## OFF

### 1NC – OFF

#### Outer space isn’t value neutral but has always been a question of militarization – debates between civilian and military use are two sides of the same coin that affectively polices society, culminating in total war.

Craven 19 [Brackets Original. Matt Craven (Professor of International Law, SOAS University of London, United Kingdom). “‘Other Spaces’: Constructing the Legal Architecture of a Cold War Commons and the Scientific-Technical Imaginary of Outer Space”. European Journal of International Law, Volume 30, Issue 2, May 2019, Pages 547–572, Accessed 1/12/22. <https://academic.oup.com/ejil/article/30/2/547/5536739> //Xu]

There was little doubt to any of the observers of the launch of Sputniks I and II in 1957 that, despite their overtly ‘scientific’ purposes, the arms race had taken a decisive new turn. The exploration of outer space clearly offered a range of potential benefits; alongside the possibility of research into the physics of the atmosphere, it also would facilitate the collection of a host of meteorological, geophysical and cartographic data, enable enhanced capacity for radio communication and television broadcasting, facilitate safe navigation and, finally, open up the possibility of experimental flights to the moon and beyond. No one, however, was blind to the military implications.60 Within the USA, in particular, there was a widespread belief that command over outer space was an imperative that could not be missed: ‘[W]hoever controls outer space’, it was often said, ‘controls the world’.61 In the wilder speculations, thus, it was imagined that a nuclear power might be in a position to launch guided missiles from a space platform to any point on earth with barely any possibility of response, that outer space would be filled with ‘orbiting bombers’ or that the moon would become the site of military rocket installations. ‘Control’ of outer space, thus, was immediately conceived as being vital as a matter of security. Such concerns seemed to place a premium upon ensuring that the ‘use’ of outer space was exclusively peaceful – a view that seemed to be affirmed not merely by the establishment of COPUOS and successive proposals put to the UN by both the USA and Soviet Union. It was also recognized in the US National Aeronautics and Space Act of 1958, which created a civilian space agency (NASA) and declared, in the process, that ‘it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind’.62 This theme was carried through into the code for outer space – UN General Assembly Resolution 1962 recognizing ‘the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes’ and the Outer Space Treaty that added in Article 4 that states should not place nuclear weapons or weapons of mass destruction in orbit and that the moon and other celestial bodies shall be used by all states parties ‘exclusively for peaceful purposes’ (military bases and fortifications, in particular, being prohibited). Indeed, President Lyndon B. Johnson described the Outer Space Treaty as ‘the most important arms-control development since the limited test-ban treaty of 1963’.63 In an immediate sense, then, outer space was configured as a space radically distinct from atmospheric space and was placed at once beyond the field of both sovereignty and of war. These, however, were by no means co-terminous. The preferred analogy when the status of outer space was often that of the high seas – like the seas, outer space should be marked by the principle of freedom of access and movement, a res communis incapable of being ‘enclosed’. In fact, this was the analogy used by the USA when defending its use of satellites for reconnaissance purposes; ‘reconnaissance’ from space, it was argued, was the functional equivalent of surveillance from the high seas.64 It is clear, however, that this analogy was problematic precisely because the high seas themselves were not immune from being brought within the field of military conflict.65 And, with that in mind, alternative modes of analysis were often proffered to ensure that the ‘commons’ was not to be equated with a potential field of battle.66 Nevertheless, there was always a certain equivocation running through discussions within the UN and elsewhere as to whether the military/non-military distinction was one that could be effectively held in place. Not only were the Declaration on Outer Space and Outer Space Treaty silent on certain vital matters – on the equipping of satellites, for example, with conventional weaponry or the militarization of the ‘extracelestial void’ – but the inclusion of Article 3, which instructed states to ‘carry on activities’ in accordance with international law and the UN Charter ‘in the interest of maintaining international peace and security’, gave expression to the idea, vaunted at various moments, that outer space may nevertheless be the site of military action in self-defence.67 ‘Peaceful’ use, on such a measure, was not to be calibrated by reference to the equipment or personnel put into space – whether military or civilian – but, rather, by reference to the ends or motivation of the actors in question.68 In the case of the USA, this was to resolve itself in the idea that ‘peaceful use’ should not be equated with ‘non-military use’ but, instead, with ‘non-aggressive’ use. As Senator Albert Gore was to put it, when speaking before the UN First Committee in 1962: [i]t is the view of the United States that outer space should be used only for peaceful – that is, non-aggressive and beneficial – purposes. The question of military activities in space cannot be divorced from the question of military activities on earth. To banish these activities in both environments we must continue our efforts for general and complete disarmament with adequate safeguards. Until this is achieved, the test of any space activities must not be whether it is military or non-military, but whether or not it is consistent with the United Nations Charter and other obligations of law.69 The same general tenor was maintained in the discussion over Article 4 of the Outer Space Treaty concerning the demilitarization of the moon and celestial bodies. In this treaty, it was admitted that the use of military personnel ‘for scientific research or other peaceful purposes shall not be prohibited’, largely in recognition of the fact that for both space powers it was the military, not civilian agencies, who were responsible for developing rocket and other outer space capabilities. What one might see in this is a straightforward determination, on the part of both space powers, to continue the practice of exploiting outer space for purposes of defence whilst holding on, at the same time, to the general idea that outer space was a space of peaceful endeavour. Defensive militarization, here, was to be conceptualized as the functional equivalent of total demilitarization. Yet ‘defence’ was also an unstable category in circumstances of a bipolar military standoff that depended upon a balance of forces. For not only might an effective defence depend upon first strike capability (as the doctrine of ‘mutually assured destruction’ was to suggest),70 but also, as was later to become evident following the announcement of the US Strategic Defense Initiative in 1983,71 even the construction of an overtly ‘defensive’ system could assume an offensive cast if only one party possessed that capacity.72 There was, however, also a much deeper problematic at work here, which related to the persistence of a governmental rationality that was held over from the earlier decades of the 20th century, that understood the necessity of bringing all social resources – economic, technical, scientific and human – to bear in defence of the state against an existential threat. This was articulated in the interwar years in the theories of total war developed by the likes of Erich Ludendorff73 and Ernst Jünger,74 but was carried forward, well into the aftermath of World War II.75 Even if, at Nuremberg, the tribunal had associated the practice of total war with the pathologies of National Socialism,76 as the likes of Georg Schwarzenberger and Josef Kunz were to observe, it was a method of waging war that was only, in small part, to be associated with the problem of totalitarianism. For both, the phenomenon of total warfare was a much more general one – associated with technological developments in arms, indiscriminate modes of warfare and the mobilization of the civilian population – and was as much in play in the 1950s as it had been in earlier decades.77 If the prospect of nuclear annihilation meant that no element of society would be spared, so also, it seemed to follow, no element of society should be excluded from preparations to ward off that eventuality. Whilst, in the case of the Soviet Union, the ethos of centralized planning and a party bureaucracy equipped with an ideology of collective ownership and class warfare naturally dissolved any operative distinctions between the civil and the military establishment,78 the same was also apparent in the USA where, as was recognized as early as 1945, the ongoing development of new technologies of offence and defence, in conditions of competition, would require ‘the participation of every element of the civilian population’ and, in particular, the enlistment of the countries research capabilities.79 Alongside the development of what Dwight Eisenhower later described as a ‘military-industrial complex’, guided by a ‘scientific-technological elite’,80 the rationalities of the Cold War were to envelop US society in a much more profound way – from the mobilization of the media in defence of free thought, the enlistment of corporations, unions and research establishments in defence of national security and the co-option of cultural institutions (from Hollywood to the universities81) in the affective management and policing of public life.82 The significance of this in the context of outer space was the almost total loss of any way to distinguish effectively between military and civilian activities. Just as the requirements of resourcing a technologically dependent military armature increasingly depended upon a civilian infrastructure of research, industry and economic management,83 so also was it clear that prospective civilian and scientific activities in space (such as meteorology, remote sensing, navigation systems and telecommunications) all had military dimensions. If, for example, developments in meteorological knowledge and environmental science seemed to open up the possibility of weather control for the purposes of combating drought, improving agriculture or the avoidance of natural disasters, so also could that same science assist in the development of military communications and ballistic missile capability (which depended upon information about the lower and upper atmosphere, ionospheric behaviour, geodesy and geomagnetism).84 Such knowledge also opened up new possibilities for manipulating weather systems in order to procure military advantage (such as the manipulation of thunderstorms to disable communication systems or the creation of fog or cloud).85 But it was not just about scientific knowledge enabling new avenues of military innovation; it was also about the purposes to which the same technology might be put. Thus, for example, the camera-equipped satellite programmes (Tiros, CORONA), with the auxiliary systems of information recovery and reproduction, were virtually identical (give or take a few degrees of resolution) whether they were used for the purposes of geodetic measurement and weather prediction or military reconnaissance. In some cases, furthermore – such as the US Galactic Radiation Background satellite – intelligence-gathering electronics was incorporated within the same instrument used for the measurement of solar radiation.86

#### The 1AC is a misdiagnosis of debris – wargames and coverups whitewashes militarism’s recreation of debris.

Reno 20 [Joshua O. Reno (Associate Professor of Anthropology at Binghamton University). February 2020. Accessed 1/15/22. “Military Waste: The Unexpected Consequences of Permanent War Readiness”. UC Press. <https://www.ucpress.edu/book/9780520316027/military-waste> //Xu]

As I write this, in the atmosphere miles above me, hundreds of millions of tiny artificial particles and larger fragments are circling the planet, mostly undetected, moving as fast as speeding bullets. This is orbital space debris—artificial objects and materials launched into orbit that no longer serve a purpose—and it has been accumulating in the sixty years since the Soviet Union sent Sputnik into space and transformed the stakes of the Cold War. In this chapter, I review various attempts to witness and revalue space debris, which expose the historical and ongoing militarization of outer space. At first glance, space debris would seem very different from the other objects discussed in this book. On the one hand, they are not as clearly linked to the military and permanent war preparation, because this connection has been actively foreclosed from public awareness by the US security state. Every space mission creates some debris, and many space missions had covert and classified goals that were not disclosed until later, and some never were. One famous example is the cover story used to account for the U2 incident in 1960. Shot down while conducting covert surveillance of suspected Russian ICBM development from Soviet airspace, the U2 spy plane was initially characterized as a NASA weather vessel. However, two days after the cover story was released, a photo was wired to the US government of Khrushchev holding aerial photographs the U2 had taken, proving the NASA story was a lie.1 If one problem with examining space debris as military waste is a history of secrecy, another concerns the undetectability immanent to space debris as a material object. It is one thing to write with authority about orbital space debris. It is quite another to bear witness to space debris, as one can other forms of American military waste. “To witness,” Michael Taussig writes, “as opposed to see, is to be implicated in a process of judgement. . .such that the mere act of seeing tilts the cosmos and deranges the eyeball” (2011, 71). Yet, with this most cosmic of wastes, witnessing is hard to come by. I cannot swear that I have seen orbital space debris (in orbit, that is) and haven’t met many who can. Amateur astronomers sometimes think they have seen space debris, but do not know for certain if they ever will again or if they’ll even know when they do. And, more importantly, they probably will not care if they do. If this book is about finding people who bear witness to military waste, who not only see it but become invested in this act of perception, then in that sense at least this chapter is premised on a failure. Those I spent the most time with—amateur astronomers and a ham radio operator in the Southern Tier of New York—were not already interested or invested in space debris. I did not trace a preexisting network linking nonhumans with humans (Latour 2005). I did not locate a public affected by an act of contamination, slow violence, or environmental injustice (Marres 2012). That is to say, with few exceptions, I did not succeed in finding a group for whom this object matters and using their interest to direct my own. Instead, I found a problematic object and tried to recruit people who might care to do so. One reason space debris is not very interesting for the people I got to know is that anything so labeled is uninteresting almost by definition. Space debris is perhaps the truest expression of what Mary Douglas (1966) meant when she labeled dirt, “matter out of place.” Almost anything can be considered space debris if it was launched into orbit and people think it should not be there anymore. It may refer to satellites that have aged and become obsolete or can no longer be contacted or controlled from the ground, thus rendering them useless. Space debris also consists of materials of varying size and substance that were purposely released or jettisoned by vessels and satellites to facilitate their ascent or as part of their ongoing maintenance. But whether something counts as space debris depends on who is making this judgment and how. Part of the reason that amateur astronomers might not care about space debris is that anything they do care about may no longer be recognized as debris. Consider NASA’s Cassini probe, which entered Saturn’s atmosphere after completing its twenty-year mission on September 15, 2017. I began hearing about Cassini’s final descent weeks earlier from the members of the Kopernik Astronomical Society (KAS). Cassini was being discarded, but it was difficult to find anyone characterizing it as debris. In early September, KAS members were still sharing their best photographs of the solar eclipse that had captivated the country in August. But soon they began posting links on the group’s public Facebook page related to Cassini’s last mission: September 14: #Live #Coverage: NASA Monitors #Cassini’s #Dive Into #Saturn Friday morning, NASA & #JPL will monitor the Cassini #Spacecraft as it ends its #mission by diving into the #clouds of Saturn. #NASATV and NASA & JPL #Internet #web-sites will provide live #steaming coverage as #scientists #monitor Cassini’s “#GrandFinale,” as well as #news#conferences before (Thursday afternoon) & after (Friday morning) the #event. September 16: A fantastic overview of the Cassini Mission, including it’s [sic] very last image. Such an amazing mission just to tease our wonder a little bit.#FarewellCassini Explore More! September 20: NOVA: Death Dive to Saturn These posts provided hashtags and links one could use to learn about Cassini’s final mission, witness live broadcasts, and honor the lost spacecraft. Cassini was singled out for so much praise by astronomy enthusiasts for good reason. Many knew it had been responsible for some of the best pictures of the solar system ever captured. As a writer for a science and technology website put it: While many uncrewed spacecraft have done an incredible job of revealing our solar neighborhood to us, honestly, none did it better than NASA’s Cassini probe. After exploring Saturn for 13 years, on September 15th at 4:55am PDT, the probe will plunge itself into the planet’s atmosphere, becoming one with the very object of its fascination. (Paoletta 2017) As in many examples that appeared around this time, on- and offline, this writer treats Cassini like a person. It is as if the probe itself were intentionally doing the “exploring,” plunging “itself,” and intentionally merging with “the very object of its fascination.” Such eulogistic prose could be found among many techno-science and astronomy feeds and sites at the time. Consequently, what otherwise might have been seen as just an expensive, floating camera became instead a subject of interest akin to Saturn itself. But objects never mean just one thing, even within the same community of practitioners.2 From another point of view, the disposal of Cassini on Saturn was more like an act of cosmic littering disguised as a funeral. One small but vocal group of Cassini-truthers claimed that there was another, more nefarious purpose behind the destruction of the probe. NASA was, they claimed, trying to accomplish its decade-old goal of creating another sun by detonating a nuclear payload on Saturn. Known as “Project Lucifer,” such a claim had been made before in relation to other space missions. But for every so-called conspiracy theory, there are even more people who delight in debunking and deconstructing them. A decade before Cassini’s final dive, an author for the online publication Universe Today had already set about deconstructing Project Lucifer’s assertions (see O’Neill 2008). It is worth noting, however, that claims and counterclaims such as these, much like narratives of UFO sightings and abductions, are about more than what “really happened.” They are more centrally concerned with whether or not hidden powers are operating in the shadows, just beneath awareness. If they exist, such powers are only visible in momentary glimpses and if one looks carefully enough to see the pattern.3 Whether Cassini is seen as a mournful loss or a frightening conspiracy, it is still not quite “debris” since it has greater purpose than something merely drifting, colliding, orbiting. In other words, whether something counts as debris depends on how astronomical observers (and conspiracists) think about and act towards the things that populate outer space. More than just claims to debunk, conspiracy theories like Project Lucifer raise ethical and political questions surrounding what is otherwise accepted as relatively innocent and harmless civilian science. More to the point, they point toward forgotten and troublesome understories associated with the exploration and exploitation of outer space. It is not so strange to suspect that NASA is concealing the true motivations behind its projects, as it has done in the past and as its less-wellknown sister agency, the National Reconnaissance Office (NRO), has done for the entirety of its existence. Fantasies of hidden nuclear reactions on Saturn are not just conspiratorial paranoia, therefore, but manifestations of a general mistrust around state secrets concerning the militarization of space, which did not end with the Cold War. This chapter explores space debris as openended rubbish (Thompson [1979] 2017) and as an object of militarized fantasies, past and present. The example of Cassini is telling because it represents a situation where what might otherwise be thought of as mere space debris is instead revalued as a sign of discovery and scientific achievement or, alternately, of conspiratorial, cosmic destruction. The intentional generation of space debris becomes more apparent by linking it with the historical and ongoing militarization of space. My argument is not that the US military is directly responsible for all space debris (a claim thatwould be difficult to definitively prove in any case). That being said, antisatellite weapons testing has by all accounts made the problem of space debris worse; furthermore, defense agencies have been at the forefront of studying and proposing solutions to space debris.4 In this chapter, I link both the historical and ongoing creation of space debris, as a problem, and current proposals to solve it to a common source: a tendency to imagine expert knowledge and technical practice as a form of mastery, despite the fact that they lead to new and unanticipated accidents and risks. Here I draw from the Aristotelian argument of Paul Virilio (2007, 5) that the accident reveals the substance. In other words, the invention of any substance is equally the invention of any of its accidental manifestations. The shipwreck is the invention of the ship (see chapter 3) just as the Chernobyl meltdown is the invention of the nuclear power station. So, too, space debris is the invention of the Cold War space race, an invention distinctly different from the way planets ordinarily shed and reabsorb materials. Clearly, orbital space debris is very different from things like planes, ships, and guns. Yet, it is productive to think of all forms of military waste not only as different kinds of things, but as associated with different microworlds of action connected with permanent war preparation. For this reason all of these forms, as rubbish, have elements of indeterminacy associated with them, which lead to disputes about their social and material potential. After all, what is difficult to represent clearly can be even more disturbing to imagine, since this usually makes it harder to control and predict.5 Is space debris polluted and polluting or valuable and meaningful? Is it raw material for a radical new vision or heritage that should be preserved? When objects are simultaneously rare and abundant like space debris, hard to relate to, yet ubiquitous in orbital environments, these questions pose even greater challenges. Acknowledging the militaristic origins of space debris does not make it more accessible or amenable to reuse and rethinking by civilians. As I will explain, even astronomers might only encounter space debris fleetingly, and only for a brief moment as it quickly vanishes out of sight. In some ways, this makes space debris both less visible and more threatening than the other forms of military waste I discuss in this book. When it comes to astronomical phenomena, seeing is believing. But believing is also seeing, insofar as imagined evidence of aliens or government conspiracy involves prior and ongoing attunement toward that which lies concealed beyond familiar experience and official explanation. The idea of cultivating ethical attunement of the senses, especially to listen for signs of otherworldly beings and designs, has been dis-cussed for religious subjects (Luhrmann and Morgain 2012; Hirschkind 2015; Zani 2019). I extend this to include visual attunement of lay astronomers. Astronomical attunement can involve searches for alien life, but it can also be more modest in its scope, associated with wise use of and participation in the Earth’s orbital environment. I was unsuccessful finding many people who already cared about space debris, but getting to know them I came to see their practices of attunement as an alternative to the dominant strategies to address space debris. Unlike the attunement of amateurs, space agencies represent space debris as a problem to address through techno-solutionism. This is a way of valuing the technical fix as an end in itself, and it is deeply connected to the militarization of space and the problem of space debris. the color out of space Space debris comes in the form of subsidiary materials intentionally or inadvertently discarded after helping satellites escape Earth’s gravity, as well as the satellites themselves. Some of these objects are broken down by interactions with other bits of debris and physical processes while in orbit, but may continue orbiting the Earth all the same. There are good records of the over six thousand satellites that have been launched since 1957. But they can be difficult to locate and identify from the ground all the same. Depending on the altitude, lost and disused satellites and their accompanying materials either circle the planet at low Earth orbit (LEO), medium Earth orbit (MEO), or geostationary orbit (GEO), and this also affects their relative velocity, with objects further away moving more slowly. The ISS is located about 250 miles above the surface of the Earth in LEO and moves about 17,500 miles per hour, whereas satellites in GEO are located about a hundred times further above the Earth and travel at less than half that velocity. The difference is that disused space junk has lost attitude control, meaning that its orientation becomes more haphazard as it tumbles through space.6 As different forms of space debris move, sometimes at tens of thousands of miles per hour, they occasionally collide with one another and splinter into additional, smaller fragments. There are an estimated half a million pieces today, a fraction of which can be tracked by space agencies like NASA. Using the publicized data from the DoD’s Space Surveillance Network, there have been numerous models generated to display the problem of space debris as it has accumulated over time. One of the problems with depicting space debris accurately has to do with the conditions of orbital environments. In time-lapse videos, one can visualize the Earth as if it were sloughing off dandruff—hundreds of thousands of tiny flecks that encircle it at various distances. This metaphor is actually more appropriate than it might seem. Like an animal’s scalp, the Earth routinely sheds materials that continue to orbit it or are jettisoned into the universe. As part of this metabolic process orbital environments “self-clean,” meaning that various planetary forces allow materials to leave and rejoin the surface, as well as capture that which other planetary bodies have jettisoned. In a certain sense, for something to be called “orbital space debris” depends entirely on human beings deciding something is no longer valuable, useful, or notable. Yet, what becomes of space debris depends on the power of the Earth itself.7 After all, debris is not something that troubles planets, but defines them. According to Lisa Messeri, the prevailing definition of a planet is an object that is “large enough to have either captured or expelled the debris to other orbits” (2016, 8). If not for Earth’s gravitational force, bending spacetime as it does, it would not require so much expenditure to escape its orbit, nor would so much material fall back to Earth or remain in orbit after the fact. As Lisa Ruth Rand notes, “the geophysical world of outer space” is “a historical actor of equivalent importance to astronauts, engineers, governments, and publics” (2016, 13). The planet’s metabolic relationship to debris is not simply a threat to life, but may help spread it across the cosmos.8 Anthropogenic space debris mixes with the naturally occurring debris of orbital environments to generate new risks and possibilities. Unlike functional satellites, which can be manipulated and brought more or less in sync with the designs of those on the ground, the alternative spatial and temporal rhythms of space debris represent a distinct risk to other things (and persons) in orbit. As such, they also represent a potential barrier to further human exploration and exploitation of space. To begin with, space debris is potentially dangerous to spacecraft. Space debris is partly assessed by treating returning spacecraft in a way they were never intended, as a “hypervelocity impact capture medium” as they are dented more by artificial objects than natural meteorites (Bernhard, Christiansen, and Kessler 1997). The impetus for tracking and modeling space debris thus comes from the temporal possibilities it threatens. This includes a hypothetical feedback process whereby objects continually collide and spread out, converting Earth orbits, especially in LEO, into a hazardous environment filled with tiny fragments. Space debris would then circle eternally overhead like a cloud of bullets awaiting a target, trapping us in fear on the surface. This was used to produce a new element of space horror in the recent science fiction film Gravity (2013), where space debris played a key role and was depicted as a monstrous threat—like a swarm of abiotic locusts—that cycled the Earth with an alien regularity. In this film, without warning debris hurtles into view to annihilate spacecraft or slaughter hapless astronauts.9 Whether this sort of possibility is a likely scenario or not, it reflects anxiety about the unexpected and emergent spacetime of materials orbiting the Earth. The time they threaten is not only the immediate present but future plans, which are increasingly incorporated into fantasies of space travel. At least one of the astronomers I spoke with considered space debris a broader environmental problem. One of the older staff members at the Kopernik Observatory was Nicholas, who grew up in the Southern Tier and designed computer hardware for IBM. When I interviewed Nicholas, he was preparing a talk for the public on the search for life and its creation from inorganic materials, a subject of great personal interest. This gave him a unique view on the ecological risks of space exploration, “I think of debris as sort of garbage. Stuff that’s out there, you don’t know what to do with it so you just leave it laying around, it’s like cluttering on a highway. You know?” For Nicholas, depositing leftover materials from missions, like the Cassini probe, on a foreign planet is about more than the technical junk itself. Even the most sanitized bit of space equipment might carry remnants of the living world it came from. Nicholas had pictures in his Facebook feed of tardigrades (or water bears), the peculiar microbes that seem capable of withstanding the vacuum of space. “To me that’s one of the areas that you could contaminate, if you’re searching for life, you don’t want to contaminate it. NASA scientists are aware of these concerns, which are normally glossed as planetary protection and were included as part of the Outer Space Treaty of 1967. This stipulates the necessity of protecting the Earth from organisms that might exist beyond it, and protecting other planets from contamination by human and nonhuman earthlings. For instance, Cassini was positioned to collide with Saturn so that it would not inadvertently contaminate life that might exist on one of the gas giant’s moons (life which, many astronomical enthusiasts would be quick to point out, Cassini’s photographs had helped demonstrate might exist). And Nicholas was also not alone in thinking that enthusiasm for space exploration could lead to denial about its unforeseen consequences.10 Not everyone agrees, however. In 2018, the SETI institute sponsored a debate over planetary protection between a member of NASA and founder of the Mars Society and author Robert Zubrin. During the debate, Zubrin accused planetary protection of being nonsensical, since planets exchange substances all the time on their own, and dangerous, since it could limit human exploitation and exploration of the universe. Space debris is meaningful as both barrier and bridge to desirable futures. These hoped-for futures involve, for instance, further exploration and exploitation beyond LEO and into the very valuable and legally contested domain of geostationary orbit, where satellites can more easily analyze from and transmit data to the entire planet. This also includes NewSpace initiatives that seek to extend capitalism and empire beyond the limits of the Earth, whether to mine asteroids or colonize Mars.11 Such initiatives demonstrate a clear motivation to clean up the polluted and risk-filled environment in the vicinity of Earth. From this admittedly interested perspective, the presence of space debris limits the utilization of LEO, MEO, and GEO, creating risks for any state and/or capital investment. Insofar as space debris influences assessments concerning the utilization of outer space for various ends, it directly mediates the futures that space agencies and industries imagine possible and desirable. It may be that the risks of orbital debris are being somewhat amplified by filmmakers and the media more broadly. After all, most chunks of space debris burn up completely before descending to Earth, posing little threat to life on the surface. And only those nations and corporations powerful enough to summon the resources to escape the planet’s gravitational pull, to operate the ISS for example, place themselves directly at risk. In this regard, space debris is somewhat analogous to floating Pacific garbage patches in the world’s oceans (see chapter 6). While troubling and aesthetically striking, space debris and garbage patches are located in little-used borderlands rather than directly inhabited landscapes. They would seem to lack an affected public, that is, a collective of interested social actors directly impacted by the problem and thus likely to organize to bring the problem to light. The analogy between the garbage patches and space debris is more than incidental. At the opposite side of the Pacific from the first garbage patch to be discovered is another dumping zone. Known as Point Nemo—the place in the ocean furthest from any land—this stretch of ocean has been used for decades as a convenient place to deposit space debris, when such a thing is possible for space agencies.12 But debris does not always land where one would expect. And the threat of damage from orbital space debris is real. Space debris represents a clear barrier to the continued use of orbital environments. The ISS had to perform approximately eight evasive maneuvers during its first decade of operation in order to avoid collisions with debris. Calculations are normally performed at least three times a day to determine risks of collision over the subsequent seventy-two hours; if the chance of collision with a large enough object is determined to be greater than one in ten thousand, then maneuvers are planned and executed. In late August of 2008, the ISS had to engage in a collision avoidance maneuver when it was nearly struck by just one piece of more than five hundred cataloged bits of debris that resulted from Kosmos 2421’s planned fragmentation earlier that summer (see Johnson and Klinkrad 2009, 5). In this case, the ISS was not dodging anonymous debris, but the specific fragments that are attributable to a Russian spy satellite that was launched in 2006 and began fragmenting two years later. According to widely agreed-upon space policy, if old satellites cannot be sent to the “parking zones” above LEO, then they are sent crashing into the atmosphere to hopefully disintegrate.13 In some ways, concerns over orbital debris can be related to the discourse around climate change, sociologist and historian of science Lisa Ruth Rand argues, insofar as both are global in scope and have been associated with “tipping points” toward certain and perpetual disaster. “With no control over where surviving fragments might land, orbital space became a site from which pollutants could cross geographic boundaries and extraterritorial regions” (Rand 2016, 11). In this sense, orbital regions are not some sort of beyond, disconnected from terrestrial life. Like the atmosphere itself, planetary borderlands are dynamically entangled with life on Earth. Moreover, like the seemingly never-ending threat of nuclear annihilation, they are also associated with the rise of the national security state in the twentieth century.14 When specific entities generate fragments or are threatened by them, orbital space debris begins to resemble other pollution events where there is an alleged perpetrator and a documented victim. More often than not, it is not just any perpetrator accused. Discussions of space debris events frequently single out America’s adversaries as being responsible, as in the episode above, despite the fact that Americans contaminate orbital environments as well and that other countries are frequently responding to and imitating the ongoing American militarization of space. Politicizing space debris in this way fits easily into previous Cold War–era assessments of risk and blame where it is only national rivals to the United States and Europe who break rules and incur risks, namely China and Russia, which implies that Americans are blameless by contrast.15 Space Debris as Military Waste All of the information provided in the section above, outlining orbital space debris as a problem, can be considered entirely without reference to the US military. This not only leaves out an important part of the story of space exploration and exploitation; it also helps further distinctions between civilian science and defense projects, as if the two were completely separate spheres of social action and imagination. In fact, they are continuous. The launch of Sputnik I by the Soviet Union was the beginning of space exploration and the age of satellites. It also set the stage for a new alliance between scientific experts, the federal government, and the DoD. Prior to Sputnik, it was widely believed throughout the US that its Soviet rivals were incapable of launching a satellite into space. When they did, it not only demonstrated a flaw in this chauvinist presumption, but made clear that the Soviet Union had the capacity to launch intercontinental missiles as well. Even though the Eisenhower administration knew, by this time, that there was no “bomber gap” between the two countries, this real embarrassment and virtual threat radically altered relationships between scientists and government and military officials, which had previously been strained by McCarthyism and the Korean War. At least some Americans felt vulnerable to attack, and Eisenhower, who had hoped to reduce what he regarded as wasteful military spending, reevaluated his position on the matter and helped foster the military industrial complex he would later name and criticize.16 If an interpretation of space exploration as militarization is often foreclosed from consideration, one of the reasons is that the intentions behind space discovery have been successfully represented in different ways over the course of NASA’s history. Outer space and space agencies are more popularly represented in terms of discovery, invention, and wonder. This has been a deliberate effort on the part of civilian scientists, government officials, and media organizations to differentiate NASA from military projects. Though NASA was created to be a civilian space agency, the end result of the initial shock and panic surrounding the launch of Sputnik, this was not a foregone conclusion. At the time, all of the technology that might have been used for possible space exploration was in the hands of the US military; consequently, some prominent members of the government scientific advisory, as well as Eisenhower himself, were initially in favor of folding all space exploration within the DoD as part of ARPA. ARPA had itself been recently created in order to consoli- date and reduce waste from interdepartmental competition. Consequently, it only stood to reason that it would also absorb the space agenda, which also had enormous implications for the future of defense. The reason NASA emerged, instead, was the result of fears of the militarization of space, both because of the dangers this would raise for people on Earth but also because it went against the utopian internationalism of many American scientists of the time. It was decided that there would be a civilian space agency, but one that would remain funded by and deeply connected to the military, for fear that the loss of military relevance in space missions would cause it to die on the vine.17 While NASA is a civilian agency, stories of its rise and contemporary relevance illustrate the longstanding relationship its people and projects have had with the DoD. Near-continuous war games in space go back to when the first satellites entered near-Earth orbit and generated ever more debris. According to Rand, “Both superpowers carried out high altitude and exoatmospheric nuclear weapons tests beginning in 1958 and ending in 1963 with the Partial Nuclear Test Ban Treaty” (2016, 10). Secrecy regarding military-related space missions (and the debris they have caused) is most clearly associated with the National Reconnaissance Office (NRO), the “other space agency” that was created in 1961 but kept a secret until 1992 (Paglen 2009, 20–31). As an author from Wired magazine puts it, debris is a legacy of militaristic statecraft: In 2007. . .China decided to de-orbit one of its defunct weather satellites...by firing a missile at it. That certainly took the sat out of its path—but it also created a flume of debris that flung toward the Space Station in 2011. In February 2008, the US Navy launched its own projectile at a spy satellite toward its own satellite. The government claimed to worry that if it let the satellite fall back intact, its hydrazine fuel could release toxic vapors at breathing level. But some, at the time and still, interpret the action militarily. (Scoles 2017) Debris from the NRO was not necessarily from weapons testing, moreover, because weapons are not the only space projects of great military interest. As Rand explains: New kinds of satellites—from giant, shiny inflatable balloons to a ring of hundreds of millions of tiny copper fibers—tested the use of space for communications while spurring controversy over whether such satellites could interfere with astronomy, crowd the electromagnetic spectrum, or present a collision hazard to other spacecraft. (2016, 10) Official histories of space exploration as civilian science tend to demilitarize its relevance. Moreover, when a cover story is needed—as with the U2 spy plane debacle—the official narrative can be called upon to distract or misinform inquiring Americans, allies or rivals. The activities of ARPA and especially the NRO are shrouded in mystery, though that has not stopped amateur astronomers from successfully tracking their activity.18 From the beginning of the space race, nation-states with property in orbit worked out the basic terms of space law (see Beery 2016), which among other things does not allow for the practices of salvage characteristic of maritime law. Instead of seeing these materials as property to be protected, astronomers were historically the first group to mobilize against the contamination of the planetary borderlands with space debris. Sputnik’s launch also began a wave of UFO sightings of all kinds, which would continue over the ensuing decades. As Americans watched the night skies, it was as if their apprehension and mistrust of Soviets somehow turned on their own government. And why not? Space exploration was begun in earnest by competing US and Soviet militaries during the Cold War and continues to be central to the machinations of securitizing states today.19 The ability for anyone with a telescope to track near-Earth objects makes complete secrecy all but impossible. Most recently, space enthusiasts were the first to raise awareness about the possibility of China’s Tiangong-1 space lab tumbling out of the sky, before the Chinese state admitted this was happening. In essence, it was amateur astronomers who first noticed that the space lab was acting more like space debris, against the wishes of a government hoping to keep this from public knowledge. The first story reclassifying the space lab as space debris appeared in June 2016, and was quoted from for the next year and a half by the Guardian and the Washington Post. Eventually the Chinese state admitted that it had lost control of the lab and that it would likely fall to Earth sometime in late 2017 or early 2018 (see David 2016).20

#### The 1AC’s use of international law in regulating outer space whitewashes the fundamental asymmetries of IR – 1AC Leon claims of “superior authority, a State, entitled to attribute and enforce them” proves it greenlights Great Power domination, while “Withdrawal of a single state “ and “it must be accepted as such by the major space faring states” is homogenization.

Havercroft and Duvall 09 [Jonathan Havercroft (Associate Professor in the Department of Politics and International Relations at the University of Southampton) and Raymond Duvall (Professor of Political Science and Associate Director of the Interdisciplinary Center for the Study of Global Change/MacArthur Interdisciplinary Program on Global Change, Sustainability, and Justice at the University of Minnesota). “Critical astropolitics The geopolitics of space control and the transformation of state sovereignty”. Securing Outer Space. 2009. Accessed 1/26/2022. https://www.taylorfrancis.com/chapters/edit/10.4324/9780203882023-8/critical-astropolitics-geopolitics-space-control-transformation-state-sovereignty-jonathan-havercroft-raymond-duvall //Xu]

Although Deudney has not extended his “historical security materialist” approach into explicitly theorizing space weapons, per se (dealt with only tangentially and implicitly in the last two chapters of his recent book), his proposals during the Cold War to foster institutional collaboration between space powers as a way of promoting peace can safely be understood as a form of the mutually binding practices that he associates with the federalrepublican mode of protection. In addition, one of the general conclusions that Deudney reaches about “historical security materialism” is that the more a security context is rich in the potential for violence, the better suited a federal-republican mode of protection is to avoid systemic breakdown. Therefore, it seems reasonable to conclude that within Deudney’s work is a nascent theory of how a federal-republican international system could limit conflict between space powers by binding them together in collaborative uses of space for exploratory and security uses. In this sense, Deudney can be read as the liberal-republican astropolitical counterpart to Everett Dolman.5 While Deudney’s astropolitical theorizations hold out the promise of a terrestrial pacification through space exploration it is interesting to note a significant aporia in his theory – empire as a possible mode of protection. While real-statist modes of protection have an internal hierarchical authority structure, they are based on assumptions of external-anarchy, which is to say a system of sovereign states. Conversely, the federal-republican model is based on a symmetrical binding of units, in a way that no single unit can come to dominate others and accordingly in which they preserve their sovereignty (Deudney 2000, 2002, 2007). In a third mode, to which Deudney gives only scant attention, the case of empire, the hegemony of a single unit is such that other units are bound to it in an asymmetrical pattern that locates sovereignty only in the hegemon, or imperial center. Successful empires, including the Roman, British, and American, permit local autonomy in areas that are not of the imperial power’s direct concern while demanding absolute obedience in areas that are of vital concern to it, particularly when it comes to issues of security.6 Deudney’s implicit astropolitical theory thus ignores structurally asymmetric relations – in effect he ignores power. It is as if in wanting to have the world avoid the possibility of a planetary hegemony at the heart of the premise with which he and Dolman began their respective analyses, he white-washes it by failing to acknowledge the profound asymmetries of aspirations and technological–financial–military capacities among states for control of orbital space. In the next two sections we respond to Deudney’s call for “historical security materialism” by focusing on the premise that he skirts but that Dolman emphasizes, that military control of space means (at least the possibility of) mastery of the Earth. Specifically we examine how a new mode of destruction – space weapons – is the ideal basis for the third mode of protection – empire – through its potential for substantial asymmetry. We argue that the power asymmetries of space weapons have very significant constitutive effects on sovereignty and international systemic anarchy, and underlie the constitution of a new, historically unprecedented, form of empire. Before turning to that central thesis, however, we will first sketch the general contours of a critical astropolitics, which builds on the foundational premise of Dolman and Deudney, but modifies their theories in light of the significant insights of critical theory, particularly with respect to constitutive power. We ask: what consequences of astropolitics can a critical approach illuminate that may be concealed by an astropolitics informed by either liberal-republican or realist assumptions? How can insights offered by the revival of geopolitics in the writings of Deudney and Dolman – particularly the call for a new security materialist mode of analysis – be used to supplement and refine critical international relations theory? Critical astropolitics In the broad intellectual tradition of geopolitics, advocates of a critical perspective – particularly Simon Dalby, John Agnew, and Gearóid Ó Tuathail – have challenged mainstream geopolitical theory for assuming and validating power relations implicit in the production of geopolitical knowledge, and for a tendency to be a reifying and totalizing discourse that erases difference and political contestation from processes of representing space (Agnew 2003, 2005; Dalby 1991; Dalby and Ó Tuathail 1998; Ó Tuathail 1996). Ó Tuathail has criticized earlier forms of geopolitics for their ocularcentrism and what he terms the “geopolitical gaze.” Drawing on the work of Michel Foucault, he reads geopolitical discourse as power/knowledge, such that knowledge of spaces produces subjects empowered for expansive control. Geopolitical representations – what Ó Tuathail terms geo-power – are in a mutually supportive relation with the imperial institutions in which they are produced (Ó Tuathail 1996: 6–20). Empires cannot function without clear representations that explore, chart, and bring under control cartographic spaces. The spatial imaginary of the “geopolitical gaze,” then, is immanent to empire. In a related vein, Simon Dalby, too, has studied the role that geographical representations play. He has examined official policy documents and academic analyses of U.S. strategic thinking in both Cold War strategies and the Bush doctrine to determine how geographical representations of the earth shape U.S. imperial strategy (Dalby 2007). Additionally, John Agnew’s work examines how a particular geopolitical imagining – a global order constituted by sovereign states – “arose from European–American experience but was then projected on to the rest of the world and in to the future in the theory and practice of world politics” (Agnew 2003: 2). Such scholarly work of critical geopolitics makes two crucial contributions. First it draws on the interpretive strategies of various theorists – from Foucault to Derrida and others – to critique the assumptions of mainstream geopolitical analysis. Second it moves toward a reformulation of geopolitics in a form that is more conscious of how power operates in the theory and practice of world politics. In the first two parts of this chapter we have drawn on the first of those contributions for our critical reading of realist and liberal-republican astropolitics, albeit without our making explicit reference to specific social theorists. Thus, just as Mackinder’s geopolitics re-presented how the world operated in a way that could be understood and controlled by British imperialists, it can be argued, following Agnew’s, Ó Tuathail’s and Dalby’s lead, that the kinds of representations of space proffered by Dolman (as orbits, regions, and launching points of strategic value) make the exercise of control over space intelligible from an American imperialist perspective. The “astropolitical gaze” and its cartographic representations are mutually productive with the current U.S. policy of attempting to secure control over orbital space. As we saw, realist astropolitics celebrates the ways in which extending U.S. military hegemony into space could amplify America’s imperial power. Yet, Dolman’s realist astropolitik leaves under-theorized the normative implication of space-based imperialism. Instead, Dolman merely asserts that America would be a benevolent emperor without explaining what checks on U.S. power might exist to prevent it from using the “ultimate high ground” to dominate all the residents of the Earth. Conversely, Deudney focuses on the potential for inter-state collaboration to produce a federalrepublican global political order. However, Deudney leaves under-theorized the very real possibility that a unilateral entry into space by the U.S. could create an entirely new mode of protection and security. While our approach to critical astropolitics shares the political commitments and many of the theoretical foundations of critical geopolitical scholarship, our interest is more in the study of the constitutive as opposed to the representational consequences of astropolitics. Accordingly, in the remainder of this chapter we draw on the second contribution of critical geopolitics – the reformulation of geopolitical theory through concepts of critical theoretical analysis – to address the normative and theoretical absences we have identified in the realist and liberal astropolitical writings of Dolman and Deudney. First, we will draw on the critical theories of sovereignty offered in writings of Foucault, Agamben, and Hardt and Negri to theorize the form that the missing mode of protection/security from Deudney’s “historical security materialist” analysis – empire – would take. Second, we conclude by arguing that such a mode of protection/security would lack any effective counterbalances to its ability to project force, and as such it is unlikely that it would be the benevolent imperial power that Dolman claims it would be.

#### The impact is *unending war* and *environmental catastrophe*.

Craven 19 [Matt Craven (Professor of International Law, SOAS University of London, United Kingdom). “‘Other Spaces’: Constructing the Legal Architecture of a Cold War Commons and the Scientific-Technical Imaginary of Outer Space”. European Journal of International Law, Volume 30, Issue 2, May 2019, Pages 547–572, Accessed 1/12/22. <https://academic.oup.com/ejil/article/30/2/547/5536739> //Xu]

Even in the aftermath of the pronounced ‘closure’ of the Cold War, the residue of the formation that was brought into play in space remains very much with us today. On the one hand, outer space has been progressively enveloped within the technological infrastructure of warfare and policing actions – the first Gulf War of 1990 ushering in a new era of ‘smart’ weaponry and GPS-configured surgical violence139 – anticipating, in the process, the ‘remote’ operations of the drone and cyber warfare of the contemporary era. The blurring of the demarcation between the (outer space) technologies of war and peace finds its contemporary parallels in the collapse of a range of other operative distinctions – between the virtual and the real, the combatant and the civilian, the battlefield and the battle space, the interstate and the intra-state. The juridical formations on which these depend, furthermore, have themselves become enveloped within the same strategic operations – ‘lawfare’ becoming the adjunct to a new form of totalized warfare stripped of any spatial determinacy. On the other side, outer space has increasingly become the terrain of speculative capitalism, which, following the growth of space tourism (pioneered by the Russian space administration in the 1990s140), has seen the active development of a range of commercial projects from the construction of sub-orbital ‘space planes’ to asteroid and lunar mining undertaken by both public and private agencies. The imaginative resources for such projects have come from various directions, but a common theme is that impending resource depletion on earth will soon bring such resources within commercial and technological reach, and that outer space will therefore provide a ‘spatial fix’ for a system of global capitalism that might otherwise run into the ground.141 There is, as Katarina Damjanov has noted,142 a deep parallelism here between the juridical opening of the seas (mare liberum), which served to stabilize the system of sovereignty within Europe in the 17th century by extroverting the site of conflict and competition,143 and the opening of outer space three centuries later as another prophylactic measure, even if, in this case, that which was to be guarded against was a planetary-wide, environmental catastrophe. Perhaps the deepest irony, here, is that the mode of salvation on offer is precisely the same as that which is the extant cause of crisis, which one may take to be a remorseless instrumentalization of nature.

#### The alternative is *Worldism* – the refusal of international relations and specialization as dictated by militarism in favor of epistemological interventions into the exercise of Space as a carceral apparatus.

Agathangelou and Ling 09 Anna M. Agathangelou is an Associate Professor in the Departments of Political Science and Women’s Studies at York University, Canada and co-director of the Global Change Institute, Nicosia, Cyprus, L.H.M. Ling is an Associate Professor in the Graduate Program in Inter- national Affairs at The New School, New York, USA., Transforming World Politics: From empire to multiple worlds, The New International Relations Series, 2009.

MAIN ASPECTS Worldism presents world politics as a site of multiple worlds. These refer to the various and contending ways of being, knowing, and relating that have been passed onto us from previous generations. Histories, languages, myths, and memories institutionalize and embody multiple worlds through simple daily acts like cooking and eating, singing and dancing, joking and playing but also through larger events like trade, development, conflict, and war. Worldism registers not only the “difference” that comes from multiple worlds (see Inayatullah and Blaney 2004) but also their entwinements. Selves and others reverberate,2 producing multi- and trans-subjectivities that leave us legacies of reinforcement and conflict, reconstruction and critique, reconciliation and resistance. Such syncretic engagements belie seeming oppositions and contradictions among multiple worlds to reveal their underlying connections despite hegemony’s violent erasures. On this basis, communities have opportunities to heal and recuperate so they can build for another day, for another generation. Worldism as everyday life enacts self–other reverberations and syncretic engagements, especially by communities at the margins. Worldism as an analytical framework theorizes about them. Both types of worldist activity expose the problematic of empire in practice and logics. Building on the postcolonial notion that all parties make history, albeit with unequal access to power, worldism leads to an undeniable conclusion: our mutual embeddedness makes us mutually accountable. One cannot escape from the other. Mutual accountability brings with it duties and responsibilities, to be sure, but also possibilities: that is, (a) an internal dialectic of constant questioning to check and problematize hegemony, so that (b) we can expand our visions, strategies, and approaches beyond the narrow, hegemonic confines of realism/liberal internationalism, in order to (c) arrive at a more inclusive, conciliatory, and democratic world politics. In brief, worldism consists of two simultaneous processes: descriptive and analytical. Worldism-as-description features the following: (a) multi- and trans-subjectivities that institutionalize the social and structural reverberations between selves and others; (b) the agency of all parties, despite inequities and injustices, to create, build, and articulate multiple worlds; (c) syncretic engagements that consolidate the entwinements of multiple worlds into concrete strategies for change, adjustment, adaptation, refor- mulation, and transformation; and (d) community-building that integrates and accretes these syncretic engagements despite denials of such efforts from hegemonic elites and their ideologies. Worldism-as-analysis draws on the struggles and learning undertaken in worldist daily life to emphasize: (a) accountability as a hallmark of worldist inquiry that ensures (b) an internal criticality to question, contest, and challenge hegemony, so that we may (c) arrive at emancipatory construction even as we critique and resist. The critical reader may interject: Couldn’t “agency” and “accountabil- ity” in worldism be taken as a fancy way of blaming the victim? Are Jews, for example, responsible for the Holocaust; slaves for their enslavement; or any oppressed people for their oppression? Worldism as a politics of multiple relations subsumes this liberal, individualist understanding of responsibility. Multiple relations produce a web of effects and consequences to any kind of decisions and/or set of practices. Accountability in worldism asks: Who’s involved, under what conditions, and through which processes can we redress or transform the violence? What kinds of understanding are generated to account for these relations and/or to make them invisible? Without the painful concession that all of us, “abusers,” “victims,” and “innocent bystanders” alike, contribute to the production of hegemonic violence, whether it results in domestic abuse (see Adler and Ling 1995) or state violence (see Ling 1994), we may never realize how violence is conceived, generated, and sustained. By extension, we will never understand ways to end it. Instead, in our injuries and (self ) alienation, we may reproduce time and again the same conditions of violence or hegemony that afflicted us in the past and which seems the only option for the present. Suspended political ideals, in this case, could also block us from action and change. Worldist agency and accountability compel us to face the complicities (including our own) that sustain violence in the making of history, so that we may, as Marx exhorted, change it. Where do these ideas come from?, our reader may ask. Let us delineate the intellectual precedents to worldism. INTELLECTUAL PRECEDENTS Worldism draws on constructivism and postmodernism but also differs from them. Worldism shares with constructivism its emphasis on intersubject- ivity, and with postmodernism its insights on asymmetrical difference: that is, the norms, institutions, practices, and behaviors that set up certain subjects and subjectivities as more privileged and protected than others. Power, then, cannot be reduced to an objectified, reified condition of who’s “on top” or who “has more” but instead results from agents contributing to macro-political structures like ideology, organization, and capitalist relations. Power redefined in these terms stems from an intersubjective consensus within a context of material conditions and relations. The crux here lies in the framing. Since narration as a process is never complete, the story can always change.3 However, worldism departs from constructivism by asking: What kinds of intersubjectivity are constructed, by whom, and for what purpose, and how do theories of subjectivity restructure the world “otherwise”? And is this how we want the world to be? Not probing into the social relations of intersubjectivity, according to worldism, effectively erases the power politics of meaning, including the political economy behind such constructions. And unlike postmodernism, worldism distinguishes power from the resistance it induces. Contra Foucault (1994), we differentiate between the colonizer and colonized in their experiences of colonial power (see Stoler 2002) and the entwinements that follow, both reinforcing and conflicting complicity (see Ling 2002b). Not doing so implicitly reinforces the imperialist assertion that “this is the way the world is”: that is, it is not open to alternative concepts, discourses, strategies, or ways of being. These gaps in constructivism and postmodernism return us to the conventional treatment of power as domination, pure and simple. Ronen Palan (2000), for instance, finds a strain of conservative realism in Alexander Wendt’s “naturalist” version of constructivism, primarily because he claims to offer a method only, and not an interpretation, of politics. Wendt (2005) himself admits as much. For similar reasons, Samir Amin (2004) calls postmodernism an “ideological accessory” to elite, bourgeois interests just as Aijaz Ahmad (1992) considers post-structuralist theories serve as alibis for imperialism. Both post- modernism and poststructuralism value critique and deconstruction over political action, thereby keeping de facto power intact. We note that although critical theories like postmodernism and con- structivism open up spaces to think about shifting power politics, they fall short of transforming the very asymmetries they critique. Inattention to structural, material interest and lack of integrating the Other analytically – that is, as a substantive maker of the world – undermines their claims of emancipatory social theory. Ultimately, the Other becomes a repository of raw materials for hegemonic actors and sites in the North to process. Worldism acknowledges a deep intellectual debt to postcolonial studies. Here, race, gender, sexuality, class, and nationality serve as analytics and substance in examinations of power relations. Postcolonial studies demystify empire’s boast, like Kipling’s “White Man’s Burden,” that the imperial Self makes the world for all Others. And that world is unidimensional (top- down state power), unilateral (center dominates periphery), and unilinear (past–present–future). Postcolonial studies record a more nuanced and multiple history by problematizing the ways colonial power is imposed on the colonized. That is, colonization involves more than a unilateral and mechanical domination of the subjugated by colonizers and their states. As documented by postcolonial studies, tensions and contradictions emerge from these relations (Said 1979; Spivak 1999), leading to adaptations and integrations between hegemonic selves and subaltern others. From this inter- action, “colonizers” and “colonized” produced something together over the course of time that neither anticipated nor perhaps desired but which all learned to live with, and eventually called their own. Divides along lines of property, race, class, language, religion, and ideology did not disappear. They fused, rather, into hybrid, creole, or mélange cultures that, nonethe- less, contested these categories constantly (Ashcroft, Griffiths, and Tiffin 1995; Lewis and Mills 2003). In recognizing that colonizer and colonized mutually construct their sub- jectivities, postcolonial studies attribute to both the legacies of power that we face today. Note, for example, Britain’s principal instrument of colonial and imperial power: the East India Company. Sudipta Sen (1998) shows that, contrary to claims that the British brought capitalism to India, the East India Company had to adjust to pre-existing market structures and political relations to gain access to the thriving trade already in place in northern India.4 Only through this kind of entry could the East India Company later redirect the trade to its favor. L.H.M. Ling (2002b) traces how institutional elites in East Asia learned syncretically and “interstitially” between two world orders – the agrarian-based, cosmo-moral universe of Confucian governance and the Westphalian inter-state system of commerce and trade – to cumulate into what we know as Asian capitalism today. Walter Mignolo (2000) highlights the “gnosis” of thought and action, Self and Other, that comes from centuries of transgressing and reformulating the colonial boundaries that comprise Latin America. Of course, those subjected to hegemony must accommodate others more than those who perpetrate it. Yet hegemony’s very asymmetry highlights the resilience and creativity of the marginalized. Ordinary people can journey across subjectivities to engage syncretically with others, even under conditions of poverty and inequality, to rebuild, reconstruct, and reorganize communities. Cherrie Moraga and Gloria Anzaldua (1983) characterize their straddling of multiple worlds as life on the “borderlands.” Typically, they point out, women of color from the South must bear the biggest burden of negotiating the multiple worlds of language, culture, class, and gender to survive white- majority society in the North despite systemic discrimination and obstacles. Still, they are able to exercise internal reserves of freedom, thought, and action to sort through hegemony, not simply surrender to it. Similarly, the indigenous populations of the Americas, Australia, and New Zealand have entered into treaties with their white majorities to retain aspects of indigenous ontologies by formalizing them in Western institutions (Shilliam 2008).

#### Interp – the 1AC is an object of research - the role of the neg is to refuse that object - we should be able to negate the aff in its totality by testing their justifications because those are the reasons they staked out to vote aff.

#### 1] Whitewashing – militaristic discourse is a self-fulfilling prophecy, which proves reps are necessary and absent critique their epistemology should be assumed incorrect.

#### 2] Spillover – voting aff doesn’t pass the plan but the scholastic endeavors in are deployed in debate impact our subjectivity.

### 1NC – OFF

#### Text – Private Appropriation of Outer Space except for Space Elevators is Unjust.

#### Space Elevators constitute Appropriation – they impede orbits.

Matignon 19 Louis de Gouyon Matignon 3-3-2019 "LEGAL ASPECTS OF THE SPACE ELEVATOR TRANSPORTATION SYSTEM" <https://www.spacelegalissues.com/space-law-legal-aspects-of-the-space-elevator-transportation-system/> [PhD in space law (co-supervised by both Philippe Delebecque, from Université Paris 1 Panthéon-Sorbonne, France, and Christopher D. Johnson, from Georgetown University || regularly write articles on the website Space Legal Issues so as to popularise space law and public international law]//Elmer

An Earth-based space elevator would consist of a cable with one end attached to the surface near the equator and the other end in space beyond geostationary orbit. An orbit is the curved path through which objects in space move around a planet or a star. The 1967 Treaty’s regime and customary law enshrine the principle of non-appropriation and freedom of access to orbital positions. Space Law and International Telecommunication Laws combined to protect this use against any interference. The majority of space-launched objects are satellites that are launched in Earth’s orbit (a very small part of space objects – scientific objects for space exploration – are launched into outer space beyond terrestrial orbits). It is important to precise that an orbit does not exist: satellites describe orbits by obeying the general laws of universal attraction. Depending on the launching techniques and parameters, the orbital trajectory of a satellite may vary. Sun-synchronous satellites fly over a given location constantly at the same time in local civil time: they are used for remote sensing, meteorology or the study of the atmosphere. Geostationary satellites are placed in a very high orbit; they give an impression of immobility because they remain permanently at the same vertical point of a terrestrial point (they are mainly used for telecommunications and television broadcasting). A geocentric orbit or Earth orbit involves any object orbiting Planet Earth, such as the Moon or artificial satellites. Geocentric (having the Earth as its centre) orbits are organised as follow: 1) Low Earth orbit (LEO): geocentric orbits with altitudes (the height of an object above the average surface of the Earth’s oceans) from 100 to 2 000 kilometres. Satellites in LEO have a small momentary field of view, only able to observe and communicate with a fraction of the Earth at a time, meaning a network or constellation of satellites is required in order to provide continuous coverage. Satellites in lower regions of LEO also suffer from fast orbital decay (in orbital mechanics, decay is a gradual decrease of the distance between two orbiting bodies at their closest approach, the periapsis, over many orbital periods), requiring either periodic reboosting to maintain a stable orbit, or launching replacement satellites when old ones re-enter. 2) Medium Earth orbit (MEO), also known as an intermediate circular orbit: geocentric orbits ranging in altitude from 2 000 kilometres to just below geosynchronous orbit at 35 786 kilometres. The most common use for satellites in this region is for navigation, communication, and geodetic/space environment science. The most common altitude is approximately 20 000 kilometres which yields an orbital period of twelve hours. 3) Geosynchronous orbit (GSO) and geostationary orbit (GEO) are orbits around Earth at an altitude of 35 786 kilometres matching Earth’s sidereal rotation period. All geosynchronous and geostationary orbits have a semi-major axis of 42 164 kilometres. A geostationary orbit stays exactly above the equator, whereas a geosynchronous orbit may swing north and south to cover more of the Earth’s surface. Communications satellites and weather satellites are often placed in geostationary orbits, so that the satellite antennae (located on Earth) that communicate with them do not have to rotate to track them, but can be pointed permanently at the position in the sky where the satellites are located. 4) High Earth orbit: geocentric orbits above the altitude of 35 786 kilometres. The competing forces of gravity, which is stronger at the lower end, and the outward/upward centrifugal force, which is stronger at the upper end, would result in the cable being held up, under tension, and stationary over a single position on Earth. With the tether deployed, climbers could repeatedly climb the tether to space by mechanical means, releasing their cargo to orbit. Climbers could also descend the tether to return cargo to the surface from orbit.

#### Private Companies are pursuing Space Elevators.

Alfano 15 Andrea Alfano 8-18-2015 “All Of These Companies Are Working On A Space Elevator” <https://www.techtimes.com/articles/77612/20150818/companies-working-space-elevator.htm> (Writer at the Tech Times)//Elmer

Space elevators are solid proof that any mundane object sounds way cooler if you stick the word "space" in front of it. But there's much more than coolness at stake when building a space elevator – this technology has the potential to revolutionize space transportation, and the Canadian private space company Thoth Technology that was recently awarded a patent for its space elevator design isn't the only company in the game. One of the other major players is a U.S.-based company called LiftPort Group, founded by space entrepreneur Michael Laine in 2003. Its plan for a space elevator is vastly different from the one for which Thoth received a patent, however. Whereas Thoth's plans entail tethering a 12-mile-high inflatable space elevator to the Earth, LiftPort is shooting for the moon. Originally, LiftPort had planned to build an Earth elevator, too, but it abandoned the idea in 2007 in favor of building a lunar elevator. The basic design for a lunar elevator is an anchor in the moon that is attached to a cable that extends to a space station situated at a very special point. Known as a Lagrange Point, this is the gravitational tipping point between the Earth and the moon, where their gravitational pulls essentially cancel one another out. A robot could then travel up and down the tether, ferrying cargo between the moon and the station. Out farther in space, a counterweight would balance out the system. Both types of space elevator are intended to increase space access, but in very different ways. Thoth's Earth elevator aims to make launches easier by starting off 12 miles above the Earth's surface. LiftPort's space elevator aims to increase access to the moon in particular, because it is much easier to launch a rocket to the Lagrange Point and dock it at a space station than it is to get to the moon directly. There's a third major company based in Japan called Obayashi Corp. whose plans look like a hybrid of Thoth's and LiftPort's. Obayashi is not a space company, however – it's actually a construction company. Like Thoth, Obayashi plans to build an Earth elevator. But its Earth elevator would consist of a cable tethered to the blue planet, a robotic cargo-carrier, a space station, and a counterweight. It essentially looks like LiftPort's plans, but stuck to the Earth instead of to the moon.

#### They’re feasible.

Smith 17 Vincent Smith 6-21-2017 "3 Challenges for Engineering A Space Elevator" <https://www.engineering.com/story/3-challenges-for-engineering-a-space-elevator> (Engineer)//Elmer

There's a lot of junk orbiting Earth. Thousands of hours have been poured into previous NASA missions, ensuring the least possible contamination by even the tiniest motes of dust and dirt. The kinds of instrumentation that would monitor a space elevator would need to be similarly discerning. However, the fact that it would be a permanent fixture means that sooner or later, a space elevator would cross paths with meteors and even remnants of previous space missions left behind as space debris. The extreme of this phenomenon even has a name: Kessler Syndrome, where the density of low earth debris becomes so large that nothing can pass it safely into outer space. This cascading problem of space debris collisions was featured in the film Gravity. As Bullock and Clooney can tell you, this phenomenon could cause catastrophic damage to the overall structure (or knock it off balance, returning to our 'oscillation' concerns). Edwards recognized this, and devoted an entire section of his report to addressing it. According to the report, part of dealing with this obstacle is recognizing and tracking low-earth orbit objects large enough to do damage to the structure. According to Section 10.3 of the report, “A study was done at Johnson Space Center on the construction of a system that could track objects down to 1cm in size with 100m accuracy using effectively current technology. This is very close to the tracking network we would need for the space elevator.” For situations in which avoidance is not always possible (the amount of low-earth orbit debris increases significantly from altitudes of approximately 300 to 1,000 miles), Edwards posits that increasing the thickness of the cable will make it robust enough to withstand all but the largest of objects, which could be tracked and avoided ahead of time using the systems previously mentioned. Even for these exceptional pieces of debris, Edwards illustrates in a section simply labeled “Meteors” that only (i) direct impact by an object (ii) over 3cm in diameter, (iii) with enough force to stay on the initial plane of impact (as opposed to being deflected or redirected by contact with the elevator apparatus), would create the kind of catastrophic damage that we associate with a complete severing of the cable. Designing the cable with curvature and panels specifically for deflection has been proposed by both Edwards as well as several other survivability reports, including this one, put together for the 2010 International Space Elevator Consortium (ISEC). Definitive answers as to the effectiveness of these measures are hopefully forthcoming, but it's at least comforting to know that there are first, second, and third lines of defense prepared for just such occasions.

#### Regardless of completion, Elevators spur investment in Nanotechnology

Liam O’Brien 16. University of Wollongong. 07/2016. “Nanotechnology in Space.” Young Scientists Journal; Canterbury, no. 19, p. 22.

Nanotechnology is at the forefront of scientific development, continuing to astound and innovate. Likewise, the space industry is rapidly increasing in sophistication and competition, with companies such as SpaceX, Blue Origin and Virgin Galactic becoming increasingly prevalent in what could become a new commercial space race. The various space programs over the past 60 years have led to a multitude of beneficial impacts for everyday society. Nanotechnology, through research and development in space has the potential to do the same. Potential applications of nanotechnology in space are numerous, many of them have the potential to capture and inspire generations to come. One of these applications is the space elevator. By using carbon nanotubes, a super light yet strong material, this concept would be an actual physical structure from the surface of the Earth to an altitude of approximately 36 000 km. The tallest building in the world would fit into this elevator over 42 000 times. The counterweight, used to keep the elevator taught, is proposed to be an asteroid. This would need to be at a distance of 100 000 km, a quarter of the distance to the moon. The benefits of such a structure would be enormous. 95% of a space shuttle's weight at take-off is fuel, costing US$ 20 000 per kilogram to send something into space. However, with a space elevator the cost per kilogram can be reduced to as little as US$ 200. Exploration to other planets can begin at the tower, and travel to and from the moon could become as simple as a morning commute to work. Solar sails provide the means to travel large distances and incredible speeds. Much like sails on a boat use wind, the solar sail uses light as a source of propulsion. Ideally these sails would be kilometres in length and only a few micrometres in thickness. This provides us with the ability to travel at speeds previously unheard of. Using carbon nanotubes once again, a solar sail has the capability to travel at 39 756 km/s which is 13% of the speed of light! This sail could reach Pluto in an astonishing 1.7 days, and Alpha Centauri in just 32 years. Space travel to other planets, other stars, could be possible with solar sails. The Planetary Society is funding for a space sail of itself, and has successfully launched one into orbit. NASA has also sent a sail into orbit, allowing it to burn up in the atmosphere after 240 days. Investing time and resources into nanotechnology for space exploration has benefits for society today. Materials such as graphene are being used in modern manufacturing at an increasing rate as the applications become utilised. Carbon nanotubes will change the way we think about materials and their strength. These nanotubes have a tensile strength one hundred times that of steel, yet are only a sixth of the weight. Imagine light weight vehicles using less petrol and energy as well as being just as strong as regular vehicles. With potentials to revolutionize the way we think about space travel, nanotechnology has a bright future. As a new field of science, it has the capability to push the human race to the outer reaches of our galaxy and hopefully one day to other stars. It will inspire generations of explorers and dreamers to challenge themselves and advance the human race into the next era. As Richard Feynman said in his 1959 talk 'There's Plenty of Room at the Bottom' "A field in which little has been done, but in which an enormous amount can be done. There is still plenty more to achieve.

#### Nanomaterials solve Warming and Water Scarcity.

Khullar 17 Bhavya Khullar 9-4-2017 "Nanomaterials Could Combat Climate Change and Reduce Pollution" <https://www.scientificamerican.com/article/nanomaterials-could-combat-climate-change-and-reduce-pollution/> (Former Programme Officer with the Food Safety and Toxins Unit, Centre for Science and Environment (CSE))//Elmer

August 18, 2017 — The list of environmental problems that the world faces may be huge, but some strategies for solving them are remarkably small. First explored for applications in microscopy and computing, nanomaterials—materials made up of units that are each thousands of times smaller than the thickness of a human hair—are emerging as useful for tackling threats to our planet’s well-being. Scientists across the globe are developing nanomaterials that can efficiently use carbon dioxide from the air, capture toxic pollutants from water and degrade solid waste into useful products. “Nanomaterials could help us mitigate pollution. They are efficient catalysts and mostly recyclable. Now, they have to become economical for commercialization and better to replace present-day technologies completely,” says Arun Chattopadhyay, a member of the chemistry faculty at the Center for Nanotechnology, Indian Institute of Technology Guwahati. HARVESTING CO2 To help slow the climate-changing rise in atmospheric CO2levels, researchers have developed nanoCO2 harvesters that can suck atmospheric carbon dioxide and deploy it for industrial purposes. “Nanomaterials can convert carbon dioxide into useful products like alcohol. The materials could be simple chemical catalysts or photochemical in nature that work in the presence of sunlight,” says Chattopadhyay, who has been working with nanomaterials to tackle environmental pollutants for more than a decade. Many research groups are working to address a problem that, if solved, could be a holy grail in combating climate change: how to pull CO2 out of the atmosphere and convert it into useful products. Chattopadhyay isn’t alone. Many research groups are working to address a problem that, if solved, could be a holy grail in combating climate change: how to pull CO2 out of the atmosphere and convert it into useful products. Nanoparticles offer a promising approach to this because they have a large surface-area-to-volume ratio for interacting with CO2 and properties that allow them to facilitate the conversion of CO2into other things. The challenge is to make them economically viable. Researchers have tried everything from metallic to carbon-based nanoparticles to reduce the cost, but so far they haven’t become efficient enough for industrial-scale application. One of the most recent points of progress in this area is work by scientists at the CSIR-Indian Institute of Petroleum and the Lille University of Science and Technology in France. The researchers developed a nanoCO2 harvester that uses water and sunlight to convert atmospheric CO2 into methanol, which can be employed as an engine fuel, a solvent, an antifreeze agent and a diluent of ethanol. Made by wrapping a layer of modified graphene oxide around spheres of copper zinc oxide and magnetite, the material looks like a miniature golf ball, captures CO2 more efficiently than conventional catalysts and can be readily reused, according to Suman Jain, senior scientist of the Indian Institute of Petroleum, Dehradun in India, who developed the nanoCO2harvester. Jain says that the nanoCO2 harvester has a large molecular surface area and captures more CO2 than a conventional catalyst with similar surface area would, which makes the conversion more efficient. But due to their small size, the nanoparticles have a tendency to clump up, making them inactive with prolonged use. Jain adds that synthesizing useful nanoparticle-based materials is also challenging because it’s hard to make the particles a consistent size. Chattopadhyay says the efficiency of such materials can be improved further, providing hope for useful application in the future. CLEANSING WATER Most toxic dyes used in textile and leather industries can be captured with nanoparticles. “Water pollutants such as dyes from human-created waste like those from tanneries could get to natural sources of water like deep tube wells or groundwater if wastewater from these industries is left untreated,” says Chattopadhyay. “This problem is rather difficult to solve.” An international group of researchers led by professor Elzbieta Megiel of the University of Warsaw in Poland reports that nanomaterials have been widely studied for removing heavy metals and dyes from wastewater. According to the research team, adsorption processes using materials containing magnetic nanoparticles are highly effective and can be easily performed because such nanoparticles have a large number of sites on their surface that can capture pollutants and don’t readily degrade in water. Chattopadhyay adds that appropriately designed magnetic nanomaterials can be used to separate pollutants such as arsenic, lead, chromium and mercury from water. However, the nanotech-based approach has to be more efficient than conventional water purification technology to make it worthwhile. In addition to removing dyes and metals, nanomaterials can also be used to clean up oil spills. Researchers led by Pulickel Ajayan at Rice University in Houston, Texas, have developed a reusable nanosponge that can remove oil from contaminated seawater. The technology shows promise, but it’s not yet ready for prime time. “While the nanosponge is a good material to deal with oil spills, these results are confined to the laboratory,” says Ashok Ganguli, director of the Institute of Nano Science and Technology in Mohali, Punjab, India. “Large-scale synthesis is required if we have to remove oil from seawater which is spread over several miles.” Although scientists have yet to successfully synthesize nanomaterials for cleaning oil spills at a scale large enough for practical application, “this may become possible with more research and industry partnerships,” Chattopadhyay says.

#### 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.

#### Space Elevators solve Space Debris – reduces Rocket Launches

Forgan 19, Duncan H. Solving Fermi's Paradox. Vol. 10. Cambridge University Press, 2019. (Associate Lecturer at the Centre for Exoplanet Science at the University of St Andrews, Scotland, founding member of the UK Search for Extra-terrestrial Intelligence (SETI) research network and leads UK research efforts into the search)//Elmer

All objects in HEO reside beyond the geostationary orbit (GEO). The orbital period at GEO (w'hich is aligned with the Earth's equator) is equal to the Earth’s rotational period. As a result, from a ground observer’s perspective the satellite resides at a fixed point in the sky, with clear advantages for uses such as global communication. Activities at HEO are considerably less than at LEO and MEO. Earth's orbital environment does contain a natural component - the meteoroids. These pose little to no threat to space operations - the true threat is self-derived. The current limitations of spacefaring technology ensure that every launch is accompanied by substantial amounts of space debris. This debris ranges in size from dust grains to paint flecks to large derelict spacecraft and satellites. According to NASA’s Orbital Debris Program Office, some 21.000 objects greater than 10 cm in size are currently being tracked in LEO. with the population below 10 cm substantially higher. Most debris produced at launch tends to be deposited with no supplemental velocity - hence these objects tend to follow the initial launch trajectory, which often orbits with high eccentricity and inclination. However, these orbits do intersect with the orbits of Earth’s artificial satellite population, resulting in impacts w'hich tend to produce further debris. The vast majority of the low-size debris population is so-called fragmentation debris. This is produced during spacecraft deterioration, and in the most abun- dance during spacecraft break-up and impacts. The first satellite-satellite collision occurred in 1961. resulting in a 400% increase in fragmentation debris (Johnson et al.. 2008). Most notably, a substantial source of fragmentation debris was the deliberate destruction of the Fengyun 1C satellite by the People’s Republic of China, which created approximately 2.000 debris fragments. As with collisions of ‘natural debris’, debris-debris collisions tend to result in an increased count of debris fragments. Since the late 1970s, it has been understood that man-made debris could pose an existential risk to space operations. Kessler and Cour-Palais (1978) worked from the then-population of satellites to extrapolate the debris production rate over the next 30 years. Impact rates on spacecraft at any location. /, can be calculated if one knows the local density of debris p, the mean relative velocity vrei\* and the cross-sectional area ct: [[EQUATION 13.5 OMITTED]] Each impact increases p without substantially altering vrel or o. We should there- fore expect the impact rate (and hence the density of objects) to continue growing at an exponential rate: [[EQUATION 13.6 OMITTED]] Kessler and Cour-Palais (1978) predicted that by the year 2000, p would have increased beyond the critical value for generating a collisional cascade. As new collisions occur, these begin to increase ^jjp, which in turn increases resulting in a rapid positive feedback, with p and I reaching such large values that LEO is rendered completely unnavigable. This has not come to pass - LEO remains navigable, partially due to a slight overprediction of debris produced by individual launches. The spectre of a collisional cascade (often referred to as Kessler syndrome) still looms over human space exploration, as debris counts continue to rise. Without a corresponding dedicated effort to reduce these counts, either through mitigating strategies to reduce the production of debris during launches, or through removal of debris fragments from LEO. we cannot guarantee the protection of the current flotilla of satellites, leaving our highly satellite-dependent society at deep risk. What strategies can be deployed to remove space debris? Almost all debris removal techniques rely on using the Earth’s atmosphere as a waste disposal sys- tem. Most debris is sufficiently small that atmospheric entry would result in its complete destruction, with no appreciable polluting effects. Atmospheric entry requires the debris fragments to be decelerated so that their orbits begin to intersect with lower atmospheric altitudes. Once a critical altitude is reached, atmospheric drag is sufficiently strong that the debris undergoes runaway deceleration and ultimately destruction. There are multiple proposed techniques for decelerating debris. Some mechani- cal methods include capturing the debris using either a net or harpoon, and applying a modest level of reverse thrust. These are most effective for larger fragments, and especially intact satellites (Forshaw et al., 2015). Attaching sails to the debris is also a possibility if the orbit is sufficiently low for weak atmospheric drag. The Japanese space agency JAXA’s Kounotori Integrated Tether Experiment (KITE) will trail a long conductive cable. As a current is passed through the cable, and the cable traverses the Earth’s magnetic field, the cable experiences a magnetic drag force that will de-orbit the spacecraft. Orbiting and ground-based lasers can decelerate the debris through a variety of means. For small debris fragments, the radiation pressure produced by the laser can provide drag. A more powerful laser can act on larger debris fragments through ablation. As the laser ablates the debris, the resulting recoil generated by the escaping material produces drag and encourages de-orbit. A more lateral solution is to ensure that launches and general space-based activity no longer generate debris. These approaches advocate lower-energy launch mechanisms that do not rely on powerful combustion. The most famous is the space elevator (see Aravind. 2007). Originally conceived by Tsiolkovsky, the ele- vator consists of an extremely durable cable extended from a point near the Earth’s equator, up to an anchor point located at GEO (most conceptions of the anchor point envision an asteroid parked in GEO). ‘Climber’ cars can then be attached to the cable and lifted to LEO, MEO and even GEO by a variety of propulsion methods. Most notably, the cars can be driven to GEO without the need for chemical rockets or nuclear explosions - indeed, a great deal of energy can be saved by having coupled cars, one ascending and one descending. Space elevators would solve a great number of problems relating to entering (and leaving) Earth orbit, substantially reducing the cost of delivering payload out of the Earth's atmosphere. The technical challenges involved in deploying a cable tens of thousands of kilometres long are enormous, not to mention the material science required to produce a cable of sufficient tensile strength and flexibility in the first place. The gravitational force (and centrifugal force) felt by the cable will vary significantly along its length. As cars climb the cable, the Coriolis force will move the car (and cable) horizontally also, providing further strain on the cable material. The relatively slow traversal of the biologically hazardous Van Allen Belt on the route to GEO is also a potential concern for crewed space travel. Whatever the means, a spacefaring civilisation (or at least, a civilisation that utilises its local orbital environment as we do) must develop a non-polluting solution to space travel, whether that is via the construction of a space elevator, a maglev launch loop, rail gun, or some other form of non-rocket acceleration. If it cannot perform pollution-free spacecraft launches (or fully clean up its pollution), then it will eventually succumb to Kessler syndrome, with potentially drastic consequences for future space use, with likely civilisation-ending effects (Solution C.13).

## ON

### Util

#### 1] Actor-spec is incoherent – states isn’t in the resolution NOR the plan-text but it proves the deeper relationship of the psychic investment of deferral to governments as they still rely on it even when its irrelevant

#### 2] “Death as Evil” framing is an investment in the reproductive object that makes macro-level violence inevitable is contructed through a violent relationship with the ideal child.

Baedan 12 (baedan is a journal composed by a collective of anonymous queer negativists, Summer 2012, “Baedan 1: Journal of Queer Nihilism,” pp 17-9) gz

It should be obvious through Edelman’s treatment of the relationship of politics to the Child that the cathexis which captures all political ambition is a drive toward the future. The social order must concern itself with the future so as to create the forward-moving infrastructure and discourse to proliferate itself. Edelman’s name for this insistence on the Child as the future is reproductive futurism. Reproductive futurism is the ideology which demands that all social relationships and communal life be structured in order to allow for the possibility of the future through the reproduction of the Child, and thus the reproduction of society. The ideology of reproductive futurism ensures the sacrifice of all vital energy for the pure abstraction of the idealized continuation of society. Edelman argues that “futurity amounts to a struggle for Life at the expense of life; for the Children at the expense of the lived experiences of actual children.” If queerness is a refusal of the symbolic value of the Child as the horizon of the future, queerness must figure as being against the future itself. To be specific, our queer project must also pose itself as the denial of the future of civilization. Edelman argues that “the queer comes to figure the bar to every realization of futurity, the resistance, internal to the social, to every social structure or form.” He locates this queer anti-futurity as being the primary fantastic justification for anti-queer violence: “If there is no baby and, in consequence, no future, then the blame must fall on the fatal lure of sterile, narcissistic enjoyments understood as inherently destructive of meaning and therefore as responsible for the undoing of social organization, collective reality, and, inevitably, life itself.” He invokes the anti-queer interpretations of the Biblical destruction of Sodom to describe the ways in which the collective imaginary is still haunted by the notion that a proliferation of queerness can only result in a persistent threat of societal apocalypse. Thus in the name of the Child and the future it represents, any repression, sexual or otherwise, can be justified. The Child, immured in an innocence seen as continuously under siege, condenses a fantasy of vulnerability to the queerness of queer sexualities precisely insofar as that Child enshrines, in its form as sublimation, the very value for which queerness regularly find itself condemned: an insistence on sameness that intends to restore an Imaginary past. The Child, that is, marks the fetishistic fixation of heteronormativity: an erotically charged investment in the rigid sameness of identity that is central to the compulsory narrative of reproductive futurism. And so, as the radical right maintains, the battle against queers is a life-and-death struggle for the future of a Child whose ruin is pursued by queers. Indeed, as the Army of God made clear in the bomb-making guide it produces for the assistance of its militantly “pro-life” members, its purpose was wholly congruent with the logic of reproductive futurism: to “disrupt and ultimately destroy Satan’s power to kill our children, God’s children.” Edelman goes on to cite the ways in which reproductive futurism is intrinsic to white supremacist ideology and white nationalism; bound as the Child is to notions of race and nation: Let me end with a reference to the “fourteen words,” attributed to David Lane, by which members of various white separatist organizations throughout the United States affirm their collective commitment to the cause of racial hatred: “we must secure the existence of our people and a future for white children.” So long as “white” is the only word that makes this credo appalling, so long as the figural children continue to “secure our existence” through the fantasy that we survive in them, so long as the queer refutes that fantasy, effecting its derealization as surely an encounter with the Real, for just so long must [queerness] have a future after all. To bolster his argument about the repressive nature of reproductive futurism, Edelman cites Walter Benjamin in describing the way in which the fantasy of the future was intrinsic to the spread of fascism in Europe. Edelman, via Benjamin, describes “the fascism of the baby’s face,” a phrase meant to illustrate the absolute power afforded to the ideology of reproductive futurism. This fascism of the baby’s face serves to reify difference and thus to secure the reproduction of the existent social order in the form of the future. No atrocity is out of the question if it is for the Child; no horrible project of industry should precluded if it will serve to hasten the future of industrial civilization. Armies of men, imperial and revolutionary alike, have always lined up to the slaughter in the name of the Child. But we needn’t look any further than today’s headlines to see the symbolic power the Child’s face deploys in the service of the social order. This year, the nation has been captivated by two horrific examples of the death-regime of white supremacy in the United States. Trayvon Martin in Sanford, Florida and Bo Morrison in Slinger, Wisconsin: two black youth murdered at the hands of racist vigilantes. While the systematic murder and imprisonment of black people is so commonplace that it cannot make headlines, these stories have swept the nation particularly because of the way they intersect with the narratives of innocence and childhood. Specifically in the case of Trayvon Martin, whose future was taken from him at the age of seventeen, a debate is raging centered around his character and his innocence with regard to his symbolic place as the Child. One side of this debate circulates a “angelic” picture of his face to assure society of his child-like nature. The other side circulates a doctored picture of him wearing a grill as a kind of racialized testament to his adultness. Each side feverishly examines the ‘evidence’ to argue whether or not he had attacked his murderer before he died. What’s at stake in this debate is Trayvon’s symbolic position as the Child: if he represents the Child, his murder is the atrocious destruction of his future (and by extensions everyone’s). If he is not the Child, then his killer acted out of the need to protect the future of his own community (and the children within it) from a perceived (even if falsely) threat. While politicians as high-ranking as the President invest Trayvon with the burden of carrying the futurity of their own children, others continue to assert their second amendment right to own weapons so they may protect theirs. Bo Morrison was also murdered by a racist homeowner, and his killer continues on with impunity because he can claim that he needed to eliminate any threat to his children. Young black men who figured, like the queer, as threats to the family were destroyed in the Child’s name. In each instance, the entire discourse is centered on the Child while entirely obscuring the reality of the actual young individuals executed in the Child’s name. Pundits articulate the measures that could be taken by parents and the state to restore the promise of the future: a ban on guns, more responsible gun ownership, the removal of ‘hoodies’ from children’s wardrobes, neighborhood watch, more policing, “justice.” These horrific killings demonstrate that there truly is no future. It is this truth which young people everywhere are awakening to. They are swarming the streets en masse, hoods up, to outrun the police and snare the flows of the cities. They are walking out of school — that banal prison of futurity — in order to loot stores and be with their friends. They are preparing and coordinating, so that the next time one of them is burned at the stake for the sake of the Future, they’ll make the city burn in kind. The fires of Greece, London and Bahrain hint toward the consequences of such an awakening.

#### 3] Slow violence first

#### A] - Timeframe - debate isn’t politics but discursive practices immediately shape political subjectivities and social truths - even if they win a link to the world out there the in round impact of racialization outweighs the impact of discussions about their outcomes - which means their justifications should be apriori rejected because it’s the only impact the ballot can overcome

#### B] - Magnitude - The normalization of the murder of the periphery through preemptive violence justifies ANY atrocity and endless racialized and gendered violence through the militarization of peace seen with the non-wars of Libya, Syria, the Israeli brutalization of Palestinian and mass upswings in fascist ideology - that outweighs because overtime it stacks up to more bodies then a one-off extinction event

### Solvency

#### Circumvention

### Space War

#### AT CSIS – No Internal Link – it’s limited to space – zero risk of spill-over into broader cooperation – proven by Putin-Biden tensions across the board in the Ukraine – why does Biden cooperating w/ Russia over one issue solve every issue.

#### AT Arbatov – No Reverse U/Q for Coop driving Arms Control now – means Miscalc is inevitable since the card assumes existing cooperation.

#### Space coop doesn’t reverse causally solve relations – specifically US and Russia

Knipfer, 17 - BA in Polisci & IR from McDaniel College with a specialized focus on outer space history, affairs, and policy; pursuing Masters studies in Space Policy at George Washington University’s Space Policy Institute Cody Knipfer, “International Cooperation and Competition in Space” http://www.reallycoolblog.com/international-cooperation-and-competition-in-space/

It need be remembered that while space cooperation may serve as diplomatic signaling and as “grease on the wheels” for a country seeking to achieve its foreign policy aims, it is more often an effect of developments in international relations than a direct cause. While the Apollo-Soyuz Test Project was a marker and symbol of détente between the United States and Soviet Union, for example, it was not the catalyst nor the primary driver. Likewise, American cooperation with – and indeed current reliance on, for crew transportation – Russia in the International Space Station did not prevent nor has stymied the reemergence and growth of tensions between the two countries. Nonetheless, when coupled with an active diplomatic strategy on Earth, space cooperation can serve to strengthen a country’s foreign policy pursuits. And, by process of establishing diplomatic channels and acclimating leaders to partners’ decision-making processes, institutional cultures, and standard operating procedures, it enables future cooperation between countries in space and on Earth – and, critically, builds trust.

#### Russia already has its plan in place to invade Ukraine – uq definitively overwhelms

CNN 2/17 (2-17-21 at 9:20PM Pacific, Jeremy Herb, Veronica Stracqualursi, Kylie Atwood and Ellie Kaufman US says Russia plans to manufacture justification for war, <https://www.cnn.com/2022/02/17/politics/us-russia-ukraine-thursday/index.html)-TL>

US Secretary of State Antony Blinken said Russia was laying the groundwork to justify starting a war and preparing to launch an attack on Ukraine in the coming days, urging Moscow to change course at a tense United Nations Security Council meeting Thursday. Blinken changed his travel plans so he could speak Thursday's UN meeting, where the top US diplomat said he was detailing US intelligence about Russia's attempts to fabricate a pretext for an invasion in an attempt to "influence Russia to abandon the path of war and choose a different path while there's still time." "I am here today not to start a war, but to prevent one," Blinken said. The United States says evidence at Ukraine's border shows that Russia is "moving towards an imminent invasion" and is not withdrawing troops, despite Moscow's claims. The comments from Blinken and other top US officials Thursday -- including President Joe Biden's blunt warning that he believed an attack would happen "within the next several days" -- marked an even greater sense of urgency from the Biden administration that Russia's actions indicated the Kremlin was moving forward with plans for war. "Every indication that we have is that they are prepared to go into Ukraine, attack Ukraine," Biden told reporters as he left the White House on Thursday. Russia once again dismissed the notion it was preparing to attack Ukraine as "baseless accusations." In his address to the Security Council, Blinken laid out several steps the US expected Russia to take in the coming days in an attempt to justify military action in Ukraine. He said Moscow was likely to try to generate a pretext for the war, which could be a fabricated terrorist bombing inside Russia, the invented discovery of a mass grave or a staged drone strike. "Russia may describe this event as ethnic cleansing or a genocide, making a mockery of a concept that we in this chamber do not take lightly," Blinken said.

### Debris

#### Squo debris thumps

**Wall 21** [Mike Wall, Michael Wall is a Senior Space Writer with [Space.com](http://space.com/) and joined the team in 2010. He primarily covers exoplanets, spaceflight and military space. He has a Ph.D. in evolutionary biology from the University of Sydney, Australia, a bachelor's degree from the University of Arizona, and a graduate certificate in science writing from the University of California, Santa Cruz. 11/15/21, "Kessler Syndrome and the space debris problem," Space, [https://www.space.com/kessler-syndrome-space-debris accessed 12/10/21](https://www.space.com/kessler-syndrome-space-debris%20accessed%2012/10/21)] Adam

Earth orbit is getting more and more crowded as the years go by. Humanity has launched about 12,170 satellites since the dawn of the space age in 1957, [according to the European Space Agency](https://www.esa.int/Safety_Security/Space_Debris/Space_debris_by_the_numbers) (ESA), and 7,630 of them remain in orbit today — but only about 4,700 are still operational. That means there are nearly 3,000 defunct spacecraft zooming around Earth at tremendous speeds, along with other big, dangerous pieces of debris like upper-stage rocket bodies. For example, orbital velocity at 250 miles (400 kilometers) up, the altitude at which the ISS flies, is about 17,100 mph (27,500 kph). At such speeds, even a tiny shard of debris can do serious damage to a spacecraft — and there are huge numbers of such fragmentary bullets zipping around our planet. ESA estimates that Earth orbit harbors at least 36,500 debris objects that are more than 4 inches (10 centimeters) wide, 1 million between 0.4 inches and 4 inches (1 to 10 cm) across, and a staggering 330 million that are smaller than 0.4 inches (1 cm) but bigger than 0.04 inches (1 millimeter). These objects pose more than just a hypothetical threat. From 1999 to May 2021, for example, the ISS conducted 29 debris-avoiding maneuvers, including three in 2020 alone, [according to NASA officials](https://www.nasa.gov/mission_pages/station/news/orbital_debris.html). And that number continues to grow; the station performed [another such move in November 2021](https://www.space.com/space-station-dodging-chinese-space-junk-spacex-crew-3), for example. Many of the smaller pieces of space junk were spawned by the explosion of spent rocket bodies in orbit, but others were more actively emplaced. In January 2007, for instance, China intentionally destroyed one of its defunct weather satellites in a much-criticized test of anti-satellite technology that generated [more than 3,000 tracked debris objects](https://swfound.org/media/9550/chinese_asat_fact_sheet_updated_2012.pdf) and perhaps 32,000 others too small to be detected. The vast majority of that junk remains in orbit today, experts say. Spacecraft have also collided with each other on orbit. The most famous such incident occurred in February 2009, when Russia's defunct Kosmos 2251 satellite slammed into the operational communications craft Iridium 33, producing [nearly 2,000 pieces of debris](https://swfound.org/media/6575/swf_iridium_cosmos_collision_fact_sheet_updated_2012.pdf) bigger than a softball. That 2009 smashup might be evidence that the Kessler Syndrome is already upon us, though a cataclysm of "Gravity" proportions is still a long way off. "The cascade process can be more accurately thought of as continuous and as already started, where each collision or explosion in orbit slowly results in an increase in the frequency of future collisions," [Kessler told Space Safety Magazine in 2012](http://www.spacesafetymagazine.com/space-debris/kessler-syndrome/don-kessler-envisat-kessler-syndrome/).

#### Collision risk is very small

Fange 17 Daniel Von Fange 17, Web Application Engineer, Founder and Owner of LeanCoder, Full Stack, Polyglot Web Developer, “Kessler Syndrome is Over Hyped”, 5/21/2017, http://braino.org/essays/kessler\_syndrome\_is\_over\_hyped/

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.

#### No ozone impact

AFP 13 5-13-2013 "Space Tourism Won't Hurt Environment: Branson" <https://www.industryweek.com/the-economy/environment/article/21960227/space-tourism-wont-hurt-environment-branson> (Agence France-Presse)//Elmer

SINGAPORE - British billionaire Richard Branson said Monday that rocket-powered space tourism flights by his firm Virgin Galactic would have only a minor impact on climate change. More than 500 people have already reserved seats -- and paid deposits on the $200,000 ticket price -- for a minutes-long suborbital flight on the SpaceShipTwo (SS2) set to begin by the end of this year. "We have reduced the (carbon emission) cost of somebody going into space from something like two weeks of New York's electricity supply... to less than the cost of an economy round-trip from Singapore to London," Branson told reporters in Singapore. See Also: 'Experience of a Lifetime': Billionaire Branson Achieves Space Dream The founder of the diversified Virgin group was in the Southeast Asian city-state to attend a summit organized by the Carbon War Room, an environmental charity organization he founded in 2009. "New technology can dramatically reduce the carbon output and that is the challenge we have set ourselves," added Branson. The SS2's lightweight carbon-fiber body will also "reduce fuel burn dramatically," he said. The SS2, with two pilots, is designed to be launched by a transport plane called White KnightTwo and will be guided by a rocket motor before gliding back to Earth. Branson, whose Virgin group includes airlines Virgin Atlantic and Virgin Australia, said the aviation industry could do more to cut its carbon output and shift to cleaner fuels. Rising carbon emissions caused by industry, transport and deforestation have been blamed for global warming. "If you have clean fuels, you got a competitor to the dirty fuels and you could hopefully reduce the cost of the fuel, which means you can reduce the price of the ticket," he said. Branson's Virgin Group and Virgin Green Fund last October announced plans to form a $200 million emerging markets fund with Russia's Rosnano Capital to invest in innovations and green technologies. The Carbon War Room, which he founded with other global entrepreneurs, aims to empower industries to find market-based incentives to reduce carbon emissions.

#### No tourism pollution

NSS 21 7-23-2021 "Why Space Tourism?" <https://space.nss.org/why-space-tourism/> (National Space Society)//Elmer

Space Tourism Will Not Be a Pollution Disaster It is possible to accept all the benefits above, and still express concern about the potential that a really successful space tourism industry will pollute the air and contribute to global warming. Fortunately, Blue Origin’s New Shepard produces only water as an exhaust, so neither is going to be an issue even if there are 1,000s of flights per year. Some have claimed that space tourism will be more polluting per passenger mile since there are fewer passengers per vehicle at the current time, but (a) New Shepard has zero carbon/zero pollution, and (b) over time space tourism vehicles will grow in capacity, just like airliners did. The Virgin Galactic engine is more problematic, but will most likely be replaced by a more sustainable engine before flight volumes become large. Some might be more worried about SpaceX’s StarShip/SuperHeavy driving global warming when used for point-to-point travel on the Earth, and for space tourism. Elon Musk has declared his intention to produce the methane fuel it uses directly from the atmosphere using solar power, assuring that the fuel cycle is carbon-neutral. In terms of air pollution, StarShip in a point-to-point mode will to a large degree replace airplanes currently flying while using cleaner burning methane, potentially resulting in less pollution than is the case currently. In any case, trips to space will likely always remain a minor part of point-to-point travel on the Earth. Currently, in the U.S. alone, there are about 5,700 passenger flights PER DAY. Even if we are simultaneously supporting dozens of orbital hotels, building a city on Mars, and constructing a network of space solar power satellites, we will be hard pressed to generate more than a tiny fraction of that traffic level.