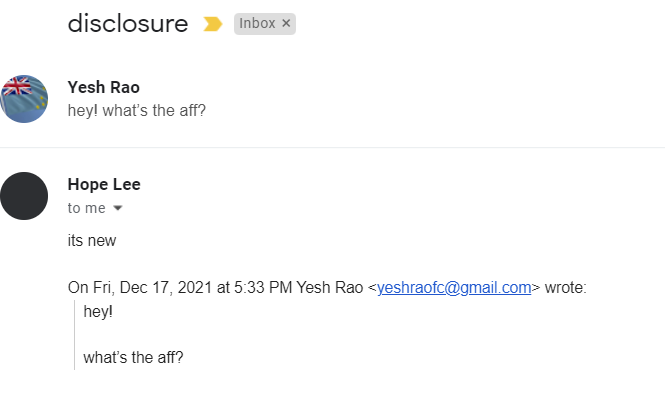
# 1NC CPS R2

## OFF

### 1

#### Interpretation: Debaters must disclose affirmative frameworks, advocacy texts, and advantage areas thirty minutes before round if they haven’t read the affirmative before

#### Violation: They didn’t



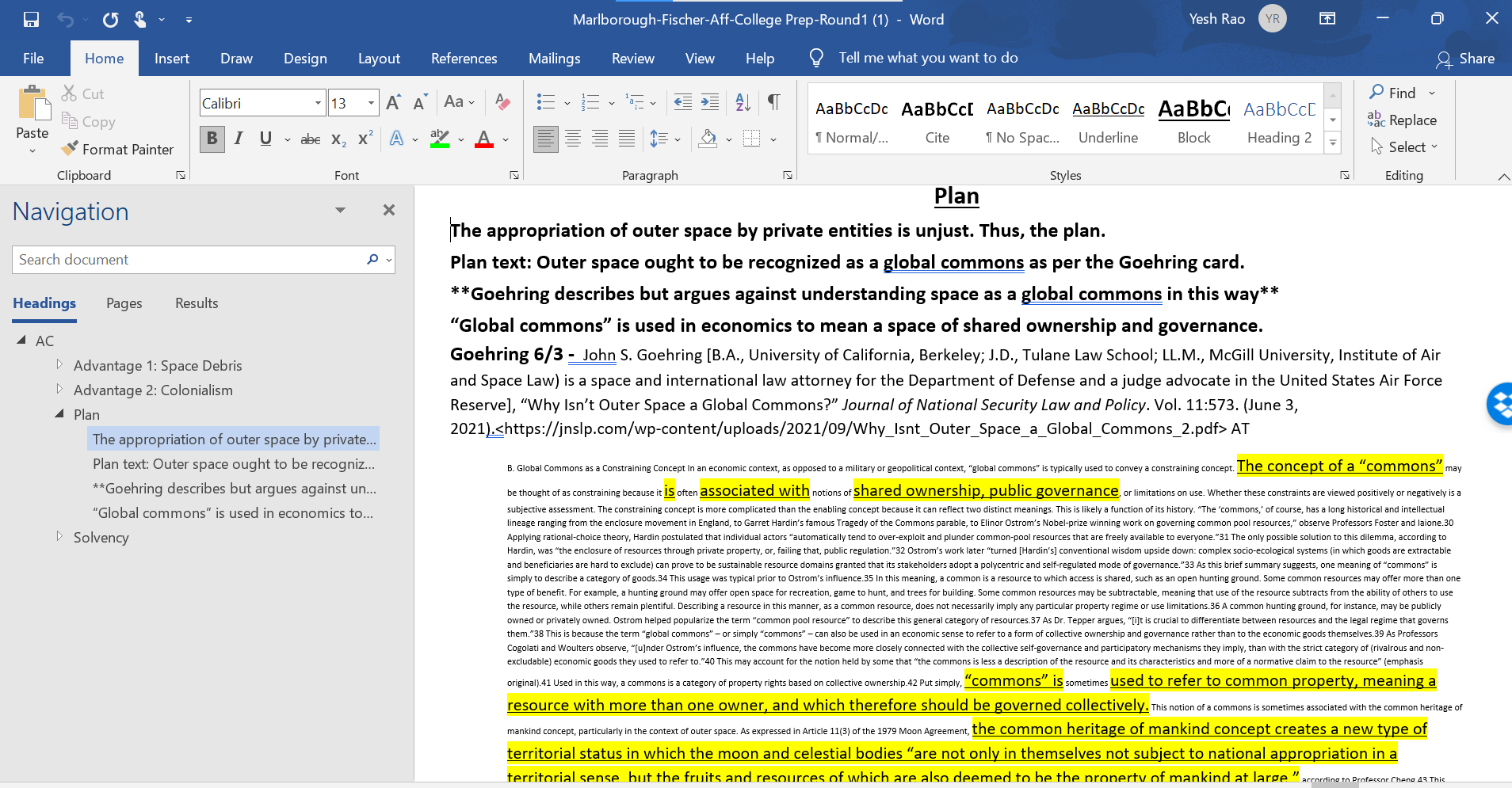
#### Standards:

#### 1] Clash- Not disclosing incentivizes surprise tactics and poorly refined positions that rely on artificial and vague negative engagement to win debates. Their interpretation discourages third- and fourth-line testing by limiting the amount of time we have to prepare and forcing us to enter the debate with zero idea of what the affirmative is. Negatives are forced to rely on generics instead of smart contextual strategies destroying nuanced argumentation.

#### 2] Reciprocity – They get an infinite amount of time to frontline their aff to write the most efficient and effective answers to anything we could say against it while we get only four minutes in round. This gives them a tremendous advantage over us that makes it impossible to win substance.

#### 3] Shiftiness- Not knowing enough about the affirmative coming into round incentivizes 1ar shiftiness about what the aff is and what their framework/advocacy entails. That means even if we could read generics or find prep, they’d just find ways to recontextualize their obscure advocacy in the 1ar.

#### Independently, lying about disclosure is bad, you said it was new but your teammate’s read the aff



### 2

#### CP Text: States ought to call a global constitutional convention and establish a constitution reflecting intergenerational concern with exclusive authority to the plan and bind participating bodies to its result.

#### The CP applies intergenerational equity to future generations – that’s better than trying to decide now whether the plan is beneficial across deep time – every country would say yes.

Tan 2k [David Tan, LL.M., Harvard Law School; LL.B. (Hons), B.Com., University of Melbourne. Former Tutor in Law, Trinity College, University of Melbourne, “Towards a New Regime for the Protection of Outer Space as the "Province of All Mankind",” 2000, *The Yale Journal of International Law*, Vol. 25, https://digitalcommons.law.yale.edu/cgi/viewcontent.cgi?article=1114&context=yjil]

Edith Brown Weiss has advanced the theory of “intergenerational equity,” which provides for generational rights and obligations.158 Her thesis consists of a normative framework of intersecting theories of intergenerational and intragenerational equity that are derived from an underlying planetary trust, embodying the notion that generations act as stewards to sustain the welfare and well-being of all generations. This planetary trust obliges “each generation to preserve the diversity of the resource base and to pass the planet to future generations in no worse condition than it receives it.”159 The principle of the conservation of options requires each generation “to conserve the diversity of the natural and cultural resource base, so that it does not unduly restrict the options available to future generations in solving their problems and satisfying their own values, and should be entitled to diversity comparable to that enjoyed by previous generations.”\*60 The theory of intergenerational equity is an appealing one. Unfortunately, Weiss’s model generally rests upon an intertemporal human rights model for preserving the global environment. This presents many problems, ranging from the questionable existence of the right to a decent environment to the issue of remedies in respect of claims made by future generations against present generations.161

Whether the global awareness of the harm to our sense of intergenerational identity, as evidenced by the various U.N. General Assembly resolutions and numerous international conventions, will be sufficient to mobilize the implementation and enforcement of effective legal measures on behalf of future generations is doubtful. But more importantly, the notions of intergenerational identity and sustainable development will prove to be invaluable concepts in framing the discussion in Part VI.

Current literature has concentrated on the notion of sustainable development as involving the integration of economic and environmental considerations at all levels of decision-making.162 But the outer-space environment has been largely ignored, as if it were simply economic development on Earth that must be environmentally sound. There is no reason, however, why the precautionary principles that emerge from the concept of sustainable development in the Stockholm Declaration, the Rio Declaration, and the World Charter for Nature should not apply equally to the outer-space environment. Few states, if any, will take issue with the proposition that the exploration and use of outer space should be sustainable. It is in the common interest of all states, whether spacefaring or otherwise, to subscribe to a regime that allows for the development of space activities in a manner that leaves the space environment in a substantially unimpaired condition for future generations. One might even ultimately find that the uniqueness and vulnerability of the outer-space environment demand that the international community as a whole recognize sustainable development as a “global ethic”163 that transcends terrestrial boundaries, as a peremptory norm that prohibits “policies and practices that support current living standards by depleting the productive base, including natural resources, and that leaves future generations with poorer prospects and greater risks than our own.”164 We should not confine our actions to those we are now able to determine as directly or indirectly benefiting ourselves or our descendants. On the contrary, we should “cultivate our natural sense of obligation not to act wastefully or wantonly even when we cannot calculate how such acts would make any present or future persons worse off.”165 It seems impossible to find universally agreed-upon limits on the freedom of exploration and use of outer space. Rather than focus on indeterminate rules of custom-formation, we should concentrate on establishing fair and workable arrangements and institutions that can successfully accommodate the competing interests of all nations. With these guidelines in mind, we will now examine new methods of treaty-making that will enhance the willingness of states to participate in an environmental program that seeks to achieve an acceptable balance between pollution control and freedom of space exploration.

#### That solves the aff – it addresses shared anxieties while building political consensus.

Gardiner 14 1 [Stephen M. Gardiner, Professor of Philosophy and Ben Rabinowitz Endowed Professor of Human Dimensions of the Environment at the University of Washington, Seattle, “A Call for a Global Constitutional Convention Focused on Future Generations,” 2014, *Ethics & International Affairs*, Vol. 28, Issue 3, pp. 299-315, https://doi.org/10.1017/S0892679414000379, EA]

A Constitutional Convention

In my view, the above line of reasoning leads naturally to a more specific proposal: that we—concerned individuals, interested community groups, national governments, and transnational organizations—should initiate a call for a global constitutional convention focused on future generations. This proposal has two components. The first component is procedural. The proposal takes the form of a “call to action.” It is explicitly an attempt to engage a range of actors, based on a claim that they have or should take on a set of responsibilities, and a view about how to go about discharging those responsibilities. The second component is substantive. The main focus for action is a push for the creation of a constitutional convention at the global level, whose role is to pave the way for an overall constitutional system that appropriately embodies intergenerational concern.

The substantive idea rests on several key ideas. Still, for the purposes of a basic proposal, I suggest that these be understood in a relatively open way that, as far as is practicable, does not prejudge the outcome of the convention, and especially its main recommendations. First, the convention itself should be understood as “a representative body called together for some occasional or temporary purpose” and “constituted by statute to represent the people in their primary relations.”14 Second, a constitutional system should be thought of in a minimalist sense as “a set of norms (rules, principles or values) creating, structuring, and possibly defining the limits of government power or authority.”15 Third, the “instigating” role of the convention should be to discuss, develop, make recommendations toward, and set in motion a process for the establishment of a constitution. Fourth, its primary subject matter should be the need to adequately reflect and embody intergenerational concern, where this would include at least the protection of future generations, the promotion of their interests (where “interests” is to be broadly conceived so as to include rights, claims, welfare, and so on), and the discharging of duties with respect to them. It may also (and in my view should) include some way of reflecting concern for past generations, including responsiveness to at least certain of their interests and views. However, I will leave that issue aside in what follows.

The proposal to initiate a call for a global constitutional convention has at least two attractive features. First, it is based in a deep political reality, and does not underplay the challenge. It acknowledges the problem as it is, both specific and general, and calls attention to the heart of that problem, including to the failures of the current system, the need for an alternative, and the background issue of responsibility. Moreover, though the proposal is dramatic and rhetorically eye-catching, it is so in a way that is appropriately responsive to the seriousness of the issue at hand, the persistent political inertia surrounding more modest initiatives, and the fact that (grave though concerns about it are) climate change is only one instance of the tyranny of the contemporary (and the wider perfect moral storm), and we should expect others to arise over the coming decades and centuries.

The second attractive feature of the proposal is that, though ambitious, it is not alienating. While it does not succumb to despair in the face of the challenge, neither does it needlessly polarize and divide from the outset (for example, by leaping to specific recommendations about how to fill the institutional gap). Instead, it acknowledges that there are fundamental difficulties and anxieties, but uses them to start the right kind of debate, rather than to foreclose it. As a result, the proposal is a promising candidate to serve as the subject of a wide and overlapping political consensus, at least among those who share intergenerational concern.

Selective Mirroring

To quell some initial anxieties, it is perhaps worth clarifying the open-ended and non-alienating character of the proposal. One temptation would be to view the call for a global constitutional convention as a fairly naked plea for world government, a prospect that would be deeply alienating—indeed anathema—to many. However, that is not my intention. Though it is possible that a global constitutional convention would lead in this direction, it is by no means certain.

At a minimum, no such body could plausibly recommend any form of “world government” without simultaneously advancing detailed suggestions about how to avoid the standard threats such an institution might pose. Moreover, it seems perfectly conceivable, even likely under current ways of thinking, that a global constitutional convention would pursue what we might call a selective mirroring strategy. Specifically, a convention would seek to develop a broader system of institutions and practices that reflected the desirable features of a powerful and highly centralized global authority but neutralized the standing threats posed by it (for example, it might employ familiar strategies such as the separation of powers). In all likelihood, one feature of a selective mirroring approach would be the significant preservation of existing institutions to serve as a bulwark against the excesses of any newly created ones. Whether and how such a strategy might be made effective against the perfect moral storm, and whether something closer to a “world government” would do better, would be a central issue for discussion by the convention.

#### It spills over to foster broader intergenerational representation, but independence is key

Gardiner 14 2 [Stephen M. Gardiner, Professor of Philosophy and Ben Rabinowitz Endowed Professor of Human Dimensions of the Environment at the University of Washington, Seattle, “A Call for a Global Constitutional Convention Focused on Future Generations,” 2014, *Ethics & International Affairs*, Vol. 28, Issue 3, pp. 299-315, https://doi.org/10.1017/S0892679414000379, EA]

One set of guidelines concerns how the global constitutional convention relates to other institutions. The first guideline concerns relative independence:

(1) Autonomy: Any global constitutional convention should have considerable autonomy from other institutions, and especially from those dominated by factors that generate or facilitate the tyranny of the contemporary (and the perfect moral storm, more generally).

Thus, for example, attempts should be made to insulate the global constitutional convention from too much influence from short-term and narrowly economic forces.

The second guideline concerns limits to that independence:

(2) Mutual Accountability: Any global constitutional convention should be to some extent accountable to other major institutions, and they should be accountable to it.

Thus, for example, though the global constitutional convention should not be able to decide unilaterally that national institutions should be radically supplanted, nevertheless such institutions should not have a simple veto on the recommendations of the convention, including those that would result in sharp limits to their powers.

A third guideline concerns adequacy:

(3) Functional Adequacy: The global constitutional convention should be constructed in such a way that it is highly likely to produce recommendations that are functionally adequate to the task.

Thus, for example, the tasks of the global constitutional convention should not be assigned to any currently existing body whose design and authority is clearly unsuitable. In my view, this guideline rules out proposals such as the Royal Society’s suggestion that governance of geoengineering should be taken up by the United Nations’ Commission on Sustainable Development,20 or the Secretary-General’s recommendation of a new United Nations’ High Commissioner for Future Generations.21 Though such proposals may have merit for some purposes (for example, as pragmatic, incremental suggestions to highlight the importance of intergenerational issues), they are too modest, in my opinion, to reflect the gravity of the threats posed by climate change in particular, and the perfect moral storm more generally.

Aims

A second set of guidelines concerns the aims of the global constitutional convention. Here, the perfect moral storm analysis would suggest:

(4) Comprehensiveness: The convention should be under a mandate to consider a very broad range of global, intergenerational issues, to focus on such issues at a foundational level, and to recommend institutional reform accordingly.

(5) Standing Authority: Though the convention may recommend the establishment of some temporary and issue-specific bodies, its focus should be on the establishment of institutions with standing authority over the long term.

These guidelines are significant in that they stand against existing issue-specific approaches to global and intergenerational problems, and encourage not only a less ad hoc but also a more proactive approach. In particular, the global constitutional convention might be expected to recommend institutions that would be charged with identifying, monitoring, and taking charge of intergenerational issues as such. For example, such institutions should address not only specific policy issues (such as climate change, large asteroid detection, and long-term nuclear waste) but also the need to identify similar threats before they arise.

#### Proactive measures mitigate a laundry list of emerging catastrophic risks – extinction.

Beckstead 14 [Nick Beckstead, Nick Bostrom, Niel Bowerman, Owen Cotton-Barratt, William MacAskill, Seán Ó hÉigeartaigh, Toby Ord, \* Future of Humanity Institute, University of Oxford, \*\* Director, Future of Humanity Institute, University of Oxford, \*\*\* Global Priorities Project, Centre for Effective Altruism; Department of Physics, University of Oxford, \*\*\*\* Global Priorities Project, Centre for Effective Altruism; Future of Humanity Institute, University of Oxford, \*\*\*\*\* Uehiro Centre for Practical Ethics, University of Oxford, \*\*\*\*\*\* Cambridge Centre for the Study of Existential Risk; Future of Humanity Institute, University of Oxford, \*\*\*\*\*\*\* Programme on the Impacts of Future Technology, Oxford Martin School, University of Oxford, “Policy Brief: Unprecedented Technological Risks,” 2014, *The Global Priorities Project, The Future of Humanity Institute, The Oxford Martin Programme on the Impacts of Future Technology, and The Centre for the Study of Existential Risk*, https://www.fhi.ox.ac.uk/wp-content/uploads/Unprecedented-Technological-Risks.pdf, Accessed: 03/13/21, EA]

In the near future, major technological developments will give rise to new unprecedented risks. In particular, like nuclear technology, developments in synthetic biology, geoengineering, distributed manufacturing and artificial intelligence create risks of catastrophe on a global scale. These new technologies will have very large benefits to humankind. But, without proper regulation, they risk the creation of new weapons of mass destruction, the start of a new arms race, or catastrophe through accidental misuse. Some experts have suggested that these technologies are even more worrying than nuclear weapons, because they are more difficult to control. Whereas nuclear weapons require the rare and controllable resources of uranium-235 or plutonium-239, once these new technologies are developed, they will be very difficult to regulate and easily accessible to small countries or even terrorist groups.

Moreover, these risks are currently underregulated, for a number of reasons. Protection against such risks is a global public good and thus undersupplied by the market. Implementation often requires cooperation among many governments, which adds political complexity. Due to the unprecedented nature of the risks, there is little or no previous experience from which to draw lessons and form policy. And the beneficiaries of preventative policy include people who have no sway over current political processes — our children and grandchildren.

Given the unpredictable nature of technological progress, development of these technologies may be unexpectedly rapid. A political reaction to these technologies only when they are already on the brink of development may therefore be too late. We need to implement prudent and proactive policy measures in the near future, even if no such breakthroughs currently appear imminent.

## Case

### 1NC---Advantage 1

#### No debris cascades, but even a worst case is confined to low LEO with no impact

Fange 17 [Daniel Von Fange, Web Application Engineer, Founder and Owner of LeanCoder, Full Stack, Polyglot Web Developer, “Kessler Syndrome is Over Hyped”, 05/21/17, *Braino*, http://braino.org/essays/kessler\_syndrome\_is\_over\_hyped/]

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.

#### Plan gets circumvented – empirics prove. Circumvention doesn’t turn the case but waters down enforcement

Johnson 20 [Matthew Johnson, PhD, University of Technology Sydney, “Mining the high frontier: sovereignty, property and humankind’s common heritage in outer space,” 2020, PhD Thesis, https://opus.lib.uts.edu.au/handle/10453/142380, EA]

However, the terrestrial history of mineral sovereignty tells us that even modest constraints imposed on private space mining interests may be undermined through the capture of democratic institutions. Private mining firms that have drawn on the political infrastructure of the neoliberal network have proven adept at hindering policies and governments that protect common interests in common spaces, from counter-movements against the nationalisation of mining operations to concerted lobbying efforts against international agreements that seek to impose limits on atmospheric carbon emissions. The US rejection of the Moon Agreement is consistent with neoliberal resistance to protective ‘double movements’ in a host of policy arenas, ranging from the creation of ecological conservation zones and provision of free healthcare, to increasing minimum wages or funding for public education. When the interests of mining capital are supported by and even embedded within political institutions (as in the case of ‘revolving doors’ between industry and public office), a concerted effort will need to be made in domestic and international institutions to push international space law towards anything resembling the ambitions of the Moon Agreement. Given the emergent connections between NewSpace and the Atlas Network, any double movement towards the preservation of intergenerational rights in the space commons would likely meet well-funded and well-organised resistance.

### 1NC---Advantage 2

#### We’re impact turning it;

#### Space col possible within decades

Armstrong & Sandberg 13 [Stuart Armstrong and Anders Sandberg, \* James Martin Research Fellow, Future of Humanity Institute, Oxford University, \*\* PhD in computational neuroscience from Stockholm University, and is currently a Senior Research Fellow at the Future of Humanity Institute at the University of Oxford, “Eternity in six hours: Intergalactic spreading of intelligent life and sharpening the Fermi paradox,” 2013, *Acta Astronautica*, Vol. 89, pp. 1-13, https://doi.org/10.1016/j.actaastro.2013.04.002, EA]

We have shown that, given certain technological assumptions, intergalactic colonisation appears to be possible given known natural laws and the resources within a solar system. This process could be initiated on a surprisingly short timescale (decades)—well within timescales we know some human societies have planned and executed large projects. A star-spanning civilisation would find the energy and resources requirement to be so low that they could do this project as an aside to their usual projects. Thus if interstellar expansion can be attempted, then intergalactic expansion should also be feasible. Indeed, there is likely no inherent limitation on the scales of activities of technological civilisations beyond those imposed by the laws of nature and available resources [51].

#### Only private sector solves it

Diakovska & Aliieva 20 [Halyna Diakovska and Olga Aliieva, Ph.D.s in Philosophy, Associate Professors, Donbass State Pedagogical University, “Consequentialism and Commercial Space Exploration,” 2020, *Philosophy and Cosmology*, Vol. 24, pp. 5-24, https://doi.org/10.29202/phil-cosm/24/1, EA]

The experience of the USA showed that leadership in space exploration, which is maintained solely through public funding, could be erroneous. Since 1984, the share of public funding has gradually decreased in space telecommunications, commercial space transportation, remote sensing, etc., while the share of participation of non-state enterprises has increased rapidly. A legal and regulatory framework has been modified to stimulate space commercialization. The stages of space law development are discussed in the research of Valentyn Halunko (Halunko, 2019), Larysa Soroka (Soroka & Kurkova, 2019), etc. Larysa Soroka and Kseniia Kurkova explored the specifics of the legal regulation of the use and development of artificial intelligence for the space area (Soroka & Kurkova, 2019).

As a result of changing the legal framework and attracting private investors to the space market, the US did not lose its leadership in space exploration, but rather secured it. Private investment along with government funding have significantly reduced the risk of business projects in the space industry. The quality and effectiveness of space exploration programs have increased.

In 2018, Springer published an eloquent book The Rise of Private Actors in the Space Sector. Alessandra Vernile, the author of the book, explores a broad set of topics that reveal the role of private actors in space exploration (Vernile, 2018). The book covers the following topics: “Innovative Public Procurement and Support Schemes,” “New Target Markets for Private Actors,” etc. In the “Selected Success Stories,” Vernile provides examples of successful private actors in space exploration (Vernile, 2018).

The current level of competition, which has developed on the space market, allows us to state the following fact. Private space companies have been able to compete with entire states in launching spacecraft, transporting cargo to orbital stations, and exploring space objects. The issue of mining on space objects, the creation of space settlements and the intensive development of the space tourism market are on the agenda.

In the 21st century, the creation of non-governmental commercial organizations specializing in the field of commercial space exploration, is regarded as an ordinary activity. They are established as parts of the universities around projects funded by private investors. For example, Astropreneurship & Space Industry Club based on the MIT community (Astropreneurship, 2019).

Large-scale research in the field of commercial space exploration, as well as the practical results achieved, led to the formation of a new paradigm called “New Space” ecosystem. The articles of Deganit Paikowsky’s (Paikowsky, 2017), Clelia Iacomino (Iacomino & Ciccarelli, 2018) et al. reveal its key meanings and the opportunities it offers in the space sector. The “New Space” ecosystem is a new vision for commercial space exploration. It is the formation of a cosmic worldview, in which the near space with all the wealth of its resources and capabilities, becomes a part of the global economy and the sustainable development of the society. The “New Space” ecosystem offers the following ways for commercial space exploration (Iacomino & Ciccarelli, 2018):

1. Innovative public procurement and support schemes, which significantly expand the role of commercial actors in space exploration.

2. Attracting new entrants in the space sector. First of all, these are companies working in the domain of Information and communications technology, artificial intelligence, etc. that are expanding their research in space markets. They offer innovative business models and new solutions to space commercialization.

3. Innovative industrial approaches based on new processes, methods, and industrial organization for the development and production of space systems or launchers.

4. Disruptive market solutions, which significantly reduce commercial space exploration prices, increase labor productivity, provide new types of services, etc.

5. Substantial private investment from different sources and involving different funding mechanisms. For instance, these are private fortunes, venture capital firms, business angels, private equity companies, or banks, etc.

6. Involvement of an increasing number of space-faring nations investing in the acquisition of turnkey space capabilities or even in the development of a domestic space industrial base. This expands the space markets and makes it more competitive.

The analysis of the research and advances in commercial space exploration allows us to draw the following conclusions:

1. In fact, the space market has already been created. It is currently undergoing continuous development that will integrate the resources and capabilities of the near space into the global economy over the next decade.

2. A new paradigm, denoted by the term “New Space” ecosystem, is at the heart of the created space market. The “New Space” ecosystem is a step towards the formation of cosmic thinking, in which outer space, with its resources and capabilities, is considered as a sphere of human activities.

3. Space market regulates space law, which is constantly evolving. The space law develops within the bounds of international law. In essence, the space market is integrated into the international legal field and is governed by its laws.

#### Massive spillover effects, solves resources and ex risks

Green 21 [Brian Patrick Green, director of technology ethics at the Markkula Center for Applied Ethics, Santa Clara University, “Space Ethics,” 2021, Rowman, pp. 4-5, EA]

In favor of going into space are such basics as gaining scientific knowledge and developing beneficial new technologies, both of which space exploration and use have already begun to accomplish with dramatic and sometimes unexpected effects for humankind. Scientific advancements include astronomical and cosmological knowledge from various orbiting experiments and telescopes that have let us gain unprecedented understanding about our universe. But space activities have also contributed to a great deal of scientific knowledge about our Earth, including measurements of environmental status, habitat conversion and destruction, detailed knowledge of anthropogenic climate change, and much about Earth’s chemistry and geology. We have also learned a great deal about our local planets, for example, that a runaway “greenhouse effect” in the atmosphere of Venus makes the surface scorchingly hot, while too little greenhouse effect on Mars leaves the surface quite cold. There have also been significant contributions made to medical science, especially concerning the behavior of the human body when subjected to radiation, microgravity, nutritional restrictions, and so on.

On the technological side, everything with American global positioning system (GPS), Russian Glonass, or other global navigation systems—from smartphones to military vehicles—relies on a network of satellites above us, placed there by rocketry and painstakingly tracked with instruments developed for the task. So many technologies have been pioneered by space exploration and use that it is hard to list them all, but some of the more important ones include weather satellites (which are not only convenient but also allow preparation for and evacuation from severe weather), communication satellites, solar photovoltaic (PV) cells, advances in electronics and computers, advances in materials science, and so on.

Space is also an important location for the contention of national interests in a geopolitical and military sense. As the ultimate “high ground” in battle, space allows certain asset classes such as spy satellites to exist in a position unassailable by many or most opponents. While permanent weapons stations and weapons of mass destruction are banned from space by the United Nations Outer Space Treaty (OST), 6 that has not stopped the development of weapons that are impermanent (such as missiles, missile interceptors, and antisatellite weapons) or the research and development of possible space-based weapons platforms, such as were envisioned by U.S. president Ronald Reagan’s Strategic Defense Initiative, nicknamed “Star Wars.” While military and political interests may ultimately seem to be a less noble reason to explore and use space, relative power, safety, and security certainly are very human interests and are valuable to those who feel they are being protected by them.

Space activities are also a key way of promoting international cooperation and global awareness. While the international competition of the “space race” fueled one nation all the way to the Moon, shortly afterward, the Apollo-Soyuz program announced a thawing of this competition and commenced a period of cooperation between the United States of America and the Union of Soviet Socialist Republics. Currently the International Space Station continues this cross-national cooperation in space, with five space agencies (representing Canada, the European Space Agency nations, Japan, Russia, and the United States) participating. In addition to cooperation in space exploration itself, the perspective given from space has itself helped to produce some feelings of unity on Earth, with the famous “Blue Marble” and “Earthrise” pictures showing Earth’s oneness and scientific discoveries supported by space science, such as those related to climate change, helping to promote international cooperation to address these problems.

Gaining access to new critical resources may be another reason to go into space. Earth is a finite planet, and certain elements on Earth are very rare in the planetary crust, particularly platinum group metals that are very dense and siderophilic (iron-loving) and so have tended to sink toward the core over the natural history of the planet. However, asteroids and other objects in space (for example, planets, comets, and moons) can sometimes have these elements in abundance and in more available locations, making them potentially excellent sources for these valuable materials. Now-defunct asteroid-mining startup Planetary Resources once estimated that one “platinum-rich 500 meter wide asteroid contains . . . 1.5 times the known world-reserves of platinum group metals (ruthenium, rhodium, palladium, osmium, iridium, and platinum).” 7 In addition to returning elements to a resource-hungry Earth, further exploration and development of space will require access to resources that are not purely sourced from Earth. In particular, it will be necessary to gain access to water, which is relatively rare in the inner solar system and which would be far too costly to transport in any significant amounts from the Earth’s surface.

Another reason that humans may want to explore space would be to create a “backup Earth” to hedge against global catastrophic and existential risks (risks that may cause widespread disaster or human extinction, respectively) on our home planet. 8 Earth has always been a dangerous place for humans, with asteroid impacts, supervolcanic eruptions, pandemic disease, and other natural hazards threatening civilization. Now, in addition to these natural threats, human-made hazards such as nuclear weapons, climate change, biotechnology, nanotechnology, and artificial intelligence may threaten not only the viability of technological civilization but perhaps the survival of human life itself. A serious global-scale catastrophe could set back civilization many decades or centuries, and the worst disasters could cause human extinction. In one scenario, in which 100 percent of humanity dies, all of human effort for all of history would be for nothing. However, were the same global catastrophe to happen to Earth, yet humans were a multiplanetary species with just one self-sustaining settlement off-Earth, it would not result in the end of human civilization or human extinction. Instead while the same unimaginable fate would befall the Earth (certainly no mere triviality, with perhaps the deaths of 99.999 percent of all humans and possibly the destruction of the ecosphere and everything in it), at least all of human and planetory history would not be for nothing. Human life and culture would go on elsewhere, as well as other Earth species. This is a dire fate, but less terrible than the first.

#### Space colonization solves otherwise inevitable extinction.

Zarkadakis 19 [George; December 26; Ph.D. in Artificial Intelligence; George Zardakis, “Abandoning the metropolis: space colonisation as the new imperative,” <https://georgezarkadakis.com/2019/12/26/abandoning-the-metropolis-space-colonisation-as-the-new-imperative/>]

Space colonization is not only the subject of fiction but of serious science too. The late physicist Stephen Hawking argued that unless colonies were established in space the human race would become extinct. There are several natural phenomena beyond our control that could spell our obliteration. Over a long enough period of time our planet is vulnerable to catastrophic meteorite strikes, or getting exposed to the deadly radiation of a nearby supernova explosion. As our Sun burns its fuel it will start to expand and, in a few million years, will scorch Earth. We can also self-destruct by waging nuclear war, or by tilting our planet’s climate towards a runaway greenhouse effect. Space colonization is therefore the ultimate insurance policy of long-term human survival[4].

#### Independently brings immeasurable expected value

Baum 16 – Executive Director of the Global Catastrophic Risk Institute [Seth D. Baum, “The Ethics of Outer Space: A Consequentialist Perspective,” 2016, Springer, pp. 115-116, EA]

Space colonization is notable because it may be able to bring utterly immense increases in intrinsic value. Early colonies might start small, given that other planets and moons have inhospitable environments. However, it may be possible to build large indoor colonies or create more hospitable outdoor environments (i.e., terraforming). Even just on other planets and moons in the Solar System, space colonies could multiply the total area available for human habitation. And there are many more planets around other stars, as ongoing research on exoplanets is now learning. One recent study estimates 22 % of Sun-like stars have Earth-like exoplanets (Petigura et al. 2013), implying billions to tens of billions of potentially habitable planets across the galaxy.

Opportunities at any given star may also be quite a bit greater than those available only on planets. Earth only receives about one two-billionth of the Sun’s radiation. To collect all the Sun’s radiation, humanity would need a Dyson swarm (named after Dyson 1960), which is a series of structures that surrounds a star, collecting its radiation to power a civilization. A Dyson swarm around the Sun could potentially enable a civilization a billion times larger than is possible on Earth. Likewise, Dyson swarms around one billion stars would bring humanity approximately 1018 (one billion–billion) times more energy per unit time.

Space colonies could also increase the amount of time available for human civilization. Earth will remain habitable for a few billion more years (O’Malley-James et al. 2014). Stars will continue shining for about 1014 more years (Adams 2008). That gives us an additional 105 times more energy, for a total of 1023 times more energy than is available on Earth. After the stars fade, other energy sources may be available. And even if our current universe eventually becomes uninhabitable, it may be possible to move to other universes (Kaku 2005). The physics here is speculative, but it cannot be ruled out, and hence there is a nonzero chance of a literally infinite opportunity for space colonization (Baum 2010a).

Whether the opportunity is infinite or merely, say, 1023 times larger than what can be done on Earth, the opportunity is clearly immense. As long as space colonization is an improvement (Sect. 8.3.1), then it would seem that the consequentialist should prioritize space colonization. The sooner space colonization begins, the more of its immense opportunity can be gained. Indeed, Ćirković (2002) estimates 5 × 1046 human lifetimes are lost for every century in which space colonization is delayed.

There can also be large value for space colonization under ecocentric intrinsic value. It is sometimes argued that Earth would be better off without humans. For example, the Voluntary Human Extinction Movement states that “Phasing out the human race by voluntarily ceasing to breed will allow Earth’s biosphere to return to good health” (http://vhemt.org, accessed 25 October 2015). However, this makes sense only if extraterrestrial locations are not intrinsically valued. Otherwise, exterminating humanity ruins the opportunity for humans to bring flourishing ecosystems into outer space. Terraforming other planets or bringing ecosystems into Dyson swarms could bring immense amounts of ecosystem flourishing.

#### Only profit motive solves debris.

Nelson & Block 18 [Peter Lothian Nelson and Walter E. Block, \*\* Harold E. Wirth Endowed Chair and Professor of Economics, College of Business, Loyola University New Orleans, “Space Capitalism: How Humans will Colonize Planets, Moons, and Asteroids,” 2018, Springer, pp. 108, EA]

Space debris is a major challenge to space exploration (Goldsmith 2015). The higher the speed (see Chap. 1 on the need for hyper speeds), the worse will be the issue of impact avoidance or damage in the event of impact. It is through the unregulated free market that solutions to intractable problems are found. Explorers will be well motivated to develop methods for detection of both minuscule and massive invisible objects and quick reaction mechanisms for avoidance of things large and small.

#### Their impacts take centuries and mitigation checks.

Lewis 15 – Senior Lecturer in Aerospace Engineering at the University of Southampton [Hugh Lewis, “Space debris, Kessler Syndrome, and the unreasonable expectation of certainty,” 2015, *Room*, https://room.eu.com/article/Space\_debris\_Kessler\_Syndrome\_and\_the\_unreasonable\_expectation\_of\_certainty]

There is now widespread awareness of the space debris problem amongst policymakers, scientists, engineers and the public. Thanks to pivotal work by J.C. Liou and Nicholas Johnson in 2006 we now understand that the continued growth of the debris population is likely in the future even if all launch activity is halted. The reason for this sustained growth, and for the concern of many satellite operators who are forced to act to protect their assets, are collisions that are expected to occur between objects – satellites and rocket stages – already in orbit. In spite of several commentators warning that these collisions are just the start of a collision cascade that will render access to low Earth orbit all but impossible – a process commonly referred to as the ‘Kessler Syndrome’ after the debris scientist Donald Kessler – the reality is not likely to be on the scale of these predictions or the events depicted in the film Gravity. Indeed, results presented by the Inter-Agency Space Debris Coordination Committee (IADC) at the Sixth European Conference on Space Debris show an expected increase in the debris population of only 30% after 200 years with continued launch activity. Collisions are still predicted to occur, but this is far from the catastrophic scenario feared by some. Constraining the population increase to a modest level can be achieved, the IADC suggested, through widespread and good compliance with existing space debris mitigation guidelines, especially those relating to passivation (whereby all sources of stored energy on a satellite are depleted at the end of its mission) and post-mission disposal, such as de-orbiting the satellite or re-orbiting it to a graveyard orbit. Nevertheless, the anticipated growth of the debris population in spite of these robust efforts merits the investigation of additional measures to address the debris threat, according to the IADC.

#### Private sector gets us off the rock.

Diakovska 20 [Halyna Diakovska and Olga Aliieva, Ph.D.s in Philosophy, Associate Professors, Donbass State Pedagogical University, “Consequentialism and Commercial Space Exploration,” 2020, *Philosophy and Cosmology*, Vol. 24, pp. 5-24, https://doi.org/10.29202/phil-cosm/24/1, EA]

The experience of the USA showed that leadership in space exploration, which is maintained solely through public funding, could be erroneous. Since 1984, the share of public funding has gradually decreased in space telecommunications, commercial space transportation, remote sensing, etc., while the share of participation of non-state enterprises has increased rapidly. A legal and regulatory framework has been modified to stimulate space commercialization. The stages of space law development are discussed in the research of Valentyn Halunko (Halunko, 2019), Larysa Soroka (Soroka & Kurkova, 2019), etc. Larysa Soroka and Kseniia Kurkova explored the specifics of the legal regulation of the use and development of artificial intelligence for the space area (Soroka & Kurkova, 2019).

As a result of changing the legal framework and attracting private investors to the space market, the US did not lose its leadership in space exploration, but rather secured it. Private investment along with government funding have significantly reduced the risk of business projects in the space industry. The quality and effectiveness of space exploration programs have increased.

In 2018, Springer published an eloquent book The Rise of Private Actors in the Space Sector. Alessandra Vernile, the author of the book, explores a broad set of topics that reveal the role of private actors in space exploration (Vernile, 2018). The book covers the following topics: “Innovative Public Procurement and Support Schemes,” “New Target Markets for Private Actors,” etc. In the “Selected Success Stories,” Vernile provides examples of successful private actors in space exploration (Vernile, 2018).

The current level of competition, which has developed on the space market, allows us to state the following fact. Private space companies have been able to compete with entire states in launching spacecraft, transporting cargo to orbital stations, and exploring space objects. The issue of mining on space objects, the creation of space settlements and the intensive development of the space tourism market are on the agenda.

In the 21st century, the creation of non-governmental commercial organizations specializing in the field of commercial space exploration, is regarded as an ordinary activity. They are established as parts of the universities around projects funded by private investors. For example, Astropreneurship & Space Industry Club based on the MIT community (Astropreneurship, 2019).

Large-scale research in the field of commercial space exploration, as well as the practical results achieved, led to the formation of a new paradigm called “New Space” ecosystem. The articles of Deganit Paikowsky’s (Paikowsky, 2017), Clelia Iacomino (Iacomino & Ciccarelli, 2018) et al. reveal its key meanings and the opportunities it offers in the space sector. The “New Space” ecosystem is a new vision for commercial space exploration. It is the formation of a cosmic worldview, in which the near space with all the wealth of its resources and capabilities, becomes a part of the global economy and the sustainable development of the society. The “New Space” ecosystem offers the following ways for commercial space exploration (Iacomino & Ciccarelli, 2018):

1. Innovative public procurement and support schemes, which significantly expand the role of commercial actors in space exploration.

2. Attracting new entrants in the space sector. First of all, these are companies working in the domain of Information and communications technology, artificial intelligence, etc. that are expanding their research in space markets. They offer innovative business models and new solutions to space commercialization.

3. Innovative industrial approaches based on new processes, methods, and industrial organization for the development and production of space systems or launchers.

4. Disruptive market solutions, which significantly reduce commercial space exploration prices, increase labor productivity, provide new types of services, etc.

5. Substantial private investment from different sources and involving different funding mechanisms. For instance, these are private fortunes, venture capital firms, business angels, private equity companies, or banks, etc.

6. Involvement of an increasing number of space-faring nations investing in the acquisition of turnkey space capabilities or even in the development of a domestic space industrial base. This expands the space markets and makes it more competitive.

The analysis of the research and advances in commercial space exploration allows us to draw the following conclusions:

1. In fact, the space market has already been created. It is currently undergoing continuous development that will integrate the resources and capabilities of the near space into the global economy over the next decade.

2. A new paradigm, denoted by the term “New Space” ecosystem, is at the heart of the created space market. The “New Space” ecosystem is a step towards the formation of cosmic thinking, in which outer space, with its resources and capabilities, is considered as a sphere of human activities.

3. Space market regulates space law, which is constantly evolving. The space law develops within the bounds of international law. In essence, the space market is integrated into the international legal field and is governed by its laws.

#### But private property is key to transform short-term goals into settlement.

Jonckheere 18 [Evarist Jonckheere, Master of Laws, Ghent University, “The Privatization of Outer Space and the Consequences for Space Law,” 2018, Master’s Thesis, https://libstore.ugent.be/fulltxt/RUG01/002/479/330/RUG01-002479330\_2018\_0001\_AC.pdf, EA]

The reality is that private enterprises are already moving in a direction that will need a similar regime. So, the big legal uncertainties concerning space property should be dealt with sooner rather than later.194 Legal certainty on an international level would greatly benefit the space industry. The existing risks of space ventures would be minimized as private companies would know what they are up against. This could give a boost to private enterprises to be more technologically innovative and entrepreneurial when it comes to outer space exploration. The prospect of gaining property rights might push them to undergo more fully realized expeditions for larger and fixed rewards. The legal regime should however ensure fairness and order between the competing space entrepreneurs.195

#### Immeasurable expected value outweighs.

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#### Private actors solve space war and specifically ASAT restraint.

Cobb 21 [Wendy N. Whitman Cobb, Associate Professor of Strategy and Security Studies at the School of Advanced Air and Space Studies, “Privatizing Peace: How Commerce Can Reduce Conflict in Space,” 2021, Routledge, pp. 68-69, EA]

Finally, given the involvement of an ever-larger number of private actors in space, states also need to consider the lost opportunity costs if private actors choose to forego research, development, and deployment of new technologies because the danger in space is too high. As space becomes more commercialized, these private actors can exert pressure on states to behave peacefully in order to promote further economic development. Gartzke and Quan Li argue that this can happen through the movement of capital from conflict-prone states or areas to non-conflictual states.50 This is not necessarily applicable to space because there is no area in space which is formally protected, but commercial space actors may choose not to engage in new economic investment which can in turn affect a state’s economic performance. To date, the size of the space sector is comparatively small, so, arguably, the potential economic loss would not be that great. Where the harm comes from is state reliance on private actors for military and national security space services. As states contract out space services to a greater extent, private actors exert an even greater influence over the state by having a capability they do not.

Why might private companies want a more conflict-free space? If there is weaponized conflict in space, they could potentially benefit through new launches to send up replacement satellites; this is similar to an argument that war can actually be beneficial to an economy because companies are needed to create materiel and weapons.51 But, in a debris filled environment, sending replacements is more difficult and dangerous. Some private companies want to engage in human spaceflight; a conflictual or more dangerous orbital environment would likely prevent those activities or increase their costs to such an extent that it becomes economically infeasible. James Clay Moltz argues specifically that “the growing presence of space tourists in low-Earth orbit would greatly increase the incentives for restraint in any future [ASAT] test programs.”52 Those foregone development costs and commercial activities can have a similar cost to states simply by discouraging private actors from participating in the market.

#### That turns case and goes nuclear – extinction.

Blatt 20 [Talia M. Blatt, “Anti-Satellite Weapons and the Emerging Space Arms Race,” 05/26/20, *Harvard International Review*, https://hir.harvard.edu/anti-satellite-weapons-and-the-emerging-space-arms-race/, EA]

Nevertheless, a space race born from the Cold War continues to unfold. While the current space race may not have the same monopoly on the American imagination as the sprint to the moon held during the 1950s and 60s, it deserves our equal attention. We are now witnessing the rapid and increasingly international development of anti-satellite weapons. The race for these weapons not only increases the risk of global conflict—it could jeopardize all future space exploration.

What Are Anti-Satellite Weapons (ASATs)?

Difficult to define, ASATs occupy a gray zone in international arms control. On one level, they are exactly what the term suggests: weapons designed to destroy or limit satellites for military purposes, such as undermining the command and control centers of an adversary’s military. ASATs can function in several ways. For example, kinetic energy ASATs (KE-ASATs) destroy satellites by physically colliding with them at high velocities. Drones, ballistic missiles, and explosives detonated near satellites can all function as KE-ASATs.

Conversely, non-kinetic ASATs use any non-physical mechanism to render a satellite inoperative, such as blinding satellites with lasers, launching cyberattacks, or jamming frequencies.

But definitional issues arise because any technology that can physically or non-kinetically damage a satellite can be considered an ASAT weapon. For example, supposedly benign technology aimed at removing defunct satellites or other space junk—known as Active Debris Removal (ADR) technology—can also remove active satellites. With ostensibly civil but covertly military capabilities or functions, many space technologies, including ADR, are put in a category commonly known as “dual-use.” The dual-use nature of space infrastructure makes differentiating between weapon and non-weapon nearly impossible. As a result, regulating ASATs—and many other space-based weapons systems—is extremely difficult.

A Brief History of ASAT Proliferation

The earliest ASAT testing began during the Cold War, when the success of Sputnik I in October of 1957 catalyzed American fears about the Soviet Union’s potential goal of developing nuclear armed satellites capable of circling the globe. In response, the US developed its first ASAT: Bold Orion, an air-launched ballistic missile. The Soviet Union responded with its own ASAT program, developing weapons through the 1960s and 70s known as co-orbitals. Unlike previous KE-ASAT designs, these co-orbitals worked by syncing up with a target satellite’s orbit, then detonating.

The United States responded to Soviet co-orbitals in the 1980s with the ASM-135 weapon, an air-launched KE-ASAT distinguished by its hit-to-kill method. Unlike the Soviet co-orbitals, the hit-to-kill system did not require explosives; it just used the energy generated by the collision between the craft and the satellite, making delivery more stable. In a 1985 demonstration authorized by President Ronald Reagan, an ASM-135 successfully destroyed a defunct satellite.

Roughly 30 years later, China joined the space race. In 2007, China successfully tested a KE-ASAT, destroying an old weather satellite with a ballistic missile. And just last year, India also successfully tested an ASAT in what the Indian government referred to as Mission Shakti.

As of 2018, Russia and China were still developing more advanced non-kinetic ASATs. Russia is specifically developing an ASAT system known as Nudol, which operates in Lower Earth Orbit and can move between orbital paths, threatening more satellites than weapons limited to just one orbital path. So, despite the end of the Cold War era, more and more nations are jumping into a space arms race that is resulting in the rapid proliferation of advanced space weaponry.

The ASAT Appeal

A global fixation on anti-satellite weapons is arguably the logical end result of the main American project of the late 20th and early 21st century: the movement to digital communications. Via the telephone, computers, and eventually the internet, the United States pioneered the use of space-based communications for most civil and military functions. The benefits of satellite-based communications—namely increased efficiency, precision, and volume of information transmitted—are self-evident; however, the US lead in the transition to space-based systems posed a threat: relying on satellites for military use more than any other country created an asymmetric dependency. In other words, an unexpected denial of space-enabled information or capabilities would be more debilitating to the United States than to any other country because no other country is as dependent on satellite communications.

In an era of US hegemony, powers like Russia, China, and India are looking for arenas in which they can make the most gains against a conventionally stronger opponent. The space race has an asymmetric nature: the more the United States develops in space, the more it has to lose. Thus, space warfare provides an arena where emerging powers can gain a strategic advantage relative to the US.

More broadly, ASATs are also desirable because they can function as conflict deterrents. If a conflict arises, countries may be less likely to escalate if they believe their opponents are capable of essentially blinding their military. Just as two nuclear armed opponents risk mutually assured destruction (MAD), two ASAT armed countries risk mutual impotence. If they both can “turn off” each other’s militaries—or deny access to the satellites upon which their opponent’s conventional and nuclear forces rely—both countries are rendered close to defenseless, a risk they would be extremely reluctant to take.

A Uniquely Dangerous Arms Race

Despite their deterrent functions, ASATs are more likely to provoke or exacerbate conflicts than dampen them, especially given the risk they pose to early warning satellites. These satellites are a crucial element of US ballistic missile defense, capable of detecting missiles immediately after launch and tracking their paths.

Suppose a US early warning satellite goes dark, or is shut down. Going dark could signal a glitch, but in a world in which other countries have ASATs, it could also signal the beginning of an attack. Without early warning satellites, the United States is much more susceptible to nuclear missiles. Given the strategy of counterforcing—targeting nuclear silos rather than populous cities to prevent a nuclear counterattack—the Americans might believe their nuclear weapons are imminently at risk. It could be twelve hours before the United States regains satellite function, which is too long to wait to put together a nuclear counterattack. The United States, therefore, might move to mobilize a nuclear attack against Russia or China over what might just be a piece of debris shutting off a satellite.

Additionally, accidental warfare, or strategic miscalculation, is uniquely likely in space. It is much easier to hold an adversary’s space systems in jeopardy with destructive ASATs than it is to sustainably defend a system, which is expensive and in some cases not technologically feasible because of limitations on satellite movement. Space is therefore considered offense-dominant; offensive tactics like weapons development are prioritized over defensive measures, such as improving GPS or making satellites more resistant to jamming.

As a result, countries are left with poorly defended space systems and rely on offensive posturing, which increases the risk that their actions are perceived as aggressive and incentivizes rapid, risky counterattacks because militaries cannot rely on their spaced-based systems after first strikes.

There are several hotspots in which ASATs and offensive-dominant systems are particularly relevant. Early warning satellites play a central role in US readiness in the event of a conflict involving North Korea. News of North Korean missile launches comes from these satellites. Given North Korea’s history of nuclear provocations, unflinchingly hostile rhetoric towards the United States and South Korea, and diplomatic opacity, North Korea is always a threatening, unknowable adversary, but recent developments have magnified the risk. With the health of Kim Jong-un potentially in jeopardy, a succession battle or even civil war on the peninsula raises the chances of loose nukes. If the regime is terminal, traditional MAD risk calculus will become moot; with nothing to lose, North Korea would have no reason to hold back its nuclear arsenal. Or China might decide to seize military assets and infrastructure of the regime. If the US does not have its early warning satellites because they have been taken out in an ASAT attack, the US, South Korea, and Japan are all in imminent nuclear peril, while China could be in a position to fundamentally reshape East Asian geopolitics.

The South China Sea is another hotspot in which ASATs could risk escalation. China is developing Anti-Access Area Denial (A2/AD) in the South China Sea, a combination of long range radar with air and maritime defense meant to deny US freedom of navigation in the region. Given the disputed nature of territory in the South China Sea, the United States and its allies do not want China to successfully close off the region.

But the most effective way to break an A2/AD system would be with anti-satellite weapons. ASATs could neutralize the maritime surveillance China relies upon to deny access to the region and guide cruise missiles. Thus, China is extremely wary of US ASAT development: risks to Beijing’s South China Sea strategy are seen as threats to China itself because of territorial sovereignty claims that are deeply important to the regime and have only become more pronounced under President Xi Jinping. If a Chinese satellite went dark, Beijing might perceive it as a US ASAT designed to undermine the A2/AD approach, and escalate with conventional force.

An Even Greater Risk

Many of these conflict scenarios start with the loss of satellite function, which may seem unlikely. But ASATs threaten satellites through more than just direct attack. ASAT testing, rather than deployment, risks the exponential accumulation of debris, which endangers satellites and creates a host of other problems.

KE-ASATs rely on smashing satellites into thousands of pieces, so each test adds tremendous amounts of space debris. The 2007 Chinese KE-ASAT test alone increased the number of objects in orbit by 20 percent, producing more than two thousand pieces of debris large enough to be tracked and likely thousands more too small to be counted that will remain in orbit for centuries.

Even the smallest pieces of debris can do great damage; traveling at more than 15,000 miles per hour, they can crash into other debris in a proliferation known as the Kessler Syndrome. The situation in space could approach a critical mass in which collision cascading occurs even if all launches were halted, choking orbits with debris until all satellites are destroyed and spaceflight rendered impossible. Compared to the negligible debris created during commercial launches, ASAT tests—especially if the arms race continues to escalate and countries with less developed space programs join with cruder designs—may accelerate the debris in space closer and closer to this critical mass.

If debris knocks out a satellite, an increasingly likely possibility in a world with ASAT tests, then the aforementioned conflict scenarios become more likely. Conflict aside, ASAT-based debris clouds are terrifying in their own right. Public health, transportation, climate science, and a litany of other crucial infrastructures are dependent on satellites that are now at risk. Satellite GPS is a cornerstone of the modern economy; some pundits believe that the slightest glitch in GPS satellites could shock the stock market and further destabilize an unstable global economy. During the pandemic, satellites are playing a crucial role in geospatial data collection for infectious disease modeling.