more of them you have, the less satisfaction you derive from additional instalments. Yet this is only a contingent matter. If some people are very adept at turning resources into well-being – they are so-called ‘utility monsters’ – then a utilitarian should support a rule that privileges them. This seems repugnant to justice. As Rawls famously put the general point, ‘each member of society is thought to have an inviolability founded on justice which….even the welfare of every one else cannot override’ (Rawls 1971, p. 28; Rawls 1999, pp. 24–25).

The third and final difficulty stems from utilitarianism’s thoroughgoing consequentialism. Rules are assessed strictly in the light of the consequences of adopting then, not in terms of their intrinsic properties. Of course, when agents follow rules, they are meant to do what the rule requires rather than to calculate consequences directly. But for a utilitarian, it is never going to be a good reason for adopting a rule that it will give people what they deserve or what they are entitled to, when desert or entitlement are created by events in the past, such as a person’s having performed a worthwhile action or entered an agreement. Backward-looking reasons have to be transmuted into forward-looking reasons in order to count. If a rule such as pacta sunt servanda (‘agreements must be kept’) is going to be adopted on utilitarian grounds, this is not because there is any inherent wrongness in defaulting on a compact one has made, but because a rule that compacts must be kept is a useful one, since it allows people to co-ordinate their behaviour knowing that their expectations about the future are likely to be met. But justice, although not always backward-looking in the sense explained, often is. What is due to a person is in many cases what they deserve for what they have done, or what they are entitled to by virtue of past transactions. So even if it were possible to construct a forward-looking rationale for having rules that closely tracked desert or entitlement as these are normally understood, the utilitarian still cannot capture the sense of justice – why it matters that people should get what is due to then – that informs our common-sense judgements.

#### 2] Prefer our definition of justice – they can’t provide one in the 1ar b/c A] strat skew, moots 7 minutes of the NC, B] Shiftiness, it lets the 1ar change definitions in the round unpredictably, C] time skew, that puts aff a minute ahead on the new definition.

#### 3] Util calc fails – butterfly effect makes consequences unpredictable.

Kidder 95 [Rushworth, Founder of institute of global ethics, professor, “How good people make tough choices,” ] lm

How, critics argue, can you possibly foresee all the consequences of any personal action, let alone of actions on a broad social scale? Humans are notoriously poor speculators, these critics argue, routinely missing the most important consequences and stumbling into unforeseen problems of their own making. Did our ancestors really understand consequences when they imported African slaves into the American colonies with little thought to future racial inharmonies? Did they have a clear sense of end results when they built nuclear reactors with little concern for nuclear waste disposal or put CFCs into aerosol cans with no understanding of the ozone layer? Then how can we possibly be entrusted to determine the “greatest good”? Nor, they object, are humans any good at understanding the “greatest number,” since actions have such unforeseen consequences that they may affect vast numbers of people far beyond those first identified. Finally, critics raise serious practical objections. Taking this theory to its logical extreme, they note

#### 4] Self Ownership is a side constraint – morality presumes that you own yourself and your actions.

#### 5] Since happiness is subjective, util collapses to moral skep.

#### 6] CA the neg fw.

#### If I win framework you auto-vote neg on our first off.

#### Reject extinction first –

#### 1] freezes action – everything has a non-zero risk of causing extinction.

#### 2] morally repugnant – it implies that we should force women to bear as many children as possible to minimize the risk of future extinction.

#### 3] It’s consequentialist – if we beat util, we beat extinction since it’s a consequence and justice doesn’t look at consequences.

### AT Adv 1

#### Non-unique – governments have been and continue to be the primary polluters in space.

Maury 20 [Alain Maury, Alain J. Maury is a French astronomer, San Pedro de Atacama Celestial Explorations, Space Obs, “Is wild capitalism the best humanity has to offer to the Solar System ? (updated May 30th 2020)” May 30th 2020, [https://www.spaceobs.com/en/Alain-Maury-s-Blog/Is-wild-capitalism-the-best-humanity-has-to-offer-to-the-Solar-System-updated-May-30th-2020]/](https://www.spaceobs.com/en/Alain-Maury-s-Blog/Is-wild-capitalism-the-best-humanity-has-to-offer-to-the-Solar-System-updated-May-30th-2020%5d/) lm

Space debris:

So far, space exploration has mostly been done by the space agencies of the various governments which have felt necessary to launch rockets (and missiles) into space. The primary motivation has never been science or the progress of the society, but has been military. In the late fifties, there was a group of engineers who dreamt about rockets. Had basically no funding, and had to go to a Canyon in nearby La Cañada to test their toys. After Sputnik, almost instantly, it became the Jet Propulsion Laboratory, with a bit more funding than before. The truth is that the public part of the space activities has been developed as a side effect of the military space activities (said otherwise, there is one Hubble Space Telescope, while the US Air Force has launched 11 of them for spying purposes). I have participated in “space debris” meetings in the early 90s, and there are still such meetings, and nothing, absolutely nothing has been done to reduce the quantity of trash which has been sent and continues to be sent in space. The quantity of space trash keeps increasing with time (google "space debris" to see the evolution). And this is the result of the programs of (supposedly responsible) space agencies. There is already something like 250 tons of terrestrial debris on the surface on the Moon, the totality of it coming from government agencies and I could not find the value for the Mars, or how many tons of trash has been sent into “deep space”.

#### Robots being developed by private companies solve space debris.

Gao 21 – [Reporter at Reuters Liangping, and Ryan Woo, "China launches robot prototype capable of catching space debris with net," Reuters, 4-27-21, https://www.reuters.com/lifestyle/science/china-launches-robot-prototype-capable-catching-space-debris-with-net-2021-04-27/, accessed 6-25-21]

BEIJING, April 27 (Reuters) - A Chinese space mining start-up launched into low Earth orbit on Tuesday a robot prototype that can scoop up debris left behind by other spacecraft with a big net. The NEO-01, which will also peer into deep space to observe small celestial bodies, was launched on the government's Long March 6 rocket along with a handful of satellites, state-run Xinhua news agency reported. The 30kg robot developed by Shenzhen-based Origin Space will pave the way for future technologies capable of mining on asteroids, according to the company. Since the establishment of the world's first asteroid mining company Planetary Resources in 2009, more than a dozen firms across the world have entered the fledging sector, including 3D Systems (DDD.N) of the United States and Japan's Astroscale. Unlike Astroscale's technology, which uses magnets to gather up space junk, NEO-01 will use a net to capture debris and then burn it with its electric propulsion system, according to a report on the company's website. Thousands of satellites have been launched globally. As they outlive their use, many end up as junk, posing danger to other operating satellites. Origin Space plans to launch dozens of space telescopes and more spacecraft to achieve the first commercial mining of asteroids by 2045, said the company's founder Su Meng in an interview with domestic media on April 6. Xinhua reported on Saturday that China was stepping up efforts to land a probe on a near-Earth asteroid to collect samples, and also expediting a plan to build a defence system against near-Earth asteroids.

#### Babcock 15 is the link, and it cites a ‘cloudy legal regime’ which the counterplan solves for.

#### Nuclear war won’t lead to extinction, prefer this study, it has 9 PhD’s, it more recent and it’s a specific reply to Starr.

Reisner et al 18 [[Jon Reisner](https://agupubs.onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Reisner%2C+Jon) - Climate and Atmospheric Sciences PhD at Los Alamos National Laboratory;[Gennaro D'Angelo](https://agupubs.onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=D%27Angelo%2C+Gennaro) – PhD[Los Alamos National Laboratory](https://www.researchgate.net/institution/Los_Alamos_National_Laboratory),[Theoretical Division](https://www.researchgate.net/institution/Los_Alamos_National_Laboratory/department/Theoretical_Division2)[Eunmo Koo](https://agupubs.onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Koo%2C+Eunmo) - Ph.D., Mechanical Engineering, University of California at Berkeley, Expertise: Atmospheric fluid dynamics, Modeling fluid-solid interactions, Fire spread in urban and wildland environment, Wind energy harvest, High-performance computing simulations;[Wesley Even](https://agupubs.onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Even%2C+Wesley) - Ph.D. Physics - Louisiana State University, Expertise: Computational Physics, Astrophysics[Matthew Hecht](https://agupubs.onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Hecht%2C+Matthew) – Expert in Climate and Ocean Modeling[Elizabeth Hunke](https://agupubs.onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Hunke%2C+Elizabeth) - Ph.D., Program in Applied Mathematics, University of Arizona, Expertise: Sea Ice Models;[Darin Comeau](https://agupubs.onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Comeau%2C+Darin) – PhD, Applied Mathematics, University of Arizona , Expert in High dimensional data analysis, statistical and predictive modeling, and uncertainty quantification, with particular applications to climate science, as well as process-based modeling of the cryosphere;[Randall Bos](https://agupubs.onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Bos%2C+Randall) – PhD, Expert in Nuclear Weapon Effects Modeling and Simulation[James Cooley](https://agupubs.onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Cooley%2C+James) - Ph.D. -- Physics, University of Maryland, Expert in Weapon Physics, Emergency Response, Computational Physics, Verification, and Validation (2018). Climate impact of a regional nuclear weapons exchange: An improved assessment based on detailed source calculations. Journal of Geophysical Research: Atmospheres , 123 , 2752 – 2772. <https://doi.org/10.1002/2017JD027331> Received 20 JUN 2017 Accepted 1 FEB 2018 Accepted article online 13 FEB 2018 Published online 14 MAR 2018 ©2018. The Authors. This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distri- bution in any medium, provided the original work is properly cited, the use is non-commercial and no modi fi cations or adaptations are made.] LHSBC

Abstract We present a multiscale study examining the impact of a regional exchange of nuclear weapons on global climate. Our models investigate multiple phases of the effects of nuclear weapons usage, including growth and rise of the nuclear fireball, ignition and spread of the induced fi restorm, and comprehensive Earth system modeling of the oceans, land, ice, and atmosphere. This study follows from the scenario originally envisioned by Robock, Oman, Stenchikov, et al. (2007, <https://doi.org/10.5194/acp-7-2003-2007>), based on the analysis of Toon et al. (2007, <https://doi.org/10.5194/acp-7-1973-2007>), which assumes a regional exchange between India and Pakistan of fi fty 15 kt weapons detonated by each side. We expand this scenario by modeling the processes that lead to production of black carbon, in order to re fi ne the black carbon forcing estimates of these previous studies. When the Earth system model is initiated with 5 × 10 9 kg of black carbon in the upper troposphere (approximately from 9 to 13 km), the impact on climate variables such as global temperature and precipitation in our simulations is similar to that predicted by previously published work. However, while our thorough simulations of the fi restorm produce about 3.7 × 10 9 kg of black carbon, we find that the vast majority of the black carbon never reaches an altitude above weather systems (approximately 12 km). Therefore, our Earth system model simulations conducted with model-informed atmospheric distributions of black carbon produce significantly lower global climatic impacts than assessed in prior studies, as the carbon at lower altitudes is more quickly removed from the atmosphere. In addition, our model ensembles indicate that statistically signi fi cant effects on global surface temperatures are limited to the first 5 years and are much smaller in magnitude than those shown in earlier works. None of the simulations produced a nuclear winter effect. We fi nd that the effects on global surface temperatures are not uniform and are concentrated primarily around the highest arctic latitudes, dramatically reducing the global impact on human health and agriculture compared with that reported by earlier studies. Our analysis demonstrates that the probability of significant global cooling from a limited exchange scenario as envisioned in previous studies is highly unlikely, a conclusion supported by examination of natural analogs, such as large forest fires and volcanic eruptions.

#### Emissions and damage from launches are dwarfed by terrestrial mining’s impact.

ArXiv 18 [Emerging Technology from the ArXiv. Emerging Technology from the arXiv covers the latest ideas and technologies that appear on the Physics arXiv preprint server. Team list found here: <https://www.technologyreview.com/author/emerging-technology-from-the-arxiv/>. "Asteroid mining might actually be better for the environment." MIT Technology Review, 2 Apr. 2020, [www.technologyreview.com/2018/10/19/139664/asteroid-mining-might-actually-be-better-for-the-environment](http://www.technologyreview.com/2018/10/19/139664/asteroid-mining-might-actually-be-better-for-the-environment)]

For a certain kind of investor, asteroid mining is a path to untold riches. Astronomers have long known that asteroids are rich in otherwise scarce resources such as platinum and water. So an obvious idea is to mine this stuff and return it to Earth—or, in the case of water, to a moon base or Earth-orbiting space station. There is no shortage of interest in these ventures. In the last decade, investors have funded half a dozen companies that have set their sights on various nearby rocks. To many observers, it’s only a matter of time before such a mission gets the green light. But profit margins are only part of the picture. A potentially more significant aspect of these missions is the impact they will have on Earth’s environment. But nobody has assessed this environmental impact in detail. Today, that changes thanks to the work of Andreas Hein and colleagues at the University of Paris-Saclay in France. These guys have calculated the greenhouse-gas emissions from asteroid-mining operations and compared them with the emissions from similar Earth-based activities. Their results provide some eyebrow-raising insights into the benefits that asteroid mining might provide. The calculations are relatively straightforward. Rocket launches release significant amounts of greenhouse gases into the atmosphere. The fuel on board the first stage of a rocket burns in Earth’s atmosphere to form carbon dioxide. For kerosene-burning rockets, one kilogram of fuel creates three kilograms of CO2. (The second and third stages operate outside the Earth’s atmosphere and so can be ignored.) Reentries are just as damaging. That’s because a significant mass of a re-entering vehicle ablates in the upper atmosphere, producing NOx such as nitrous oxide (N2O), a greenhouse gas that is about 300 times more potent than CO2. By one estimate, the space shuttle released about 20% of its mass in the form of N2O every time it returned to Earth. Hein and co use these numbers to calculate that a kilogram of platinum mined from an asteroid would release some 150 kilograms of CO2 into Earth’s atmosphere. However, economies of scale from large asteroid-mining operations could lower this to about 60 kilograms of CO2 per kilogram of platinum. That needs to be compared with the emission from Earth-based mining. Here, platinum mining generates significant greenhouse gases, mostly from the energy it takes to remove this stuff from the ground. Indeed, the numbers are huge. The mining industry estimates that producing one kilogram of platinum on Earth releases around 40,000 kilograms of carbon dioxide. “The global warming effect of Earth-based mining is several orders of magnitude larger,” say Hein and co. The figures for water are also encouraging. In this case, the authors calculate the greenhouse-gas emissions from an asteroid-mining operation that returns water to anywhere within the moon’s orbit, a so-called cis-lunar orbit. They compare this to the emissions from sending the same volume of water from Earth into orbit. The big difference is that a water-carrying vehicle from Earth can haul only a small percentage of its mass as water. But an asteroid-mining spacecraft can transport a significant multiple of its mass as water to cis-lunar orbit. “Substantial savings in greenhouse gas emissions can be achieved,” say Hein and co. This interesting work should help to focus minds on the environmental impacts of mining, which are rapidly increasing in profile. But it is only a first step. There is significant uncertainty in the numbers here, so these will need to be better understood.

#### CP solves limits debris.

### AT Adv 2

#### Asteroid impacts low probability and massive timeframe, every 120,000 years, that’s plenty of time to make the tech to deflect asteroids from hitting earth,

#### Empirically denied – no escalation or retaliation.

Zarybnisky 18 [MA in National Security Studies from the Naval War College, PhD in Operations Research from the MIT Sloan School of Management, Lt Col, USAF, “Celestial Deterrence: Deterring Aggression in the Global Commons of Space”, 3/28/2018, <https://apps.dtic.mil/dtic/tr/fulltext/u2/1062004.pdf>]

PREVENTING AGGRESSION IN SPACE While deterrence and the Cold War are strongly linked in the public’s mind through the nuclear standoff between the United States and the Soviet Union, the fundamentals of deterrence date back millennia and deterrence remains relevant. Thucydides alludes to the concept of deterrence in his telling of the Peloponnesian War when he describes rivals seeking advantages, such as recruiting allies, to dissuade an adversary from starting or expanding a conflict.6F6 Aggression in space was successfully avoided during the Cold War because both sides viewed an attack on military satellites as highly escalatory, and such an action would likely result in general nuclear war.7F7 In today’s more nuanced world, attacking satellites, including military satellites, does not necessarily result in nuclear war. For instance, foreign countries have used high-powered lasers against American intelligence-gathering satellites8F8 and the United States has been reluctant to respond, let alone retaliate with nuclear weapons. This shift in policy is a result of the broader use of gray zone operations, to which countries struggle to respond while limiting escalation. Beginning with the fundamentals of deterrence illuminates how it applies to prevention of aggression in space.

#### Miscalculation is highly unlikely.

Pavur 19 [Professor of Computer Science Department of Computer Science at Oxford University and Ivan Martinovic, DPhil Researcher Cybersecurity Centre for Doctoral Training at Oxford University, “The Cyber-ASAT: On the Impact of Cyber Weapons in Outer Space”, 2019 11th International Conference on Cyber Conflict: Silent Battle T. Minárik, S. Alatalu, S. Biondi, M. Signoretti, I. Tolga, G. Visky (Eds.), [https://ccdcoe.org/uploads/2019/06/Art\_12\_The-Cyber-ASAT.pdf]/](https://ccdcoe.org/uploads/2019/06/Art_12_The-Cyber-ASAT.pdf%5d/) lm  
A. Limited Accessibility Space is difficult. Over 60 years have passed since the first Sputnik launch and only nine countries (ten including the EU) have orbital launch capabilities. Moreover, a launch programme alone does not guarantee the resources and precision required to operate a meaningful ASAT capability. Given this, one possible reason why space wars have not broken out is simply because only the US has ever had the ability to fight one [21, p. 402], [22, pp. 419–420]. Although launch technology may become cheaper and easier, it is unclear to what extent these advances will be distributed among presently non-spacefaring nations. Limited access to orbit necessarily reduces the scenarios which could plausibly escalate to ASAT usage. Only major conflicts between the handful of states with ‘space club’ membership could be considered possible flashpoints. Even then, the fragility of an attacker’s own space assets creates de-escalatory pressures due to the deterrent effect of retaliation. Since the earliest days of the space race, dominant powers have recognized this dynamic and demonstrated an inclination towards de-escalatory space strategies [23]. B. Attributable Norms There also exists a long-standing normative framework favouring the peaceful use of space. The effectiveness of this regime, centred around the Outer Space Treaty (OST), is highly contentious and many have pointed out its serious legal and political shortcomings [24]–[26]. Nevertheless, this status quo framework has somehow supported over six decades of relative peace in orbit. Over these six decades, norms have become deeply ingrained into the way states describe and perceive space weaponization. This de facto codification was dramatically demonstrated in 2005 when the US found itself on the short end of a 160-1 UN vote after opposing a non-binding resolution on space weaponization. Although states have occasionally pushed the boundaries of these norms, this has typically occurred through incremental legal re-interpretation rather than outright opposition [27]. Even the most notable incidents, such as the 2007-2008 US and Chinese ASAT demonstrations, were couched in rhetoric from both the norm violators and defenders, depicting space as a peaceful global commons [27, p. 56]. Altogether, this suggests that states perceive real costs to breaking this normative tradition and may even moderate their behaviours accordingly. One further factor supporting this norms regime is the high degree of attributability surrounding ASAT weapons. For kinetic ASAT technology, plausible deniability and stealth are essentially impossible. The literally explosive act of launching a rocket cannot evade detection and, if used offensively, retaliation. This imposes high diplomatic costs on ASAT usage and testing, particularly during peacetime. C. Environmental Interdependence A third stabilizing force relates to the orbital debris consequences of ASATs. China’s 2007 ASAT demonstration was the largest debris-generating event in history, as the targeted satellite dissipated into thousands of dangerous debris particles [28, p. 4]. Since debris particles are indiscriminate and unpredictable, they often threaten the attacker’s own space assets [22, p. 420]. This is compounded by Kessler syndrome, a phenomenon whereby orbital debris ‘breeds’ as large pieces of debris collide and disintegrate. As space debris remains in orbit for hundreds of years, the cascade effect of an ASAT attack can constrain the [mean] attacker’s long-term use of space [29, pp. 295– 296]. Any state with kinetic ASAT capabilities will likely also operate satellites of its own, and they are necessarily exposed to this collateral damage threat. Space debris thus acts as a strong strategic deterrent to ASAT usage.

#### Turn – private entities reduce risk in outer space.

Steer 20 [Dr. Cassandra Steer, CERL Senior Non-Resident Fellow, Center for Ethics and the Rule of Law, University of Pennsylvania, “Why Outer Space Matters for National and International Security,” January 8th 2020, [https://www.law.upenn.edu/live/files/10053-why-outer-space-matters-for-national-and]/](https://www.law.upenn.edu/live/files/10053-why-outer-space-matters-for-national-and%5d/) lm

Commercial actors have a key role in increasing cooperation and transparency because they often support multiple international clients among whom political relations may be unclear or shifting. Some commercial actors have an explicit desire to remain neutral, others have fixed alliances. All these factors may complicate the development of policies that support collaboration and TCBMs. However, it is undeniable that increased data sharing of SSA and the development of mechanisms to clarify intentions behind space-based maneuvers are essential to ensure stability in space. There is a critical need for clear representations from States as to their position on national and international law applicable to space and well-informed policy positions on the emerging weaponization of space. Due to the specificity of the space domain, specialized expertise must be provided to decision-makers, and interdisciplinary opinions must be sought from a multitude of stakeholders. Finding answers to these questions requires interdisciplinary engagement and collaboration, not only among substantive experts in different fields but also between public agencies and private commercial entities. This is not merely aspirational. There are lessons to be learned from the Cold War era when scientists pushed for increased collaboration even during periods of high tension between the two superpowers. There is a need for exchange of information and evidence-based policy, particularly in terms of SSA, cross-domain thinking, minimization of the escalatory cycle, and appreciation of the long-term effects of any space-based conflict. The challenge will be knowing how to balance this against the need to protect one’s own space assets and the need to maintain secrecy about one’s own capabilities. Space is a unique domain and requires a unique way of thinking about policy and strategy.