## 1NC – OFF

#### CP Text: Space faring nations should establish a multilateral agreement that restricts asteroid mining done by private entities except for on asteroid Kamo’oalewa.

#### Kamo’oalewa is an asteroid comprised of lunar material

Devlin 21 [Hannah Devlin is the Guardian's science correspondent, having previously been science editor of the Times. “Near-Earth asteroid is a fragment from the moon, say scientists.” November 11, 2021. https://www.theguardian.com/science/2021/nov/11/near-earth-asteroid-is-a-fragment-from-the-moon-say-scientists]

Scientists have identified what appears to be a small chunk of the moon that is tracking the Earth’s orbit around the Sun. The asteroid, named Kamo`oalewa, was discovered in 2016 but until now relatively little has been known about it. New observations suggest it could be a fragment from the moon that was thrown into space by an ancient lunar collision. Kamo`oalewa is one of Earth’s quasi-satellites, a category of asteroid that orbits the Sun, but remains relatively close to the planet – in this case about 9m miles away. Despite being close in astronomical terms, the asteroid is about the size of a ferris wheel and about 4m times fainter than the faintest star that can be seen with the naked eye. Consequently, the Earth’s most powerful telescopes are needed to make observations. Using the Large Binocular Telescope on Mount Graham in southern Arizona, astronomers found the spectrum of reflected light from Kamo`oalewa closely matched lunar rocks from Nasa’s Apollo missions, suggesting it originated from the moon. They had initially compared the light with that reflected off other near-Earth asteroids, but drawn a blank. “I looked through every near-Earth asteroid spectrum we had access to, and nothing matched,” said Ben Sharkey, a PhD student at the University of Arizona and the paper’s lead author. After missing the chance to observe Kamo`oalewa in April 2020 owing to a shutdown of the telescope during the coronavirus pandemic, the team found the final piece of the puzzle in 2021. “This spring, we got much needed follow-up observations and went, ‘Wow it is real,’” Sharkey said. “It’s easier to explain with the moon than other ideas.”

#### Space based solar power is being developed and transitions to 100% clean energy, but lunar regolith is key

O’Neill 13 [Ian O'Neill is a media relations specialist at NASA's Jet Propulsion Laboratory (JPL) in Southern California. Prior to joining JPL, he served as editor for the Astronomical Society of the Pacific‘s Mercury magazine and Mercury Online and contributed articles to a number of other publications, including Space.com, Space.com, Live Science, HISTORY.com, Scientific American. Ian holds a Ph.D in solar physics and a master's degree in planetary and space physics. “How to Turn the Moon Into a Giant Space Solar Power Hub.” December 3, 2013. https://www.space.com/23810-moon-luna-belt-solar-power-idea.html]

When it comes to space and energy, we need to think big. That's what one Japanese company is doing — and they're reaching for the moon, literally. The best thing about the moon is that one lunar hemisphere is constantly bathed in sunlight (except for the occasional eclipse), so using solar arrays to generate power may not seem like such a stretch. Take China's recently-launched Chang'e 3 Yutu rover for example, it's solar powered. Also, Apollo astronauts set up solar-powered experiments on the lunar regolith. But how about wrapping the moon's equator in a 250 mile wide band of solar panels and beaming the power generated back to Earth? That's exactly what Shimizu Corporation is proposing and they reckon their concept could harness a steady stream of 13,000 terawatts of power. According to Business Insider, "the total installed electricity generation summer capacity in the United States was 1,050.9 gigawatts." Such a vast energy resource could be transformative for our civilization. As Obi-Wan might say: "That's no moon. It's a space (solar power) station." "A shift from economical use of limited resources to the unlimited use of clean energy is the ultimate dream of all mankind," says the company's website. "The LUNA RING, our lunar solar power generation concept, translates this dream into reality through ingenious ideas coupled with advanced space technologies." Indeed, advanced space technologies will be needed, not only to harvest solar energy and efficiently beam it back to Earth, but its very construction will require several leaps in robotic technology development. Also, this mother of all engineering tasks will need to see some significant changes in international space treaties before it sees light of day. Resembling a moon born from science fiction, the LUNA RING is just that, a ring around the moon. The ring, stretching 6,800 miles around the moon's circumference, will be constructed by robots that will "perform various tasks on the lunar surface, including ground leveling and excavation of hard bottom strata." The entire project will be overseen by a team of humans while the bulk of the robotic tasks can be teleoperated from Earth. [Moon Base Visions: How to Build a Lunar Colony (Photos)] It’s all very well building a huge array of solar panels around the moon, but how would the power be sent to Earth? As our atmosphere is virtually transparent to microwaves and lasers, Shimizu envisages solar energy being fed through microwave/laser transmitters located around the Earth-facing side of the moon. As the moon orbits the Earth and the Earth rotates, international receiving stations will feed electricity grids with plentiful lunar solar power as the moon rises to when it sets. The designers are keen to point out that this is a green energy resource that could benefit the whole of mankind. What's more, when the infrastructure is set up, other resources can be exploited — such as mining for precious minerals and fabricating products from regolith. One could imagine an international consortium of nations and/or companies that buy a stake in the LUNA RING to aid its construction. Each partner would then have rights to construct receiving stations in their geographical location of choice, weaning us off polluting sources of power. Japan, which was hurt by the devastating Fukushima meltdown in 2011, is actively seeking out alternative power resources to wean itself off nuclear energy — it doesn't get more "alternative" than this.

**Warming causes extinction and guarantees every other impact**

Spratt and Dunplop 19, David Spratt [Research Director for Breakthrough National Centre for Climate Restoration, Melbourne, and co-author of Climate Code Red: The case for emergency action] & Ian Dunlop [member of the Club of Rome. Formerly an international oil, gas and coal industry executive, chairman of the Australian Coal Association, chief executive of the Australian Institute of Company Directors, and chair of the Australian Greenhouse Office Experts Group on Emissions Trading 1998-2000], “Existential climate-related security risk: A scenario approach,” Breakthrough - National Centre for Climate Restoration, May 2019, pg. 8-10, beckert. Brackets in original text

2020–2030: Policy-makers fail to act on evidence that the current ​Paris Agreement path — in which global human-caused greenhouse emissions do not peak until 2030 — will lock in at least 3°C of warming. The case for a global, climate-emergency mobilisation of labour and resources to build a zero-emission economy and carbon drawdown in order to have a realistic chance of keeping warming well below 2°C is politely ignored. As projected by Xu and Ramanathan, by 2030 carbon dioxide levels have reached 437 parts per million — which is unprecedented in the last 20 million years — and warming reaches 1.6°C.18 2030–2050: Emissions peak in 2030, and start to fall consistent with an 80 percent reduction in fossil-fuel energy intensity by 2100 compared to 2010 energy intensity. This leads to warming of 2.4°C by 2050, consistent with the Xu and Ramanathan “baseline-fast” scenario.19 However, another 0.6°C of warming occurs — taking the total to 3°C by 2050 — due to the activation of a number of carbon-cycle feedbacks and higher levels of ice albedo and cloud feedbacks than current models assume. [It should be noted that this is far from an extreme scenario: the low-probability, high-impact warming (five percent probability) can exceed 3.5–4°C by 2050 in the Xu and Ramanathan scheme.] 2050: By 2050, there is broad scientific acceptance that system tipping-points for the West Antarctic Ice Sheet and a sea-ice-free Arctic summer were passed well before 1.5°C of warming, for the Greenland Ice Sheet well before 2°C, and for widespread permafrost loss and large-scale Amazon drought and dieback by 2.5°C. The “**hothouse Earth**” scenario has been realised, and Earth is headed for another degree or more of warming, especially since human greenhouse emissions are still significant.20 While sea levels have risen 0.5 metres by 2050, the increase may be 2–3 metres by 2100, and it is understood from historical analogues that seas may eventually rise by more than 25 metres. Thirty-five percent of the global land area, and 55 percent of the global population, are subject to more than 20 days a year of **lethal heat** conditions, beyond the threshold of human survivability. The destabilisation of the Jet Stream has very significantly affected the intensity and geographical distribution of the Asian and West African monsoons and, together with the further slowing of the Gulf Stream, is impinging on life support systems in Europe. North America suffers from devastating weather extremes including wildfires, heatwaves, drought and inundation. The summer monsoons in China have failed, and water flows into the great rivers of Asia are severely reduced by the loss of more than one-third of the Himalayan ice sheet. Glacial loss reaches 70 percent in the Andes, and rainfall in Mexico and central America falls by half. Semi-permanent El Nino conditions prevail. Aridification emerges over more than 30 percent of the world’s land surface. Desertification is severe in southern Africa, the southern Mediterranean, west Asia, the Middle East, inland Australia and across the south-western United States. Impacts: A number of **ecosystems collapse**, including coral reef systems, the Amazon rainforest and in the Arctic. Some poorer nations and regions, which lack capacity to provide artificially-cooled environments for their populations, **become unviable**. Deadly heat conditions persist for more than 100 days per year in West Africa, tropical South America, the Middle East and South-East Asia, contributing to **more than a billion people being displaced** from the tropical zone. **Water availability decreases sharply** in the most affected regions at lower latitudes (dry tropics and subtropics), affecting about **two billion** people worldwide. Agriculture becomes nonviable in the dry subtropics. Most regions in the world see a significant drop in food production and increasing numbers of extreme weather events, including heat waves, floods and storms. Food production is inadequate to feed the global population and food prices skyrocket, as a consequence of a one-fifth decline in crop yields, a decline in the nutrition content of food crops, a catastrophic decline in insect populations, desertification, monsoon failure and chronic water shortages, and conditions too hot for human habitation in significant food-growing regions. The lower reaches of the agriculturally-important river deltas such as the Mekong, Ganges and Nile are inundated, and significant sectors of some of the world’s most populous cities — including Chennai, Mumbai, Jakarta, Guangzhou, Tianjin, Hong Kong, Ho Chi Minh City, Shanghai, Lagos, Bangkok and Manila — are abandoned. Some small islands become uninhabitable. Ten percent of Bangladesh is inundated, displacing 15 million people. Even for 2°C of warming, more than a billion people may need to be relocated and In high-end scenarios, the scale of destruction is beyond our capacity to model, with a **high likelihood of human civilisation coming to an end**.21 National security consequences: For pragmatic reasons associated with providing only a sketch of this scenario, we take the conclusion of the ​Age of Consequences ‘Severe’ 3°C scenario developed by a group of senior US national-security figures in 2007 as appropriate for our scenario too: Massive nonlinear events in the global environment give rise to ​massive nonlinear societal events.​ In this scenario, nations around the world will be ​overwhelmed by the scale of change and pernicious challenges, such as pandemic disease. The internal cohesion of nations will be under great stress, **including in the United States**, both as a result of a dramatic rise in migration and changes in agricultural patterns and water availability. The flooding of coastal communities around the world, especially in the Netherlands, the United States, South Asia, and China, has the potential to challenge regional and even national identities.​ **Armed conflict** between nations over resources, such as the Nile and its tributaries, is likely and **nuclear war** is possible. The social consequences range from increased religious fervor to ​outright chaos.​ In this scenario, climate change provokes ​a permanent shift in the relationship of humankind to nature​’.22 (emphasis added) DISCUSSION This scenario provides a glimpse into a world of “outright chaos” on a path to the end of human civilisation and modern society as we have known it, in which the challenges to global security are simply overwhelming and political panic becomes the norm. Yet the world is currently completely unprepared to envisage, and even less deal with, the consequences of catastrophic climate change.23 What can be done to avoid such a probable but catastrophic future? It is clear from our preliminary scenario that dramatic action is required this decade if the “hothouse Earth” scenario is to be avoided. To reduce this risk and protect human civilisation, a massive global mobilisation of resources is needed in the coming decade to build a zero-emissions industrial system and set in train the restoration of a safe climate. This would be akin in scale to the World War II emergency mobilisation. There is an increasing awareness that such a response is now necessary. Prof. Kevin Anderson makes the case for a Marshall Plan-style construction of zero-carbon-dioxide energy supply and major electrification to build a zero-carbon industrial strategy by “a shift in productive capacity of society akin to that in World War II”.24 Others have warned that “**only a drastic, economy-wide makeover within the next decade**, consistent with limiting warming to 1.5°C”, would avoid the transition of the Earth System to the Pliocene-like conditions that prevailed 3-3.3 million years ago, when temperatures were ~3°C and sea levels 25 metres higher.25 It should be noted here that the 1.5° goal is not safe for a number of Earth System elements, including Arctic sea-ice, West Antarctica and coral reefs.

## 1NC – OFF

#### Agents must be practical reasoners:

#### First, inescapability – the exercise of practical rationality requires that one regards it as intrinsically good – that justifies a right to freedom.

Wood [Allen W. Wood, (Stanford University, California) "Kantian Ethics" Cambridge University Press, 2007, https://www.cambridge.org/core/books/kantian-ethics/769B8CD9FCC74DB6870189AE1645FAC8, DOA:8-12-2020 // WWBW]//rct st

Kant holds that the most basic act through which people exercise their practical rationality is that of setting an end (G 4:437). To set an end is, analytically, to subject yourself to the hypothetical imperative that you should take the necessary means to the end you have set (G 4:417). This is the claim that you rationally ought to do something whether or not you are at the moment inclined to do it. It represents the action of applying that means as good (G 4:414) – in the sense of “good” that Kant explicates as: what is required by reason independently of inclination (G 4:413). Kant correctly infers that any being which sets itself ends is committed to regarding its end as good in this sense, and also to regarding the goodness of its end as what also makes application of the means good – that is, rationally required independently of any inclination to apply it. The act of setting an end, therefore, must be taken as committing you to represent some other act (the act of applying the means) as good. In doing all this, however, the rational being must also necessarily regard its own rational capacities as authoritative for what is good in general. For it treats these capacities as capable of determining which ends are good, and at the same time as grounding the goodness of the means taken toward those good ends. But to regard one’s capacities in this way is also to take a certain attitude toward oneself as the being that has and exercises those capacities. It is to esteem oneself – and also to esteem the correct exercise of one’s rational capacities in determining what is good both as an end and as a means to it. One’s other capacities, such as those needed to perform the action that is good as a means, are also regarded as good as means. But that capacity through which we can represent the very idea of something as good both as end and as means is not represented merely as the object of a contingent inclination, nor is it represented as good only as a means. It must be esteemed as unconditionally good, as an end in itself. To find this value in oneself is not at all the same as thinking of oneself as a good person. Even those who misuse their rational capacities are committed to esteeming themselves as possessing rational nature. It also does not imply that a more intelligent person (in that sense, more “rational”) is “better” than a less intelligent one. The self-esteem involved in setting an end applies to any being capable of setting an end at all, irrespective of the cleverness or even the morality of the end setting. Kant’s argument supports the conclusion, to which he adheres with admirable consistency throughout his writings, that all rational beings, clever or stupid, even good or evil, have equal (absolute) worth as ends in themselves. For Kantian ethics the rational nature in every person is an end in itself whether the person is morally good or bad.

#### Second, value theory – the existence of extrinsic goodness requires unconditional human worth.

Korsgaard (Christine M., “Two Distinctions in Goodness,” The Philosophical Review Vol. 92, No. 2 (Apr., 1983), pp. 169-195, JSTOR) OS \*bracketed for gen lang\* //rct st

The argument shows how Kant's idea of justification works. It can be read as a kind of regress upon the conditions, starting from an important assumption. The assumption is that when a rational being makes a choice or undertakes an action, he or she [they] supposes the object to be good, and its pursuit to be justified. At least, if there is a categorical imperative there must be objectively good ends, for then there are necessary actions and so necessary ends (G 45-46/427-428 and Doctrine of Virtue 43-44/384-385). In order for there to be any objectively good ends, however, there must be something that is unconditionally good and so can serve as a sufficient condition of their goodness. Kant considers what this might be: it cannot be an object of inclination, for those have only a conditional worth, "for if the inclinations and the needs founded on them did not exist, their object would be without worth" (G 46/428). It cannot be the inclinations themselves because a rational being would rather be free from them. Nor can it be external things, which serve only as means. So, Kant asserts, the unconditionally valuable thing must be "humanity" or "rational nature," which he defines as "the power set to an end" (G 56/437 and DV 51/392). Kant explains that regarding your existence as a rational being as an end in itself is a "subjective principle of human action." By this I understand him to mean that we must regard ourselves as capable of conferring value upon the objects of our choice, the ends that we set, because we must regard our ends as good. But since "every other rational being thinks of his existence by the same rational ground which holds also for myself' (G 47/429), we must regard others as capable of conferring value by reason of their rational choices and so also as ends in themselves. Treating another as an end in itself thus involves making that person's ends as far as possible your own (G 49/430). The ends that are chosen by any rational being, possessed of the humanity or rational nature that is fully realized in a good will, take on the status of objective goods. They are not intrinsically valuable, but they are objectively valuable in the sense that every rational being has a reason to promote or realize them. For this reason it is our duty to promote the happiness of others-the ends that they choose-and, in general, to make the highest good our end.

#### Third, practical reason – ethical principles must be derived from the structure of reason:

#### [1] Regress – we can always ask why we should follow a theory, so they aren’t binding because they don’t have a starting point. Practical reason solves – When we ask why we should follow reason, we demand a reason, which concedes to the authority of reason itself, so it’s the only thing we can follow

#### [2] Action Theory – every action can be broken down to infinite amounts of movements, i.e. me moving my arm can be broken down to the infinite moments of every state my arm is in. Only reason can unify these movements because we use practical reason to achieve our goals, means all actions collapse to reason

#### Fourth, epistemology – ethics must begin a priori, meaning they can’t be derived from our experience.

#### [A] Separateness – if space is based on experience, it must be formed from objects separate to us outside of our reasoning abilities. But to represent objects as separate from us, we would already need to assume space exists in the first place to have a concept of “separateness,” so to represent space as something separate from us would be incoherent.

#### [B] Is/Ought Gap – experience in the phenomenal world only tells us what is, not what ought to be. But it’s impossible to derive an ought from descriptive premises, so there needs to be additional a priori premises within the noumenal world to make a moral theory.

#### Practical reason means we all have a unified perspective: What can be justified to me can be justified to everyone who is a practical reasoner. If I can conclude that 2+2 is 4, then I understand not only that I know 2+2 is 4, but that everyone around me can arrive at the same conclusion. These things are temporally consistent: I know that me adding two numbers now and taking that sum will not result in me adding the same two numbers in the future and getting a different sum. Our unified perspective does not change but rather stays consistent.

#### But, willing an action that violates the freedom of others is a contradiction: If I decide to kill someone, that action is not universalizable because that would justify other people killing me too. If I die, I cannot exercise my freedom to kill someone else. This is a contradiction: I both justify extending my freedom to kill others and limiting my own freedom.

### Offense

#### Negate:

#### Acquisition of property can never be unjust – to create rights violations, there must already be an owner of the property being violated, but that presupposes its appropriation by another entity.

Feser 1, (Edward Feser, 1-1-2005, accessed on 12-15-2021, Cambridge University Press, "THERE IS NO SUCH THING AS AN UNJUST INITIAL ACQUISITION | Social Philosophy and Policy | Cambridge Core", Edward C. Feser is an American philosopher. He is an Associate Professor of Philosophy at Pasadena City College in Pasadena, California. [https://www.cambridge.org/core/journals/social-philosophy-and-policy/article/abs/there-is-no-such-thing-as-an-unjust-initial-acquisition/5C744D6D5C525E711EC75F75BF7109D1)[brackets](https://www.cambridge.org/core/journals/social-philosophy-and-policy/article/abs/there-is-no-such-thing-as-an-unjust-initial-acquisition/5C744D6D5C525E711EC75F75BF7109D1)%5bbrackets) for gen lang]//phs st

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. This is, to be sure, a bold claim. Moreover, in making it, I contradict not only Nozick’s critics, but Nozick himself, who clearly thinks it is at least possible for there to be injustices in acquisition, whether or not there have in fact been any (or, more realistically, whether or not there have been enough such injustices to justify continual redistributive taxation for the purposes of rectifying them). But here is a case where Nozick has, I think, been too generous to the other side. Rather than attempt —unsatisfactorily, in the view of his critics—to meet the challenge to show that initial acquisition has not in general been unjust, he ought instead to have insisted that there is no such challenge to be met in the first place. 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 intu- itions 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 acqui- sition and use of property. Section V shows how the results of the previ- ous 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 under- standing of Nozick’s principles of transfer and rectification. II. The Basic Argument 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 commits an injustice in acquiring R, it 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 acquisi- tion of R, B 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 some- one 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

#### Self-ownership justifies the appropriation of property – our freedom necessitates being able to set and pursue external things as our ends, including exercising our rights on property. Restricting this arbitrarily limits our freedom which is unjust.

Feser 2, (Edward Feser, 1-1-2005, accessed on 12-15-2021, Cambridge University Press, "THERE IS NO SUCH THING AS AN UNJUST INITIAL ACQUISITION | Social Philosophy and Policy | Cambridge Core", Edward C. Feser is an American philosopher. He is an Associate Professor of Philosophy at Pasadena City College in Pasadena, California. [https://www.cambridge.org/core/journals/social-philosophy-and-policy/article/abs/there-is-no-such-thing-as-an-unjust-initial-acquisition/5C744D6D5C525E711EC75F75BF7109D1)[brackets](https://www.cambridge.org/core/journals/social-philosophy-and-policy/article/abs/there-is-no-such-thing-as-an-unjust-initial-acquisition/5C744D6D5C525E711EC75F75BF7109D1)%5bbrackets) for gen lang]//phs st

V. Some Implications 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, [they] has mixed [their] labor with the resource, significantly altering it and/or bringing it under his control, and is himself solely responsible for whatever value or utility the resource has come to have. Thus, [they] has a presumptive right to it, and, if his control and/or alteration (and thus acquisition) of it is (more or less) complete, his own- ership 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 exist- ing property titles in general. In any case, there is a strong presumption against any general egalitarian redistribution of wealth, and no case what- soever to be made for such redistribution from the general theory of prop- erty just sketched, purged as it is of the Lockean proviso, with all the egalitarian mischief-making the proviso has made possible.

## Case

### 1NC – Warming

#### Asteroid Mining solves Warming – a] Key to REM’s that spur Renewables and b] Reduces Terrestrial Mining that wrecks the environment.

MacWhorter 15, Kevin. "Sustainable mining: Incentivizing asteroid mining in the name of environmentalism." Wm. & Mary Envtl. L. & Pol'y Rev. 40 (2015): 645. (J.D. Candidate, William & Mary Law School)//Elmer

A. Rare Element Mining on Earth In the next sixty years, scientists predict that certain elements crucial to modern industry such as platinum, zinc, copper, phosphorous, lead, gold, and indium could be exhausted on Earth. 12 Many of these have no synthetic alternative, unlike chemical elements such as oil or diamonds.13 Liquid-crystal display (LCD) televisions, cellphones, and laptops are among the various consumer technologies that use precious metals.14Further, green technologies including wind turbines, solar panels, and catalytic converters require these rare elements. 15 As demand rises for both types of technologies, and as reserves of rare metals fall, prices skyrocket.16 Demand for nonrenewable resources creates conflict, and consumerism in rich countries results in harsh labor treatment for poorer countries.17 In general, the mining industry is extremely destructive to Earth’s environment.18 In fact, depending on the method employed, mining can destroy entire ecosystems by polluting water sources and contributing to deforestation.19 It is by its nature an unsustainable practice, because it involves the extraction of a finite and non-renewable resource.20 Moreover, by extracting tiny amounts of metals from relatively large quantities of ore, the mining industry contributes the largest portion of solid wastes in the world.21 The Environmental Protection Agency (EPA) describes the industry as the source of more toxic and hazardous waste than any other industrial sector [in the United States], costing billions of dollars to address the public health and environmental threats to communities. 22 Poor regulations and oxymoronic corporate definitions of sustainability, however, make it unclear as to just how much waste the industry actually produces.23 Platinum provides an excellent case study of the issue, because it is an extremely rare and expensive metal—an ore expected to exist in vast quantities in asteroids.24 Further, production of platinum has increased sharply in the past sixty years in order to keep up with growing demand for use in new technologies.25 In fact, despite their high costs, platinum group metals are so useful that [one] of [four] industrial goods on Earth require them in production. **26** Scholars do not expect demand to slow any time soon.27 Among other technologies, industries use platinum in products such as catalytic converters, jewelry production, various catalysts for chemical processing, and hydrogen fuel cells.28 While there is no consensus on how far the Earth’s reserves of platinum will take humanity, many scientists agree that platinum ore reserves will deplete in a relatively short amount of time.29 With the rate of mining at an all-time high,30 it is increasingly clear that historical patterns of mineral resources and development cannot simply be assumed to continue unaltered into the future. 31 The platinum mining industry, however, has a strong incentive to increase its rate of extraction as profits grow with the rate of demand. Without any alternative, this destructive practice will continue into the future.32 So-called platinum-group metal (PGM) ores are mined through underground or open cut techniques.33 Due to these practices, all but a very small fraction of the mined platinum ore is disposed of as solid waste.34 The environmental consequences of platinum production are thus quite significant, but like the mining industry in general, the amount of waste is typically under-reported.35 While this is due to high production levels at the moment, those levels will only increase given the estimated future demand of platinum.36 In spite of the negative consequences, mining continues unabated because it is economically important to many areas.37 The future environmental costs provide a major challenge in creating a sustainable system. Relegating at least some mining companies to near-Earth asteroids would reduce the negative effects of future mining levels on Earth. The economic benefits of mining need not be sacrificed for the sake of the environment.38

#### Shortage of REM’s now endangers renewable transition.

Opray 18 Max Opray 9-28-2018 "Could a rare metals shortage disrupt the global renewable energy transition?" <https://www.metabolic.nl/news/could-a-rare-metals-shortage-disrupt-the-global-renewable-energy-transition/> (content specialist with sustainability consultants at Metabolic.)//Elmer

The world urgently needs to safeguard supply of the rare metals needed to build enough wind turbines and solar panels to meet Paris climate agreement targets, according to Metabolic’s latest analysis. Produced with partners Copper8, our white paper Metal Demands of the Dutch Energy Transition uses the Netherlands as a case study for examining what materials are needed to build the country’s planned renewable energy infrastructure. The study found that between 3.2 and 4.5 million tons of metals are required by 2030 to achieve the Dutch renewable energy targets – rising to between 11.8 and 16.4 million tons by 2050.Roughly 87% of of these metals are common materials such as steel and iron for the foundation, shaft and blades of wind turbines. However, global production of six rare metals used in solar panels and wind turbines is low enough that if the rest of the world matched Dutch targets, there would not be enough of these materials to enable the shift to renewable energy needed to avert catastrophic climate change. The situation also has significant geopolitical consequences as China has established near complete market dominance in rare metal extraction and processing. One of the most in-demand metals is neodymium, an important ingredient in wind turbine magnets, of which the report estimates the Netherlands should only consume 0.6% to 1% of global production, but is instead on track to consume up to 3%. The other metals in critical short supply are tellurium, terbium, indium, dysprosium and praseodymium.

#### Earth mining kills the environment.

Williams 19 Matthew S Williams 8-1-2019 “Asteroid Mining: What Will It Involve and Is This the Future of Wealth?” <https://interestingengineering.com/asteroid-mining-what-will-it-involve-and-is-this-the-future-of-wealth> (writer at Universe Today)//Elmer

Of course, this raises the obvious question: wouldn't it be really expensive to do all this mining? Why not simply continue to rely on Earth for sources of precious metals and resources and simply learn to use them better? To put it simply, we are running out of resources. To be clear, learning to use our resources better and more sustainably is always a great idea. And while it is certainly true than Earth-based mining is far cheaper than going to space would be, that may not be the case indefinitely. Aside from the fact that off-world minerals and ices would be of considerable value to Earth's economy, there is also the way that growing consumption is leading our reserves to become slowly exhausted. In fact, according to some estimates, it is possible that our planet will run out of key elements that are needed for modern industry and food production within the next 50 to 60 years. This alone is a pretty good incentive to tap the virtually inexhaustible supply of elements located off-world. Plus, there are a lot of benefits to expanding humanity's resource base beyond Earth. Here on Earth, mining takes a considerable toll on the natural environment. In fact, depending on the methods used, it can result in erosion, sinkholes, habitat destruction, and the destruction of native animal and plant life. There's also the dangers of toxic runoff and the contamination of soil, groundwater, and surface water, which is a danger to humans, as well as to wildlife and the natural environment. As for smelting, machining, and manufacturing, the environmental damage that results is well-documented. Combined with power generation, these industrial processes are one of the leading contributors to air, water, and pollution. By shifting these burdens off-world, humanity could dramatically-reduce the impact it has on the natural environment.

#### Bio-D loss causes human extinction

Joe McCarthy 18, a Staff Writer at Global Citizen, Nov 8 2018, "Humans Could Face Extinction if We Don't Protect Biodiversity: UN", Global Citizen, <https://www.globalcitizen.org/en/content/biodiversity-loss-human-extinction/>

As the sixth mass extinction event accelerates around the world, engulfing thousands of animal and plant species, humans risk facing a similar fate unless drastic interventions are made, according to Cristiana Pașca Palmer, the United Nations biodiversity chief, who recently spoke with the Guardian. Palmer said that within the next two years, countries have to develop an ambitious plan to conserve land, protect animals, and stop practices that are harming wildlife. This effort is equally as urgent as the Paris climate agreement’s goal of mitigating climate change, she said. “The loss of biodiversity is a silent killer,” she told the Guardian. “It’s different from climate change, where people feel the impact in everyday life. With biodiversity, it is not so clear but by the time you feel what is happening, it may be too late.” Next month, countries will meet in Sharm el Sheikh, Egypt, to begin mapping out what such a plan would like. Palmer hopes that a final version will be formalized in Beijing in 2020. If a binding global treaty fails to materialize, then humanity faces an uncertain future, she said. Past efforts to stop the loss of biodiversity have not proved successful, according to the Guardian. In recent years, evidence of this staggering loss has begun accumulating. Wild animal populations have declined by 60% since 1970, more than 26,000 plants and animals are close to extinction, nearly two-thirds of the world’s wetlands and half of all rainforests have been destroyed, more than 87% of the world’s ocean area is dying, and the planet needs an estimated 5 million years to recover from the biodiversity loss it has already sustained. “We are sleepwalking towards the edge of a cliff,” Mike Barrett, executive director of science and conservation at WWF, recently told the Guardian. “If there was a 60% decline in the human population, that would be equivalent to emptying North America, South America, Africa, Europe, China, and Oceania. That is the scale of what we have done.” “This is far more than just being about losing the wonders of nature, desperately sad though that is,” he said. “This is actually now jeopardising the future of people. Nature is not a ‘nice to have’ — it is our life-support system.” The benefits of biodiversity are hard to overstate. The food chain, climate systems, atmospheric conditions, natural resources, and much more depend on the delicately structured interactions of ecosystems around the world. The truly wild places in the world, meanwhile, are crucial to generating, cleaning, and distributing water around the world, and could help to mitigate the looming water crisis. These landscapes and marine environments also clean the air and act as carbon sinks, stabilize the global environment, and protect countries from natural disasters. In addition to climate change, the biggest threats to biodiversity are deforestation, agriculture, over-development, and industrial pollution. While Palmer sounded an urgent alarm bell while speaking with the Guardian, she’s hopeful that countries will recognize the threat of biodiversity loss and begin to take action. The UN is calling for at least 30% of all land and 15% of all marine environments to be protected by 2030 and for targets to be lifted in the following years. “Things are moving. There is a lot of goodwill,” Palmer said. “We should be aware of the dangers but not paralysed by inaction. It’s still in our hands but the window for action is narrowing. We need higher levels of political and citizen will to support nature.”

#### Warming causes Extinction

Kareiva 18, Peter, and Valerie Carranza. "Existential risk due to ecosystem collapse: Nature strikes back." Futures 102 (2018): 39-50. (Ph.D. in ecology and applied mathematics from Cornell University, director of the Institute of the Environment and Sustainability at UCLA, Pritzker Distinguished Professor in Environment & Sustainability at UCLA)//Re-cut by Elmer

In summary, six of the nine proposed planetary boundaries (phosphorous, nitrogen, biodiversity, land use, atmospheric aerosol loading, and chemical pollution) are unlikely to be associated with existential risks. They all correspond to a degraded environment, but in our assessment do not represent existential risks. However, the three remaining boundaries (**climate change**, global **freshwater** cycle, **and** ocean **acidification**) do **pose existential risks**. This is **because of** intrinsic **positive feedback loops**, substantial lag times between system change and experiencing the consequences of that change, and the fact these different boundaries interact with one another in ways that yield surprises. In addition, climate, freshwater, and ocean acidification are all **directly connected to** the provision of **food and water**, and **shortages** of food and water can **create conflict** and social unrest. Climate change has a long history of disrupting civilizations and sometimes precipitating the collapse of cultures or mass emigrations (McMichael, 2017). For example, the 12th century drought in the North American Southwest is held responsible for the collapse of the Anasazi pueblo culture. More recently, the infamous potato famine of 1846–1849 and the large migration of Irish to the U.S. can be traced to a combination of factors, one of which was climate. Specifically, 1846 was an unusually warm and moist year in Ireland, providing the climatic conditions favorable to the fungus that caused the potato blight. As is so often the case, poor government had a role as well—as the British government forbade the import of grains from outside Britain (imports that could have helped to redress the ravaged potato yields). Climate change intersects with freshwater resources because it is expected to exacerbate drought and water scarcity, as well as flooding. Climate change can even impair water quality because it is associated with heavy rains that overwhelm sewage treatment facilities, or because it results in higher concentrations of pollutants in groundwater as a result of enhanced evaporation and reduced groundwater recharge. **Ample clean water** is not a luxury—it **is essential for human survival**. Consequently, cities, regions and nations that lack clean freshwater are vulnerable to social disruption and disease. Finally, ocean acidification is linked to climate change because it is driven by CO2 emissions just as global warming is. With close to 20% of the world’s protein coming from oceans (FAO, 2016), the potential for severe impacts due to acidification is obvious. Less obvious, but perhaps more insidious, is the interaction between climate change and the loss of oyster and coral reefs due to acidification. Acidification is known to interfere with oyster reef building and coral reefs. Climate change also increases storm frequency and severity. Coral reefs and oyster reefs provide protection from storm surge because they reduce wave energy (Spalding et al., 2014). If these reefs are lost due to acidification at the same time as storms become more severe and sea level rises, coastal communities will be exposed to unprecedented storm surge—and may be ravaged by recurrent storms. A key feature of the risk associated with climate change is that mean annual temperature and mean annual rainfall are not the variables of interest. Rather it is extreme episodic events that place nations and entire regions of the world at risk. These extreme events are by definition “rare” (once every hundred years), and changes in their likelihood are challenging to detect because of their rarity, but are exactly the manifestations of climate change that we must get better at anticipating (Diffenbaugh et al., 2017). Society will have a hard time responding to shorter intervals between rare extreme events because in the lifespan of an individual human, a person might experience as few as two or three extreme events. How likely is it that you would notice a change in the interval between events that are separated by decades, especially given that the interval is not regular but varies stochastically? A concrete example of this dilemma can be found in the past and expected future changes in storm-related flooding of New York City. The highly disruptive flooding of New York City associated with Hurricane Sandy represented a flood height that occurred once every 500 years in the 18th century, and that occurs now once every 25 years, but is expected to occur once every 5 years by 2050 (Garner et al., 2017). This change in frequency of extreme floods has profound implications for the measures New York City should take to protect its infrastructure and its population, yet because of the stochastic nature of such events, this shift in flood frequency is an elevated risk that will go unnoticed by most people. 4. The combination of positive feedback loops and societal inertia is fertile ground for global environmental catastrophes **Humans** are remarkably ingenious, and **have adapted** to crises **throughout** their **history**. Our doom has been repeatedly predicted, only to be averted by innovation (Ridley, 2011). **However**, the many **stories** **of** human ingenuity **successfully** **addressing** **existential risks** such as global famine or extreme air pollution **represent** environmental c**hallenges that are** largely **linear**, have immediate consequences, **and operate without positive feedbacks**. For example, the fact that food is in short supply does not increase the rate at which humans consume food—thereby increasing the shortage. Similarly, massive air pollution episodes such as the London fog of 1952 that killed 12,000 people did not make future air pollution events more likely. In fact it was just the opposite—the London fog sent such a clear message that Britain quickly enacted pollution control measures (Stradling, 2016). Food shortages, air pollution, water pollution, etc. send immediate signals to society of harm, which then trigger a negative feedback of society seeking to reduce the harm. In contrast, today’s great environmental crisis of climate change may cause some harm but there are generally long time delays between rising CO2 concentrations and damage to humans. The consequence of these delays are an absence of urgency; thus although 70% of Americans believe global warming is happening, only 40% think it will harm them (http://climatecommunication.yale.edu/visualizations-data/ycom-us-2016/). Secondly, unlike past environmental challenges, **the Earth’s climate system is rife with positive feedback loops**. In particular, as CO2 increases and the climate warms, that **very warming can cause more CO2 release** which further increases global warming, and then more CO2, and so on. Table 2 summarizes the best documented positive feedback loops for the Earth’s climate system. These feedbacks can be neatly categorized into carbon cycle, biogeochemical, biogeophysical, cloud, ice-albedo, and water vapor feedbacks. As important as it is to understand these feedbacks individually, it is even more essential to study the interactive nature of these feedbacks. Modeling studies show that when interactions among feedback loops are included, uncertainty increases dramatically and there is a heightened potential for perturbations to be magnified (e.g., Cox, Betts, Jones, Spall, & Totterdell, 2000; Hajima, Tachiiri, Ito, & Kawamiya, 2014; Knutti & Rugenstein, 2015; Rosenfeld, Sherwood, Wood, & Donner, 2014). This produces a wide range of future scenarios. Positive feedbacks in the carbon cycle involves the enhancement of future carbon contributions to the atmosphere due to some initial increase in atmospheric CO2. This happens because as CO2 accumulates, it reduces the efficiency in which oceans and terrestrial ecosystems sequester carbon, which in return feeds back to exacerbate climate change (Friedlingstein et al., 2001). Warming can also increase the rate at which organic matter decays and carbon is released into the atmosphere, thereby causing more warming (Melillo et al., 2017). Increases in food shortages and lack of water is also of major concern when biogeophysical feedback mechanisms perpetuate drought conditions. The underlying mechanism here is that losses in vegetation increases the surface albedo, which suppresses rainfall, and thus enhances future vegetation loss and more suppression of rainfall—thereby initiating or prolonging a drought (Chamey, Stone, & Quirk, 1975). To top it off, overgrazing depletes the soil, leading to augmented vegetation loss (Anderies, Janssen, & Walker, 2002). Climate change often also increases the risk of forest fires, as a result of higher temperatures and persistent drought conditions. The expectation is that **forest fires will become more frequent** and severe with climate warming and drought (Scholze, Knorr, Arnell, & Prentice, 2006), a trend for which we have already seen evidence (Allen et al., 2010). Tragically, the increased severity and risk of Southern California wildfires recently predicted by climate scientists (Jin et al., 2015), was realized in December 2017, with the largest fire in the history of California (the “Thomas fire” that burned 282,000 acres, https://www.vox.com/2017/12/27/16822180/thomas-fire-california-largest-wildfire). This **catastrophic fire** embodies the sorts of positive feedbacks and interacting factors that **could catch humanity off-guard and produce a** true **apocalyptic event.** Record-breaking rains produced an extraordinary flush of new vegetation, that then dried out as record heat waves and dry conditions took hold, coupled with stronger than normal winds, and ignition. Of course the record-fire released CO2 into the atmosphere, thereby contributing to future warming. Out of all types of feedbacks, water vapor and the ice-albedo feedbacks are the most clearly understood mechanisms. Losses in reflective snow and ice cover drive up surface temperatures, leading to even more melting of snow and ice cover—this is known as the ice-albedo feedback (Curry, Schramm, & Ebert, 1995). As snow and ice continue to melt at a more rapid pace, millions of people may be displaced by flooding risks as a consequence of sea level rise near coastal communities (Biermann & Boas, 2010; Myers, 2002; Nicholls et al., 2011). The water vapor feedback operates when warmer atmospheric conditions strengthen the saturation vapor pressure, which creates a warming effect given water vapor’s strong greenhouse gas properties (Manabe & Wetherald, 1967). Global warming tends to increase cloud formation because warmer temperatures lead to more evaporation of water into the atmosphere, and warmer temperature also allows the atmosphere to hold more water. The key question is whether this increase in clouds associated with global warming will result in a positive feedback loop (more warming) or a negative feedback loop (less warming). For decades, scientists have sought to answer this question and understand the net role clouds play in future climate projections (Schneider et al., 2017). Clouds are complex because they both have a cooling (reflecting incoming solar radiation) and warming (absorbing incoming solar radiation) effect (Lashof, DeAngelo, Saleska, & Harte, 1997). The type of cloud, altitude, and optical properties combine to determine how these countervailing effects balance out. Although still under debate, it appears that in most circumstances the cloud feedback is likely positive (Boucher et al., 2013). For example, models and observations show that increasing greenhouse gas concentrations reduces the low-level cloud fraction in the Northeast Pacific at decadal time scales. This then has a positive feedback effect and enhances climate warming since less solar radiation is reflected by the atmosphere (Clement, Burgman, & Norris, 2009). The key lesson from the long list of potentially positive feedbacks and their interactions is that **runaway climate change,** and runaway perturbations have to be taken as a serious possibility. Table 2 is just a snapshot of the type of feedbacks that have been identified (see Supplementary material for a more thorough explanation of positive feedback loops). However, this list is not exhaustive and the possibility of undiscovered positive feedbacks **portends** even greater **existential risks**. The many environmental crises humankind has previously averted (famine, ozone depletion, London fog, water pollution, etc.) were averted because of political will based on solid scientific understanding. We cannot count on complete scientific understanding when it comes to positive feedback loops and climate change.

#### 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

Kessler Syndrome is overhyped. A chorus of online commenters great any news of upcoming low earth orbit satellites with worry that humanity will to lose access to space. I now think they are wrong.

What is Kessler Syndrome?

Here’s the popular view on Kessler Syndrome. Every once in a while, a piece of junk in space hits a satellite. This single impact destroys the satellite, and breaks off several thousand additional pieces. These new pieces now fly around space looking for other satellites to hit, and so exponentially multiply themselves over time, like a nuclear reaction, until a sphere of man-made debris surrounds the earth, and humanity no longer has access to space nor the benefits of satellites.

It is a dark picture.

Is Kessler Syndrome likely to happen?

I had to stop everything and spend an afternoon doing back-of-the-napkin math to know how big the threat is. To estimate, we need to know where the stuff in space is, how much mass is there, and how long it would take to deorbit.

The orbital area around earth can be broken down into four regions.

Low LEO - Up to about 400km. Things that orbit here burn up in the earth’s atmosphere quickly - between a few months to two years. The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, Low LEO doesn’t matter for Kessler Syndrome. If Low LEO was ever full of space junk, we’d just wait a year and a half, and the problem would be over.

High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue.

Mid Orbit - GPS satellites and other navigation satellites travel here in lonely, long lives. The volume of space is so huge, and the number of satellites so few, that we don’t need to worry about Kessler here.

GEO - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. Usually the geostationary orbit is used by big weather satellites and big TV broadcasting satellites. (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, all the satellites here are moving the same direction at the same speed - debris doesn’t get free velocity from the speed of the satellites. Also, it’s quite expensive to get a satellite here, and so there aren’t many, only about one satellite per 1000km of the ring. Kessler is not a problem here.

How bad could Kessler Syndrome in High LEO be?

Let’s imagine a worst case scenario.

An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space?

I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000.

So even in the worst case, we don’t lose access to space.

Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits.

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.

#### Thousands of satellites and a half-million objects in space now and only 15 collisions have ever happened.

**Albrecht and Graziani 16** [Mark Albrecht and Paul Graziani, 5-9-2016, "Op-ed," SpaceNews, https://spacenews.com/op-ed-congested-space-is-a-serious-problem-solved-by-hard-work-not-hysteria/]//DDPT

There are over a half million pieces of human-made material in orbit around our planet. Some are the size of school buses, some the size of BB gun pellets. They all had a function at some point, but now most are simply space debris littered from 100 to 22,000 miles above the Earth. Yet, all behave perfectly according to the laws of physics. Many in the space community have called the collision hazard caused by space debris a crisis.

Popular culture has embraced the risks of collisions in space in films like Gravity. Some participants have dramatized the issue by producing graphics of Earth and its satellites, which make our planet look like a fuzzy marble, almost obscured by a dense cloud of white pellets meant to conceptualize space congestion.

Unfortunately, for the sake of a good visual, satellites are depicted as if they were hundreds of miles wide, like the state of Pennsylvania (for the record, there are no space objects the size of Pennsylvania in orbit). Unfortunately, this is the rule, not the exception, and almost all of these articles, movies, graphics, and simulations are exaggerated and misleading. Space debris and collision risk is real, but it certainly is not a crisis.

So what are the facts?

On the positive side, space is empty and it is vast. At the altitude of the International Space Station, one half a degree of Earth longitude is almost 40 miles long. That same one half a degree at geostationary orbit, some 22,000 miles up is over 230 miles long. Generally, we don’t intentionally put satellites closer together than one-half degree. That means at geostationary orbit, they are no closer than 11 times as far as the eye can see on flat ground or on the sea: That’s the horizon over the horizon 10 times over. In addition, other than minute forces like solar winds and sparse bits of atmosphere that still exist 500 miles up, nothing gets in the way of orbiting objects and they behave quite predictably. The location of the smallest spacecraft can be predicated within a 1,000 feet, 24 hours in advance.

Since we first started placing objects into space there have been 11 known low Earth orbit collisions, and three known collisions at geostationary orbit. Think of it: 135 space shuttle flights, all of the Apollo, Gemini and Mercury flights, hundreds of telecommunications satellites, 1,300 functioning satellites on orbit today, half a million total objects in space larger than a marble, and fewer than 15 known collisions. Why do people worry?

#### Military Precedent disproves Escalation over Satellites

Zarybnisky 18, Eric J. Celestial Deterrence: Deterring Aggression in the Global Commons of Space. Naval War College Newport United States, 2018. (Senior Materiel Leader at United States Air Force)//Elmer Recut VM

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.6F 6 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.7F 7 In today’s more nuanced world, attacking satellites, including military satellites, does not necessarily result in nuclear war. For instance, foreign countries have used highpowered lasers against American intelligence-gathering satellites8F 8 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.

#### Untrackable debris thumps

Gourav Namta 19. Mechanical engineer. “Let's talk about space debris”, Sat Search, March 26th 2019, https://blog.satsearch.co/2019-03-26-lets-talk-about-space-debris.html

As harmless as those 128 million tiny objects ranging from 1 mm to 1 cm might seem, many of them are present in Low Earth Orbit traveling at speeds of approximately 17,500 mph (20x faster than a bullet). When even the smallest objects travelling at this speed collide with satellites or other technology, the results can be very serious. In 2016 for example a tiny object (likely a paint flake or small metal fragment) no bigger than few thousandths of a millimeter across caused a 7 mm diameter circular chip in the cupola window of the International Space Station (ISS).

#### No risk of extinction from asteroids---the probability of one hitting earth is extremely slim and countries developing prevention methods now

Inigo Monzon, IBT Correspondent, 9-2-2019, "Scientist Reveals Truth About Earth’s Chances Of Surviving An Asteroid Impact", International Business Times, 9-2-2019, https://www.ibtimes.com/scientist-reveals-truth-about-earths-chances-surviving-asteroid-impact-2820951, hec)

Dr. Lewiss Dartnell, a professor of science communication, believes that humans have a very good chance of enduring an asteroid impact. Despite what happened to the dinosaurs 66 million years ago, Dartnell thinks that humans are not in danger of going extinct due to an asteroid strike. The professor noted that in order to wipe out all life on Earth, an asteroid has to be hundreds or even thousands of kilometers long. Although NASA has already detected and identified asteroids that are certainly big enough to kill planets, the agency noted that none of these are currently on a collision course with Earth. “The Earth is not going to be destroyed by an asteroid,” Dartnell told Mashable India. “Alright, so a different question might be, could all life on Earth be driven to extinction by asteroids?” “Again, the answer would be that no,” he continued. “There’s no asteroid big enough that on a collision with the Earth could do that.” Dartnell, however, believes that there asteroids out there that can easily take out cities. Despite this, he still believes that chances of city-killers hitting Earth are very slim. One of the currently known asteroids that are capable of destroying entire cities is Apophis. Scientists once thought that his asteroid, which measures about 1,214 feet long, was in danger of colliding with Earth in the next decade. However, after follow-up observations, space agencies ruled out a possible collision between Apophis and Earth in the near future. “If we were very, very unlucky, and they strike over a major city, then they could destroy the city,” Dartnell said. “But the chances of that happening are very unlikely.” “Asteroid Apophis is one of the asteroids that we are tracking and we know that it is not going to impact for the next few decades and will continue on trail,” the professor added. Aside from the asteroid’s slim chances, space agencies from various countries are hatching their own plans to save Earth from getting hit by a massive space boulder.

**No ‘space war’ – Insurmountable barriers and everyone has an interest in keeping space peaceful**

**Dobos 19** [(Bohumil Doboš, scholar at the Institute of Political Studies, Faculty of Social Sciences, Charles University in Prague, Czech Republic, and a coordinator of the Geopolitical Studies Research Centre) “Geopolitics of the Outer Space, Chapter 3: Outer Space as a Military-Diplomatic Field,” Pgs. 48-49] TDI

Despite the theorized potential for the achievement of the terrestrial dominance throughout the utilization of the ultimate high ground and the ease of destruction of space-based assets by the potential space weaponry, the utilization of space weapons is with current technology and no effective means to protect them far from fulfilling this potential (Steinberg 2012, p. 255). In current global international political and technological setting, the utility of space weapons is very limited, even if we accept that the ultimate high ground presents the potential to get a decisive tangible military advantage (which is unclear). This stands among the reasons for the lack of their utilization so far. Last but not the least, it must be pointed out that the states also develop passive defense systems designed to protect the satellites on orbit or critical capabilities they provide. These further decrease the utility of space weapons. These systems include larger maneuvering capacities, launching of decoys, preparation of spare satellites that are ready for launch in case of ASAT attack on its twin on orbit, or attempts to decrease the visibility of satellites using paint or materials less visible from radars (Moltz 2014, p. 31). Finally, we must look at the main obstacles of connection of the outer space and warfare. The first set of barriers is comprised of physical obstructions. As has been presented in the previous chapter, the outer space is very challenging domain to operate in. Environmental factors still present the largest threat to any space military capabilities if compared to any man-made threats (Rendleman 2013, p. 79). A following issue that hinders military operations in the outer space is the predictability of orbital movement. If the reconnaissance satellite's orbit is known, the terrestrial actor might attempt to hide some critical capabilities-an option that is countered by new surveillance techniques (spectrometers, etc.) (Norris 2010, p. 196)-but the hide-and-seek game is on. This same principle is, however, in place for any other space asset-any nation with basic tracking capabilities may quickly detect whether the military asset or weapon is located above its territory or on the other side of the planet and thus mitigate the possible strategic impact of space weapons not aiming at mass destruction. Another possibility is to attempt to destroy the weapon in orbit. Given the level of development for the ASAT technology, it seems that they will prevail over any possible weapon system for the time to come. Next issue, directly connected to the first one, is the utilization of weak physical protection of space objects that need to be as light as possible to reach the orbit and to be able to withstand harsh conditions of the domain. This means that their protection against ASAT weapons is very limited, and, whereas some avoidance techniques are being discussed, they are of limited use in case of ASAT attack. We can thus add to the issue of predictability also the issue of easy destructibility of space weapons and other military hardware (Dolman 2005, p. 40; Anantatmula 2013, p. 137; Steinberg 2012, p. 255). Even if the high ground was effectively achieved and other nations could not attack the space assets directly, there is still a need for communication with those assets from Earth. There are also ground facilities that support and control such weapons located on the surface. Electromagnetic communication with satellites might be jammed or hacked and the ground facilities infiltrated or destroyed thus rendering the possible space weapons useless (Klein 2006, p. 105; Rendleman 2013, p. 81). This issue might be overcome by the establishment of a base controlling these assets outside the Earth-on Moon or lunar orbit, at lunar L-points, etc.-but this perspective remains, for now, unrealistic. Furthermore, no contemporary actor will risk full space weaponization in the face of possible competition and the possibility of rendering the outer space useless. No actor is dominant enough to prevent others to challenge any possible attempts to dominate the domain by military means. To quote 2016 Stratfor analysis, "(a) war in space would be devastating to all, and preventing it, rather than finding ways to fight it, will likely remain the goal" (Larnrani 20 16). This stands true unless some space actor finds a utility in disrupting the arena for others.