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#### 40] Security is a psychological construct- the aff’s scenarios for conflict are products of paranoia that project our violent impulses onto the other. Claims of war and conflict create a false dichotomy between the good us and the evil them, ignoring our role in provoking the aggression.

Mack, MD @ Harvard, 91

(John, former Professor of Psychology at Harvard and Pulitzer Prize Winner, <http://johnemackinstitute.org/1988/08/the-enemy-system-short-version/>) BW

The threat of nuclear annihilation has stimulated us to try to understand what it is about mankind that has led to such self-destroying behavior. Central to this inquiry is an exploration of the adversarial relationships between ethnic or national groups. It is out of such enmities that war, including nuclear war should it occur, has always arisen. Enmity between groups of people stems from the interaction of psychological, economic, and cultural elements. These include fear and hostility (which are often closely related), competition over perceived scarce resources,[3] the need for individuals to identify with a large group or cause,[4] a tendency to disclaim and assign elsewhere responsibility for unwelcome impulses and intentions, and a peculiar susceptibility to emotional manipulation by leaders who play upon our more savage inclinations in the name of national security or the national interest. A full understanding of the “enemy system”[3] requires insights from many specialities, including psychology, anthropology, history, political science, and the humanities. In their statement on violence[5] twenty social and behavioral scientists, who met in Seville, Spain, to examine the roots of war, declared that there was no scientific basis for regarding man as an innately aggressive animal, inevitably committed to war. The Seville statement implies that we have real choices. It also points to a hopeful paradox of the nuclear age: threat of nuclear war may have provoked our capacity for fear-driven polarization but at the same time it has inspired unprecedented efforts towards cooperation and settlement of differences without violence. The Real and the Created Enemy Attempts to explore the psychological roots of enmity are frequently met with responses on the following lines: “I can accept psychological explanations of things, but my enemy is real. The Russians [or Germans, Arabs, Israelis, Americans] are armed, threaten us, and intend us harm. Furthermore, there are real differences between us and our national interests, such as competition over oil, land, or other scarce resources, and genuine conflicts of values between our two nations. It is essential that we be strong and maintain a balance or superiority of military and political power, lest the other side take advantage of our weakness”. This argument does not address the distinction between the enemy threat and one’s own contribution to that threat-by distortions of perception, provocative words, and actions. In short, the enemy is real, but we have not learned to understand how we have created that enemy, or how the threatening image we hold of the enemy relates to its actual intentions. “We never see our enemy’s motives and we never labor to assess his will, with anything approaching objectivity”.[6] Individuals may have little to do with the choice of national enemies. Most Americans, for example, know only what has been reported in the mass media about the Soviet Union. We are largely unaware of the forces that operate within our institutions, affecting the thinking of our leaders and ourselves, and which determine how the Soviet Union will be represented to us. Ill-will and a desire for revenge are transmitted from one generation to another, and we are not taught to think critically about how our assigned enemies are selected for us. In the relations between potential adversarial nations there will have been, inevitably, real grievances that are grounds for enmity. But the attitude of one people towards another is usually determined by leaders who manipulate the minds of citizens for domestic political reasons which are generally unknown to the public. As Israeli sociologist Alouph Haveran has said, in times of conflict between nations historical accuracy is the first victim.[8] The Image of the Enemy and How We Sustain It Vietnam veteran William Broyles wrote: “War begins in the mind, with the idea of the enemy.”[9] But to sustain that idea in war and peacetime a nation’s leaders must maintain public support for the massive expenditures that are required. Studies of enmity have revealed susceptibilities, though not necessarily recognized as such by the governing elites that provide raw material upon which the leaders may draw to sustain the image of an enemy.[7,10] Freud[11] in his examination of mass psychology identified the proclivity of individuals to surrender personal responsibility to the leaders of large groups. This surrender takes place in both totalitarian and democratic societies, and without coercion. Leaders can therefore designate outside enemies and take actions against them with little opposition. Much further research is needed to understand the psychological mechanisms that impel individuals to kill or allow killing in their name, often with little questioning of the morality or consequences of such actions. Philosopher and psychologist Sam Keen asks why it is that in virtually every war “The enemy is seen as less than human? He’s faceless. He’s an animal”.” Keen tries to answer his question: “The image of the enemy is not only the soldier’s most powerful weapon; it is society’s most powerful weapon. It enables people en masse to participate in acts of violence they would never consider doing as individuals”.[12] National leaders become skilled in presenting the adversary in dehumanized images. The mass media, taking their cues from the leadership, contribute powerfully to the process. The image of the enemy as less than human may be hard to dislodge. For example, a teacher in the Boston area reported that during a high school class on the Soviet Union a student protested: “You’re trying to get us to see them as people”. Stephen Cohen and other Soviet experts have noted how difficult it is to change the American perception of the Soviet Union, despite the vast amount of new information contradicting old stereotypes.” Bernard Shaw in his preface to Heartbreak House, written at the end of World War I, observed ironically: “Truth telling is not compatible with the defense of the realm”. Nations are usually created out of the violent defeat of the former inhabitants of a piece of land or of outside enemies, and national leaders become adept at keeping their people’s attention focused on the threat of an outside enemy.[14] Leaders also provide what psychiatrist Vamik Volkan called “suitable targets of externalization”[10] – i.e., outside enemies upon whom both leaders and citizens can relieve their burdens of private defeat, personal hurt, and humiliation.[15] All-embracing ideas, such as political ideologies and fixed religious beliefs act as psychological or cultural amplifiers. Such ideologies can embrace whole economic systems, such as socialism or capitalism, or draw on beliefs that imply that a collectivity owes its existence to some higher power in the universe. It was not Stalin as an individual whom Nadezhda Mandelstam blamed for the political murder of her poet husband Osip and millions of other citizens but the “craving for an all-embracing idea which would explain everything in the world and bring about universal harmony at one go”.[16] Every nation, no matter how bloody and cruel its beginnings, sees its origins in a glorious era of heroes who vanquished less worthy foes. One’s own race, people, country, or political system is felt to be superior to the adversary’s, blessed by a less worthy god. The nuclear age has spawned a new kind of myth. This is best exemplified by the United States’ strategic defense initiative. This celestial fantasy offers protection from attack by nuclear warheads, faith here being invested not in a god but in an anti-nuclear technology of lasers, satellites, mirrors, and so on in the heavens.

#### 45] Their scripts of escalation and threat in space are dangerous and ensures securitization to continue American space dominance – Advantage 3 is just a bunch of war hawks complaining about their precious early warning sats might get hit

Peoples 11

Peoples, Columba (PhD international politics & Critical Security Expert), 2011, “The Securitization of Outer Space: Challenges for Arms Control” Contemporary Security Policy, 32(1), 76–98. doi:10.1080/13523260.2011.5568 // HW AW

It is worth noting that the securitization of outer space – in terms of the identification of space with security – is, in itself, not a novel phenomenon or development. The extent to which **ostensibly civil uses of outer space have been linked implicitly and explicitly to national security** functions historically – or, as in the case of the space race between the United States and Soviet Union, have **acted as a surrogate for direct military engagement** – is well documented.50 Similarly, the characterization of the Sputnik launch in 1957 as placing the United States ‘in the greatest danger in its history’ suggests that the representation of space technologies as potential existential threats is not entirely new either.51 What is of significance, though, is the intensification, expansion and entrenchment of securitizing moves as features of national space policies. The Space Security Index report Space Security 2009, in its overview of national policies, explicitly noted that, on the one hand, ‘National space policies consistently emphasize international cooperation and the peaceful uses of outer space’, but on the other hand that there is a ‘Growing focus within national policies on the security uses of outer space’.52 The report cited as evidence: THE SECURITIZATION OF OUTER SPACE 83 Downloaded by [University of Tennessee, Knoxville] at 06:10 01 January 2015 Japan’s 2008 space law framework, which lifted its previous ban on national security and military space activities; China’s 2006 National Defense White Paper, which identifies national security as principle of China’s emerging space programme; France’s White Paper on Defense and National Security, which calls for an overhaul of its national space strategy; and the renewed priority on ‘space for security’ within EU policy.53 Within recent **United States space policy securitization has been most noticeably prevalent and institutionalized, which is significant given the continued preeminence of the United States as a space power**. As is noted in one recent assessment, around 50 countries, intergovernmental consortia, and nongovernmental organizations have at least one satellite in space, ‘mostly for reasons that have more to do with economic performance and Earth monitoring than with military applications.’54 However, in spite of the increasing diversity of interests in space and the increased range of functions space-based technologies now fulfil, the United States defence budget still remains the single largest source of investment in space technologies. In part this sustained investment arises out of American deployment and development of missile defence systems. Space and missile defences have been intimately connected issues historically and there are obvious technological overlaps between the two. Missile defence systems, including the ground-based system (Ground-Based Midcourse Defence or GMD) currently deployed by the United States at sites in Alaska and California, are dependent on satellite and space-based tracking technologies to detect and track incoming missiles, and there is a possibility that the future connection between missile defence and space will be even stronger if current plans for missile defence are pursued to their fullest extent. Two such systems are already in the early stage of their development: the Space-Based Laser (SBL), which, like the Strategic Defence Initiative or Star Wars proposals of the 1980s, envisages using lasers to shoot down missiles in flight;55 and the ‘NFIRE’ or Near Field Infrared Experiment, a proposal to launch interceptor missiles not from the ground, as in the currently deployed GMD, but from space.56 Even if the developmental status of space-based missile defence interceptors remains uncertain (not least due to the budgetary constraints involved), the currently deployed ground-based system also poses a complex issue in terms of arms control. Though ostensibly intended for defensive purposes, ground and sea-based components of American missile defence could theoretically be employed as an ASAT – Anti-Satellite attack – device, and the use of sea-based Aegis ballistic missile defence capabilities and its Standard Missile 3 (SM3) to shoot down the malfunctioning USA-193 spy satellite in February 2008 has done little to dispel concerns over the offensive applications of current missile defence capabilities.57 In addition, the United States also conducts research into more exotic forms of space weaponry, and funds a variety of technologies aimed at creating a force application capacity from space. The Department of Defense has reportedly explored several highconcept space weapons systems such as Hypervelocity Rod Bundles (tungsten rods dropped on targets from space that would theoretically use gravity as accelerant in a manner akin to a meteor, or Rods from God as they are also colloquially known), the Experimental Spacecraft System (XSS) (a manoeuvrable microsatellite weighing 84 CONTEMPORARY SECURITY POLICY Downloaded by [University of Tennessee, Knoxville] at 06:10 01 January 2015 only 100 kilograms which could prospectively be used to attack other satellites), and the Common Aerospace Vehicle or CAV (this so-called Spaceplane would be unmanned and would orbit the earth, entering the atmosphere when needed to deploy precision guided munitions against selected targets). 58 Such programmes with possible space weapons applications (beyond ground-tospace ASAT capabilities) are still in their relative infancy, and the technical prospects for such technologies, as with the more exotic missile defence proposals outlined above, are far from certain.59 Yet **much of the rhetoric emanating from the United States in recent years has made expansive claims to space dominance far beyond existing capabilities.** In short, rather than seeking to control the means of violence in and from space, much of the military discourse on space has generally cast the United States as a trailblazer in this regard, with exotic systems cited as a necessity for future military dominance in and from space.60 Historically these claims have tended to emanate primarily from the Air Force and Air Force Space Command. In 1998, Space Command defined the control of space (‘space control’) as ‘The ability to assure access to space, freedom of operations within the space medium, and an ability to deny others use of space, if required’61, and space was also considered as part of the remit for ‘full spectrum dominance’ in Joint Vision 2020. 62 Space warriors within and beyond the United States military also make frequent reference to the ‘...importance of dominating space in peace and war’.63 Yet, ‘The **decision to weaponize space does not lie within the military** (seeking short-term military advantage in support of national security) **but at the higher level of national policy** (seeking long-term national security, economic well-being, and worldwide legitimacy of US constitutional values).’64 **Instances of the securitization of outer space within military circles are hardly surprising, given vested interests and the perceived utility of space support for American forces; what is more significant though is the extent to which national policy, though stopping short of explicit advocating of space weapons, has tended to similarly maintain the centrality of space for national security.** 65 As Moore’s ‘biography’ of the idea of unilateral space dominance in the United States attests to, this school of thought has long held a prominent place in American strategic circles.66 Of significance, though, is the extent to which this type of thinking has migrated into official policy, portraying American access to, and dominance of, outer space as key to national survival in the process. The tenure of the George W. Bush administration in particular saw military and policy discourse move much closer in terms of goals and language used, entrenching securitization within United States space policy as a whole. In the terms used above, **the views of space warriors made much greater inroads under the Bush administration, and this has had a significant bearing on how the United States has positioned itself in terms of arms control and how other states – particularly China and Russia – have subsequently defined their own positions**.67 The evolution of official American discourse on outer space over the past decade attests to this subtle shift. In 2001, the Commission to Assess United States National Security Space Management and Organization (or Rumsfeld Space Commission as it is often referred to owing to Donald Rumsfeld’s position as chair) pointed out that a number of states hostile to the United States could attain ASAT capabilities, and, THE SECURITIZATION OF OUTER SPACE 85 Downloaded by [University of Tennessee, Knoxville] at 06:10 01 January 2015 infamously, warned that if the United States did not secure space it would face a Space Pearl Harbor. Members of the Bush administration subsequently went on to effectively endorse the space control concept, asserting the primacy of space for security by openly linking its potential civil and military uses (and thus suggesting only a minimal distinction between the two). Then Deputy Secretary of Defense Paul Wolfowitz argued in a 2002 speech on missile defence that ‘as we look ahead we need to think about areas that would provide higher leverage. Nowhere is that more true than in space. Space offers attractive options not only for missile defense but for a broad range of interrelated civil and military missions. It truly is the ultimate highground.’68 The culmination of this line of thinking in policy terms came with the release of the National Space Policy (NSP) in August 2006, which stated that: The United States considers space capabilities – including the ground and space segments and supporting links – vital to its national interests. Consistent with this policy, the United States will: preserve its rights, capabilities, and freedom of action in space; dissuade or deter others from either those rights or developing capabilities intended to so; take those actions necessary to protect its space capabilities; respond to interference; and deny, if necessary, adversaries the use of space capabilities hostile to US national interests.69 The framing of the arguments from those within the Bush administration thus **clearly aligns with the dynamics of securitization as identified by Buzan et al**. The idea of a Pearl Harbor from Space invokes the nightmare scenario of a surprise attack on American interests in or from space, and was accompanied in the Rumsfeld Commission’s report by the sense of urgency characteristic of securitizing moves: ‘the present extent of US dependence on space [and] the rapid pace at which this dependence is increasing and the vulnerabilities it creates, all demand that US national security space interests be recognized as a top national security priority’.70 The Pearl Harbor analogy implied a focus on a surprise attack itself, but the rest of the report stressed the radical implications of such an attack, suggesting a **potential existential threat** to American commerce, society and, ultimately, way of life. As the report noted, ‘Space enters homes, businesses, schools, hospitals and government offices through its applications for transportation, health, the environment, telecommunications, education, agriculture and energy. Much like highways and airways, water lines and electric grids, services supplied from space are already an important part of the US and global infrastructures.’71 In turn, the NSP of 2006 repeated many of these same securitizing moves. It elevated national security functions of United States space policy, declaring these as vital to national interests, and national security as ‘critically dependent upon space capabilities... this dependence will grow.’ Similarly, the NSP described United States space systems as critical to ‘...a wide range of civil, commercial, and national security users’, identifying the wider security implications of space as well as its more direct military uses.72 **Crucially, this securitization of space was then used to justify exceptional measures with regards to arms control and the previous era of multilateral space agreements**. Among the ‘actions necessary’ to protect space capabilities the NSP declared that: 86 CONTEMPORARY SECURITY POLICY Downloaded by [University of Tennessee, Knoxville] at 06:10 01 January 2015 The United States will oppose the development of new legal regimes or other restrictions that seek to prohibit or limit US access to or use of space. Proposed arms control agreements or restrictions must not impair the rights of the United States to conduct research, development, testing, and operations of other activities in space for US national interests.73 This sentiment had effectively been put into practice even before its formalization in the NSP 2006, with the United States abstaining from votes on the UN General Assembly PAROS (Prevention of an Arms Race in Outer Space) resolution in 2000 and an amended version in 2003, and then voting against it in 2005.74 In this sense the 2006 NSP functioned as a kind of retrospective justification of the exceptional stance adopted – on security grounds – by the Bush administration in relation to space law and arms control. In addition, and moving away from a purely textualist understanding of securitization, the destruction of the USA-193 satellite in 2008 might be seen to constitute an extra-discursive instance of securitization. Although this action was not defined explicitly in terms of a military security rationale (government agencies stressed the rationale for the shoot-down in terms of preventing the malfunctioning satellite from crashing to Earth), it left clear room for interpretation, intended or not, of American willingness to display military space capabilities and further embellished the connection between space and (military) security.75

#### The management of space debris to maintain military objectives is rooted in a militarized approach to the future that culminates in the full-spectrum dominance of the globe. Don’t let them no link this – their impact to debris was military readiness

Reno, Associate Prof. Anthropology @ Binghamton, 20

(Joshua Ozias, PhD from the University of Michigan: “The Wrong Stuff”, chapter 4 of Military Waste: The Unexpected Consequences of Permanent War Readiness Univ of California Press, Feb 4, 2020 Pg. 127-130)DR 19

**Space debris** can be dangerous to orbiting vessels and, as such, it represents an ever-growing hazard to human uses of Earth space. But these objects are hard to track and easy to mistake for something else, even for people who spend all of their time looking up at the night sky. Like space exploration itself, this is a difficult problem to solve, so it is not surprising that **only the most powerful and prominent space agencies imagine they are capable of finding space debris**, let alone clearing it from orbital environments. A core dimension of that power and prominence, moreover, is about having military ambitions that extend beyond the surface of the planet. And, **from the very beginnings**, doing so has meant enrolling amateur or civilian scientists in DoD plans for outer-space. Historically, **solving space-related challenges has meant getting funds and resources from wealthy and powerful nations**. **With the growth of** a permanent war economy, **such expenditure** is very often **tied** **to** imagined or real military applications. Consequently, the history of space exploration has been and continues to be shaped by tensions and networks between **civilian and military** scientific objectives. But these seemingly opposed **groups** also align and become indistinguishable, especially insofar as they embrace a fascination with developing the latest technology and an unrelenting faith in its ability to solve all problems. This is also known as techno-solutionism. Evgeny Morozov (2013) developed this idea related to utopian appraisals of the internet. His account draws heavily on **Hannah Arendt’s** *On Violence* (1970), a book which openly criticizes **US administrations** that thought they could solve global problems through technically ingenuous forms of death and destruction. Broadly defined, techno-solutionism is faith that technical fixes can solve any problem…even when they are targeting a realm like **outer space**, one that is already saturated with the leftovers of generations of technological problem-solving. According to Gökçe Günel (2019, 129), any technical adjustment is not only about “functionality, effectiveness, or use, but rather the ways in which its materially and conceptually indeterminate existence mobilizes potential towards a technically adjusted future.” In this sense, **technical fixes for space debris are more about extending the possibility of future technical intervention in orbital environments**, rather than, for instance, **encouraging ethical reflection** on whether people should create debris at all. Space debris is not just any problem, it is **one that originated** **with** and threatens **space science** and, as such, shows the limits of technical solution-making in general. If it is problematic to see space debris as a technical glitch, as noise in an otherwise perfectly rendered human design, that is because such a view can **mislead us** into thinking that all it takes is a little more ingenuity, a bit more mastery, to solve the problem entirely. But, following Virilio (2007), every new technical innovation and improvement brings a new disaster, an unprecedented act of contamination. If **space debris represents inevitable traces** that human artifacts and projects leave behind in the space beyond Earth, then, whatever the future may hold, this problem is unavoidable. If people want to continue to escape their earthly confines, space debris will have to be reckoned with. Space debris is a possibility that haunts all uses of space *tout court*, rather than an incidental by-product of space exploration and travel. A focus on technical mastery links the cause of space debris with its proposed cure. As a counterpoint, I discuss how amateur astronomers and ham radio operators have engaged with space debris in a different manner and with altogether different goals. Specifically, they tend to look for ways to become attuned with and enliven debris that has been abandoned. Militarizing Civilian Science The possibility of a semiautonomous civilian space agency had defined space exploration from the start, but by the 1970s and ‘80s, funding had dropped precipitously from the heyday of the Apollo missions. By that time, NASA had come under widespread criticism as the country entered recession and other big programs (such as the CIA) and national initiatives (the War on poverty, Civil Rights Legislation, the Vietnam War) were attacked by political representatives and activists across the political spectrum. The prominent images that NASA members used to promote the organization during the 1960s was that of pragmatism, that space efforts would yield scientific benefits. This failed to improve the prestige of the organization within the government, until the Reagan era, when there was a resurgence of nationalist and romanticist rhetoric from earlier in NASA’s history. With the Reagan administration there was an effort, first, to block international efforts to ban weapons use in outer space and, second, to invest new symbolic importance and new financial resources in the militarization of space. Since that time, **solving space debris has become a common pursuit** of space agencies all over the world, both the more militarized and the more civilian among them. By the early 1980s, **satellites were central infrastructure**, particularly for the United States. The militarization of space had already occurred, in other words, and **without extravagant laser weapons**. Consequently, among the most central issues of the time was the testing and development of antisatellite weaponry (ASAT). The use of experimental ASAT has been partly responsible for reorienting international attention to space debris, since ASAT is a spectacular technology, the goal of which is to transform working satellites into unusable waste. Since satellites were so vulnerable to attack, and space treaties did not allow for the defense of particular regions of space as sovereign territory, satellites could be destroyed simply by sending “space mines” to collide with them. This constitutes one clear reason why DARPA and the Air Force are so intent on tracking space debris—they want to know whether satellites colliding with unidentified objects represent coincidental hazards or deliberate attacks. Being able to tell the difference between space debris and an actively launched space mine would be like knowing whether an ocean vessel sank because of an iceberg or a submarine. Even if one cannot capture space debris, being able to detect and identify it might be **necessary to predict or avoid war**. The ambiguities of witnessing discussed in the previous section, not knowing what one is seeing, therefore take on perilous consequences. While Reagan’s “Star Wars” and Trump’s “Space Force” have been heavily discussed and derided, other administrations have had similar designs. Perhaps most enduring has been the Clinton-era concept of *full-spectrum dominance*, first outlined in the United States Space Command “Vision for 2020” released in 1997. This relationship between outer space and defense and security has been so central to US policy that prominent advocates for science, notably Neil deGrasse Tyson, have authored reports suggesting that **NASA could be restored to its former glory by becoming more like DARPA**, that is, the militaristic organization it was partly created ***not to become***. In many ways the DoD’s Defense Advanced Research Projects Agency (**DARPA) is the epitome of techno-solutionist practice**. Though the term *defense* was only added to the acronym later (it was termed ARPA until 1972), **the agency was always closely linked to military interests and problem-solving**. In management studies, the concept of problems that are “DARPA-hard” has become widespread, with websites baiting visitors to see whether their company’s challenges would come close to qualifying. According to Leifer and Steinert (2011, 159), there are four criteria for the agency to consider something DARPA-hard: 1. Technically challenging (beyond current limits); 2. Actionable (proof of concept or prototype); 3. Multidisciplinary (complex); and 4. Far-reaching (advances on a grand scale, radical). At the turn of the century, **DARPA** clearly **determined that solving orbital space debris met these criteria**. Space debris fragments **exceeded the capabilities of the Air Force’s Space Surveillance Network** (SSN), it would take work with specialists from various fields, and the achievement of a solution would be legitimately global in impact. The only thing missing was proof of concept. Their first attempt at a solution was to work with MIT aeronautics labs to develop a specialized telescope to detect faint objects. In 2011, DARPA unveiled a massive new telescope, the Space Surveillance Telescope (SST), specially developed with MIT labs to identify space debris. In contrast with what DARPA spokespersons described as the “soda straw approach” of existing telescopes, the SST would allow wide-angle shots of the night sky, made possible by a much larger aperture and an advanced visual processing system. **In at least one report** provided to NBC, moreover, cleaning up space debris was linked directly with military objectives.

#### 50] State-centric security frames ensure that the aff’s benign attempt to resist insecurity reproduces the biopolitical imperative that compels liberal regimes to make catastrophic war on difference – the impact is extinction. Evans 16

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Liberal War as Divine Violence Despite universal claims to peaceful co-habitation, liberal regimes have been compelled to make war on whatever threatens it40 . This is why the liberal account of freedom has depended upon a lethal principle, which discursively wrapped in the language of rights, security and justice, inaugurated planetary state of warfare and siege. It has promoted an account of freedom that, in the process of taking hold of the problem of the planetary life of political subjects, linked human potentiality to the possibility of its ruination. If liberal violence has then produced a necessary lethal corollary in its mission to foster the peace and prosperity of the species in order to alleviate unnecessary suffering; so it has also needed to foster a belief in the necessity of violence in the name of that suffering and vulnerability to which it continually stakes a claim. The Liberal wars of the past two decades in particular have revealed a number of defining principles41 . Aside from relying upon technological supremacy and universal claims to truth, they have been overwhelmingly driven by a bio-political imperative, which has displaced concerns with Sovereign integrities with forms of violence carried out in the name of an endangered humanity. In this regard, they have destroyed the Westphalia pretence, seeing the catastrophes of our global age in fact as a condition of possibility to further the liberal will to rule. Since incorporation in this setting has proceed on the basis that all life should necessarily be included within its strategic orbit, the veritable evisceration of any sense of “the outside” (as conceived in terms of its political imaginary) has led to the blurring of all conventional demarcations between friends/enemies, citizens/soldiers, times of war/times of peace. What is more, as life itself became increasingly central to questions of security, issues of development as broadly conceived would no longer be regarded as peripheral to the war effort. It would in fact become a central motif as most notably articulated in the strategic mantras “War by Other means” and “War for Hearts and Minds”. Not only would this point to new forms of de-politicisation which, less about Schmittean exceptionalism, were more explicable in terms of the fundamental political and social transformation of societies. It would also lead to the production of violent subjects, as the recourse to violence became sure testament to a conception of humanity realised through the wars fought in its name. Liberal violence, in other words, proved to be unbounded, unlimited and without conventional Sovereign warrant – namely revealing of the fundamental principles of what Benjamin once elected to term “the divine”. Diagnosing the liberal wars of the past two decades as a form of divine violence offers a more disturbing reading of the violence of the liberal encounter. If the violence of political realism, at least in theory, appreciated the value of limits and boundaries, what seems to define the lethality of liberal freedom has been a commitment to war without boundaries, hence limitless. As Dillon and Julian Reid acutely observed: [L]iberal peacemaking is lethal. Its violence a necessary corollary of the aporetic character of its mission to foster the peace and prosperity of the species ... There is, then, a martial face to liberal peace. The liberal way of rule is contoured by the liberal way of war ... Liberalism is therefore obliged to exercise a strategic calculus of necessary killing, in the course of which calculus ought to be able to say how much killing is enough... [However] it has no better way of saying how much killing is enough, once it starts killing to make life live, than does the geopolitical strategic calculus of necessary killing’42 . This brings us to Steven Pinker’s Better Angels of Our Nature43 . Reworking the well-rehearsed liberal peace thesis, for Pinker, the reason we have become less warlike today can be account for in terms of our liberal maturity. Leaving aside the evident theological undertones to Pinker’s work, along with the numerous empirical flaws in his thesis, his not so original thesis at least accredits its all too Euro-centric sources of inspiration on matters of civility: ‘The reason so many violent institutions succumbed within so short a span of time was that the arguments that slew them belong to a coherent philosophy that emerged during the Age of Reason and the Enlightenment. The ideas of thinkers like Hobbes, Spinoza, Descartes, Locke, David Hume, Mary Astell, Kant, Beccaria, Smith, Mary Wollstonecraft, Madison, Jefferson, Hamilton and John Stuart Mill coalesced into a worldview that we can call Enlightenment humanism’. John Gray has been rightly suspicious of the entire project and claims being made here: The idea that a new world can be constructed through the rational application of force is peculiarly modern, animating ideas of revolutionary war and pedagogic terror that feature in an influential tradition of radical Enlightenment thinking. Downplaying this tradition is extremely important for Pinker. Along with liberal humanists everywhere, he regards the core of the Enlightenment as a commitment to rationality. The fact that prominent Enlightenment figures have favoured violence as an instrument of social transformation is—to put it mildly—inconvenient... No doubt we have become less violent in some ways. But it is easy for liberal humanists to pass over the respects in which civilisation has retreated. Pinker is no exception. Just as he writes off mass killing in developing countries as evidence of backwardness without enquiring whether it might be linked in some way to peace in the developed world, he celebrates “re-civilisation”... without much concern for those who pay the price of the re-civilising process44 . Gray showed his evident concerns here with the promissory nature of liberal violence. Indeed, what he elsewhere terms the violence of the liberal missionary, reposes Nietzsche’s further instance that ‘god is dead and man has killed him’ with a devastating humanistic critique45 . Such violence, in the end, however has proved to be politically, ethically and economically narcissistic. Just as liberal advocates in the zones of crises now increasingly find themselves operating within fortified protectorates as part of a great separation from the world46 , this has been matched, albeit it ways that initially appear disconnected, by new forms of violence which also takes place almost exclusively at a distance. Indeed, as liberal actors increasingly give up on the idea that the world may be transformed for the better, new modalities of violence are emerging which seem to be more logically in fitting with the new politics of catastrophe that increasingly defines our terrifyingly normal times. As the promise of violence and catastrophe now appears inescapable, insecurity is becoming normalised, dystopian realism becoming the prevailing imaginaries for political rule, and once cited claims to emancipation, unending progress and lasting security for peoples all but abandoned47 . The politics of catastrophe and its relationship to “end of times” narratives adds another layer to our theological enquiry. As Jacob Taubes once noted48 , there is perhaps something theologically different at work here between the pre-modern apocalyptic movements and the catastrophic reasoning now defining the contemporary moment. For all their nihilism and monotheistic servitude, at least the apocalyptic movements of yesteryear could imagine a better world than already existed. There is therefore a vast difference between the subjects which names its disaster ‘apocalypse’ to that which reads disaster in terms of ‘catastrophe.’49 Unlike apocalypse, there is no beyond the catastrophic. Its mediation on the “end of times” is already fated. Catastrophe denies political transformation. It demands instead a forced partaking in a world that is deemed to be insecure unto the end. The upshot being, as all things become the source of endangerment, the human becomes the source of our veritable undoing. Angels of History Every war produces its casualties. Some of these stand out in terms of the sheer body count. The horror of mass warfare reduced to the most banal forms of inhuman quantification. Others, no less important, are its political and philosophical losses. What is increasingly clear is that the past two decades of liberal warfare, punctured but not initially determined by the tragedy of the events of September 11th 2001, ultimately put the very concept of war into question. The reluctance to officially declare war, even when our involvement in the politically motivated violence appears to be all too evident, now demands a move beyond the dominant frames which have shaped discussions for the past two decades. There is an important caveat to address here. What happened during last decade of the Global Wars on Terror cannot simply be inserted into a post 9/11 frames for analysis. Much of what passed for post 9/11 justice or military excessiveness was slowly maturing in the global borderlands for some considerable time. If there is a departure it needs to be accounted for against this broader post-Cold War humanitarian sensibility through which liberalism absorbed local crises into its political fabric to further condition its violent interventions. It has been all too easy for political and social theorists to put the blame for the violence and atrocities of the Global Wars on Terror onto the shoulders of George Bush and Dick Cheney. This has allowed liberals to appropriate Schmitt as one of their own, hence reducing the entire war effort to the reductionist measures of “US hegemony/exceptionalism”. Such retreats back into state centric models have not only proved unhelpful in terms of questioning the normalization of violence, they have failed to grasp the complexity of war – especially how questions of universality, economy, power and the formation of political subjectivities can be rethought through violent encounters. What is more, the limits of these analyses have been further evidenced by the complete lack of engagement with political theology, failing to recognize the violence of universal ambitions, along with the need to put the contemporary legacy of Kant on trial. Let us not forget Tony Blair and Barack Obama have embodied the liberal Kantian idea of political leadership better than any others throughout the history of liberalism. Any change in liberal fortunes must be understood in this context. We have witnessed in recent times profound changes in the violent cartography of what is a post-Iraq liberal influence. Instead of actively and one-sidedly engaging the world, humanely, violently or otherwise, what we are now encountering are new political arrangements shaped by forms of distancing and technological realignment. Just as liberal agents in the dangerous borderland areas increasingly find themselves operating within fortified protectorates as part of a great separation from the world, this is matched, albeit it ways that initially appear disconnected, by new forms of violence that also take place at a distance. The political and philosophical significance of this should not be underestimated. The technological and strategic confluence between the remote management of populations (notably surveillance) and new forms of violence are indicative of the narcissism of a liberal project that reeks of the worst excesses of technological determinism. Instead of looking with confidence towards a post-liberal commitment to transforming the living conditions of the world of peoples, what has taken its place is an intellectually barren landscape offering no alternative other than to live out our catastrophically fated existence. This is instructive regarding how we might envisage “the end of liberal times” as marked out and defined by this incommensurable sense of planetary siege. It also demands new thinking about the relationship between violence, technology and theology in these uncertain times. The liberal wars of the past decade have been premised on two notable claims to superiority. The first was premised on the logic of technology where it was assumed that high-tech sophistry could replace the need to suffer casualties. The second was premised upon a more humanitarian ethos, which demanded local knowledge and engagement with dangerous populations. The narcissistic violence of the Global War on Terror has put this secondary vision into lasting crises as the violence of liberal encounter has fatefully exposed any universal commitment to rights and justice. Not only did we appear to be the principle authors of violence, thereby challenging the notion that underdevelopment was the true cause of planetary endangerment, populations within liberal societies have lost faith in worldly responsibilities. Metaphysical hubris displaced by a catastrophic reasoning that quite literally places us at the point of extinction.

#### 30] The alternative is to reject the AFF’s security representations as a critical intellectual labor that makes imagination of a more peaceful future possible. Neocleous 08

(Neocleous 8 — Prof of Government @ Brunel University; London (Mark, Critique of Security, pg. 184-5)

Anyone well versed in history or with experience of university life will know about the shameful ways in which large numbers of academics have elevated venality into the cardinal academic virtue, complying with the demands of those in power and the wishes of those with money: witness the political scientists, historians, anthropologists, geographers, cartographers, sociologists, linguists and many others who reworked their disciplines according to the principles and myths, and the principle myths, of fascism.' 'Academic life under fascism', notes Christopher Hutton, 'is a dismal ... episode in an unedifying story of relations between the modem academic and the state, and between academics and power both within and outside the university. But this part of the history of fascism is merely the worst moment in the wider and equally unedifying story of relations between academics and the state more generally, merely one way m which intellectuals have kowtowed to the principles and myths, and the principle myths, concerning security and the state. Spouting the jargon of security and enthralled by the trappings of power, their intellectual labour consists of nothing less than attempts to write hand-books for the princes of the new security state. The death of countless numbers in a more 'efficient' bombing of a city, the stationing of troops halfway around the World in order to bring to an end any attempt at collective self-determination, the use of military machines against civilians, the training of police forces in counter-insurgency practices, but more than anything the key concepts and categories used to explain and justify these things - all defended, supported and even ‘improved” by security intellectuals for whom, ultimately, intelIecua1 labour boils down to little more than the question of the most efficient manner. In which to achieve the security demanded by the state and bourgeois order. In rationalizing the political and corporate logic of security, the security intellectual conceals the utter irrationality of the system as a whole. The security intellectual then is nothing less than the security ideologue, peddling the fetish of our time. The only way out of such a dilemma, to escape the fetish, is perhaps to eschew the logic of security altogether - to reject it as so ideologically loaded in favour of the state that any real political thought other than the authoritarian and reactionary should be pressed to give it up, That is clearly something that can not be achieved within the limits of bourgeois thought and thus could never even begin to be imagined by the security intellectual. It is also something that the constant iteration of the refrain ‘this is an insecure world’ and reiteration of one fear, anxiety and insecurity after another will also make it hard to do, but it is something that the critique of security suggests we may have to consider if we want a political way out of the impasse of security. This impasse exists because security has now become so all-encompassing that it marginalizes all else, most notably the constructive conflicts, debates and discussions that animate political life. The constant prioritizing of a mythical security as a political end - as the political end - constitutes a rejection of politics in any meaningful sense of the term. That is, as a mode of action in which differences can be articulated, in which the conflicts and struggles that arise from such differences can be fought for and negotiated, in which people might come to believe that another world is possible - that they might transform the world and in turn be transformed. Security politics simply removes this; worse, it removes it while purportedly addressing it. In so doing it suppresses all issues of power and turns political questions into debates about the most efficient way to achieve ‘security’, despite the fact that we are never quite told - never could be told – what might count as having achieved it. Security politics is, in this sense, an anti-politics,” dominating political discourse in much the same manner as the security state tries to dominate human beings, reinforcing security fetishism and the monopolistic character of security on the political imagination. We therefore need to get beyond security politics, not add yet more ‘sectors to it in a way that simply expands the scope of the state, and legitimizes state intervention in yet more and more areas of our lives. Simon Dalby reports a personal communication with Michael Williams, co-editor of the important text Critical Security Studies, in which the latter asks: if you take away security, what do you put in the hole that’s left behind? But I’m inclined to agree with Dalby: maybe there is no hole. The mistake has been to think that there is a hole and that this hole needs to be filled with a new vision or revision of security in which it is re-mapped or civilised or gendered or humanised or expanded or whatever. All of these ultimately remain within the statist political imaginary, and consequently end up re-affirming the state as the terrain of modem politics, the grounds of security. The real task is not to fill the supposed hole with yet another vision of security, but to fight for an alternative political language which takes us beyond the narrow horizon of bourgeois security and which therefore does not constantly throw us into the arms of the state. That’s the point of critical politics: to develop a new political language more adequate to the kind of society we want. Thus while much of what I have said here has been of a negative order, part of the tradition of critical theory is that the negative may be as significant as the positive in setting thought on new paths. For if security really is the supreme concept of bourgeois society and the fundamental thematic of liberalism, then to keep harping on about insecurity and to keep demanding ‘more security’ (while meekly hoping that this increased security doesn’t damage our liberty) is to blind ourselves to the possibility of building real alternatives to the authoritarian tendencies in contemporary politics. To situate ourselves against security politics would allow us to circumvent the debilitating effect achieved through the constant securitizing of social and political issues, debilitating in the sense that ‘security’ helps consolidate the power of the existing forms of social domination and justifies the short-circuiting of even the most democratic forms. It would also allow us to forge another kind of politics centered on a different conception of the good. We need a new way of thinking and talking about social being and politics that moves us beyond security. This would perhaps be emancipatory in the true sense of the word. What this might mean, precisely, must be open to debate. But it certainly requires recognizing that security is an illusion that has forgotten it is an illusion; it requires recognising that security is not the same as solidarity; it requires accepting that insecurity is part of the human condition, and thus giving up the search for the certainty of security and instead learning to tolerate the uncertainties, ambiguities and ‘insecurities’ that come with being human; it requires accepting that securitizing an issue does not mean dealing with it politically, but bracketing it out and handing it to the state; it requires us to be brave enough to return the gift.

**30] Interpretation: The 1AC is an object of research. The role of the neg should be to disprove or challenge the representations and discourse the AC engages in prior to consequential analysis.**

**Plan focus restricts the debate to a ten second statement and leaves the rest of the aff unquestioned. They should be responsible for the way their knowledge is constructed and used because that produces the best model for activism and ethics in the context of the topic which is a unique education net benefit to our interpretation**

**Debate doesn't pass policies but it does alter the way we think about the world and about systems of power – turns their policy research standards because it's a question of how their research is oriented and whether it's for an ethical purpose – only our model of engagement accesses that education**

**Begs the question – if we win their justifications are repugnant that necessarily implicates the conclusion which means defense of their research model is a prior question to weighing the material consequences of the aff – also solves plan focus because the links necessarily implicate aff solvency**

#### 25] Specifically in space discourse – scholarly analysis is a prior task to effectively regulating private enterprise

Peoples 11

Peoples, Columba (PhD international politics & Critical Security Expert), 2011, “The Securitization of Outer Space: Challenges for Arms Control” Contemporary Security Policy, 32(1), 76–98. doi:10.1080/13523260.2011.5568 // HW AW

The context in which outer space is used by international actors is evolving rapidly and in potentially divergent directions. Most prominently, the increased use of space-based technologies to provide critical elements of national and international infrastructure (such as media, communications, and environmental monitoring) has been accompanied by growing dependence on space-based elements of military support such as reconnaissance, military surveillance, and targeting. At the same time, **the variety of actors claiming an interest in access to, and use of, outer space is also proliferating rapidly to include states, regional organizations, and private enterprise**.1 The combination of these developments raises the question of whether outer space is the site of a nascent security dilemma, wherein even ostensibly nonmilitary uses of outer space may generate dynamics of military competition due to the latent dual-use potential of many commercial space technologies.2 In light of the above, many have argued that the existing regulation of the use of outer space (originally developed within the Cold War context and the era of the ’space race’ between the United States and Soviet Union)3 needs to be reviewed, revised and updated, particularly with the emergence of new space powers such as China, India and, as a regional actor, the European Union.**4 Before this can proceed**, however, and given that a shared consensus on a revised international framework on the use of outer space has thus far been elusive, **greater research needs to be undertaken into the terms in which key international actors view outer space and how they perceive and construe their interests in this regard.** With regard to the current state of the field of space security, academic considerations of this subject recurrently tend to break down into a distinction between militarization and weaponization, and discuss the relative merits of each for space powers.5 Space militarization generally denotes the use of space-based technology and infrastructure for the purposes of supporting military operations and functions (including reconnaissance, navigation, and use of satellite targeting systems for terrestrial weapons). Space weaponization is usually taken to refer to the actual placement of weapons in outer space, although the precise definition of the term is often muddied by issues of whether targeting from space itself represents de facto weaponization, and considerations of whether the capacity to attack satellites with land-based ballistic missiles (or other such forms of rudimentary Anti-Satellite Attack Technologies [ASATs]) constitutes a latent form of space weaponization. As a result, academic analysis has tended to become bogged down in the same debates over the finer points of distinguishing between militarization and weaponization that have persistently dogged proposals for new international frameworks on the Contemporary Security Policy, Vol.32, No.1 (April 2011), pp.76–98 ISSN 1352-3260 print/1743-8764 online DOI: 10.1080/13523260.2011.556846 # 2011 Taylor & Francis Downloaded by [University of Tennessee, Knoxville] at 06:10 01 January 2015 use of outer space. **By contrast, this article proposes the introduction of the alternative concept of securitization from the field of critical security studies as a better means of capturing the exact relationship between space and security within the contemporary policy discourses of major space-faring powers, and as a means to open up a broader discussion of Controlling the Means of Violence (CMV) in relation to outer space.** Securitization refers to the discursive processes by which a particular issue comes to be spoken and thought of as a security issue, with particular reference to the ways in which policy makers successfully employ securitizing moves or speech acts. 6 Taking this perspective it is possible to argue that outer space is rapidly becoming securitized in important aspects that are largely missed by current academic accounts, and this has implications both for thinking through more traditional forms of arms control and the more expansive CMV perspective suggested in this special issue. To make this argument, the article maps the current context of space arms control and the contemporary challenges it faces, assessing key definitional issues with regard to debates over space security and arms control in further detail. It then outlines an alternative framework for understanding and conceptualizing space security based on the idea of securitization, illustrating this via an analysis of space securitization in American and European Union space policy discourses. Here it compares the historical understanding of space security in the established discourse of American space policy with the more recently emergent discourse of the EU. This comparative analysis is used to generate critical reflections on the idea of space securitization and its implications for thinking through both arms control (in a more traditional understanding) and the more expansive idea of CMV with regard to outer space. In particular, the concluding section of the article uses the previous analysis to open up a broader debate on whether the securitization of outer space is to be avoided or encouraged from a CMV perspective.

### CP

#### CP:

#### States ought to ban Space Tourism

#### The US ought to fully fund the RIKEN laser cannon

#### The use of propellants other than liquid hydrogen and liquid oxygen to fuel rocket launches is unjust.

#### First plank solves tourism scenario

**Parkinson PhD ‘21**

(Stuart Parkinson, July 20, 2021, Parkinson has a PhD in mathematical modelling of global climate change from Lancaster University and is a reviewer for the Intergovernmental Panel on Climate Change, “Space tourism: environmental vandalism for the super-rich” [https://www.sgr.org.uk/resources/space-tourism-environmental-vandalism-super-rich //](https://www.sgr.org.uk/resources/space-tourism-environmental-vandalism-super-rich%20//) HM)

The past few weeks have seen some frightening impacts of climate change – from record-breaking temperatures and major wildfires in western Canada and the USA to unprecedented floods in Germany and Belgium. The hottest temperature reliably recorded on the Earth’s surface – 54.4C – was logged in Death Valley in California on 9 July. [[1]](https://www.sgr.org.uk/resources/space-tourism-environmental-vandalism-super-rich" \l "_edn1" \o ") Scientists said the heatwave in Canada and the USA at the end of June was “virtually impossible” without **human-induced climate change.** [[2]](https://www.sgr.org.uk/resources/space-tourism-environmental-vandalism-super-rich" \l "_edn2" \o ") One thing that is especially striking is that these events are now happening in some of the wealthiest and weather-resilient nations of the world – but even that didn’t stop major death tolls. The **huge threat of global climate disruption** is leading to ever more urgent calls for society to rapidly reduce its carbon emissions. It is also clear that **technological change** alone will not be enough to tackle the problem. A recent report by the Climate Change Committee – the UK government’s main advisory body on the issue – found that 62% of the necessary measures involve **societal and behaviour change**. [[3]](https://www.sgr.org.uk/resources/space-tourism-environmental-vandalism-super-rich" \l "_edn3" \o ") Avoiding air travel is one of the most effective changes individuals can make to cut this pollution. For example, the carbon footprint of a return flight from London to Hong Kong – seated in economy-class – is about 3.5 tonnes of carbon dioxide equivalent (tCO2e) [[4]](https://www.sgr.org.uk/resources/space-tourism-environmental-vandalism-super-rich" \l "_edn4" \o ") – similar to a UK citizen’s average car use for over 10 months. [[5]](https://www.sgr.org.uk/resources/space-tourism-environmental-vandalism-super-rich" \l "_edn5" \o ") Research by the Institute for Global Environmental Strategies indicates that a globally-sustainable lifestyle carbon footprint in 2020 was 3.9 tCO2e [[6]](https://www.sgr.org.uk/resources/space-tourism-environmental-vandalism-super-rich" \l "_edn6" \o ") – which gives a clear indication of just how much our society needs to reduce its impacts now (and this figure falls rapidly to 2.5t CO2e by 2030 and then much lower still for 2040 and 2050). Against this backdrop, we have **billionaires travelling in the inaugural flights of their space tourism corporations**. On 11 July, Richard Branson flew in Virgin Galactic’s SpaceShipTwo craft, while on 20 July, Jeff Bezos travelled in Blue Origin’s New Shepard. These activities take the **climate impacts of flying to considerably more damaging level.** Let’s look at the New Shepard space-craft. Prof Mike Berners-Lee of Lancaster University – a leading expert in carbon footprint analysis – has estimated that a single flight results in emissions of at least 330 tCO2e. [[7]](https://www.sgr.org.uk/resources/space-tourism-environmental-vandalism-super-rich" \l "_edn7" \o ") With four passengers, this means each one is responsible for over 82 tCO2e – over **20 times the sustainable level for a whole year**! And note, this is **a conservative estimate**. It does not include the additional heating effects of emissions at high altitude, the carbon footprint of developing and manufacturing the space-craft, or the emissions of running the Blue Origin corporation. Furthermore, the fuel combination used by the latest generation of New Shepard craft now includes liquid hydrogen [[8]](https://www.sgr.org.uk/resources/space-tourism-environmental-vandalism-super-rich" \l "_edn8" \o ") – a higher carbon fuel than those used in Prof Berners-Lee’s calculations. What about SpaceShipTwo? Although this craft emits markedly less direct carbon emissions per flight than New Shepard, as SGR discussed back in 2016, [[9]](https://www.sgr.org.uk/resources/space-tourism-environmental-vandalism-super-rich" \l "_edn9" \o ") it uses a fuel combination which emits **significant levels of black carbon** into the upper atmosphere. Research by the University of Colorado indicates that this can **damage the stratospheric ozone layer** – not only leading to higher levels of damaging ultra-violet radiation reaching the Earth’s surface, but also causing a global heating effect likely to be considerably greater than that from the carbon emissions alone. And the aim of these journeys? A few minutes of ‘zero-gravity’ experience and a nice view. It is hard to see this as anything more than **environmental vandalism for the super-rich**. Virgin Galactic claims to want to launch a “new age of clean and sustainable access to space” [[10]](https://www.sgr.org.uk/resources/space-tourism-environmental-vandalism-super-rich" \l "_edn10" \o ")– but they and the others in the space tourism industry clearly fail to understand the level of their own climate impacts, the **rapidly increasing severity of the climate emergenc**y, or the scale of action needed to cut carbon emissions to a sustainable level. If governments are serious about trying to **prevent ‘dangerous’ climate change**, then there is an important step to take immediately: **ban space tourism**.

#### Second plank solves detritus

Powell 15

Corey S Powell (science journalist and editor in chief at discover magazine, wrote 3 books with Bill Nye!!), May 20 2015, "Space Junk is a Problem. Is a Laser Cannon the Solution?," https://www.discovermagazine.com/the-sciences/space-junk-is-a-problem-is-a-laser-cannon-the-solution#.VV4ENGRViko, // HW AW, bracketed cause I don’t like reading big numbers

There’s a general rule in media reporting called Betteridge’s Law: Whenever a headline poses a question--especially a sensational one--the answer is “no.” I’m going to break the law this time. **An orbiting laser cannon is not only an intriguing technology but, yes, it’s one of the most promising ways to clean up the ever-thickening cloud of dangerous debris surrounding the Earth**. And just to be clear, space junk is a danger. There are about 25,000 human-made objects larger than your fist flying around in orbit, and about half a million pieces bigger than a dime. If you include millimeter-scale shrapnel, the number of rogue bits reaches deep into the millions. Typical speeds in low-Earth orbit are about 30,000 kilometers per hour (18,000 miles per hour), ten times the velocity of a rifle bullet. You see the problem: A little impact can pack a big wallop. So far, there have not been any space-junk catastrophes remotely resembling the sensationalized events in the movie Gravity, but the reality is still disconcerting. In 2009, a $50 million Iridium communications satellite was destroyed by a collision with a defunct Russian satellite. Three years later, the [Fermi space observatory](https://www.nasa.gov/mission_pages/GLAST/news/bullet-dodge.html) had a near miss with another Soviet-era satellite. NASA had to clad the International Space Station in shielding to protect it from repeated small impacts, and the agency sometimes moves the whole station to dodge larger pieces of junk. Orbiting debris adds cost and risk to the space business.The proposed space-station laser cannon (upper left) would work in conjunction with a telescope called EUSO to track and destroy space debris. (Credit: RIKEN) The amount of junk in orbit is increasing rapidly, meaning that those costs and risks are increasing, too. Once junk gets up there, it takes a long time to come back down: years to centuries in low orbits, and essentially forever in geosynchronous orbit (40,000 kilometers up, where many communications satellites are located). Most disconcerting, collisions in orbit create more junk, which leads to more collisions. Potentially this could lead to a runaway process called [Kessler Syndrome](http://en.wikipedia.org/wiki/Kessler_syndrome). **This is where the laser cannon comes in**. Toshikazu Ebisuzaki and a team of researchers at the RIKEN lab in Japan have [formulated a plan](http://www.riken.jp/en/pr/press/2015/20150421_2/) to clear out near-Earth space by zapping pieces of space junk with a high-power blast of focused radiation. The laser doesn’t need to be able to destroy the whole piece of debris. All it has to do is vaporize enough of the object to slow its orbit and send it spiraling into Earth’s atmosphere, **where it will burn up harmlessly before reaching the ground. It’s an ingenious solution**. Ebisuzaki’s concept was inspired by a science project called the Extreme Universe Space Observatory, currently under development for the International Space Station. [EUSO](http://jemeuso.riken.jp/en/), which will be installed on the station in 2017, is a fascinating instrument in its own right; it will study extremely high-cosmic rays by watching the light they create when they collide with air molecules. But EUSO’s sensitive, wide-field optics also make it well suited to spotting and tracking small bits of space debris, which are hard to locate from the ground. Finding targets is the crucial first step toward getting rid of them. The next step, of course, is the laser. RIKEN’s concept (which is not yet funded) would start with a 10-watt laser prototype, mounted on the International Space Station, capable of firing 100 laser pulses a second. That would pave the way for a larger system powerful enough to blast away any pieces of space junk within a 100-kilometer range, and eventually lead to a dedicated garbage-cleanup satellite equipped with a [five-hundred-thousand]500,000-watt laser that can fire [fifty-thousand]50,000 times per second. Such a satellite could remove 100,000 pieces of junk a year, the Japanese researchers claim, **fast enough to bring the whole orbital debris problem under control.** The fast-growing population of space debris. "LEO" refers to low-Earth orbit. (Credit: Surrey Space Centre) There are significant technical hurdles to overcome, including the data-processing capacity needed to spot the bits of debris and the considerable energy supply needed to keep such a powerful laser operating for years. Building a giant laser-cannon satellite would not be cheap, either. But this is exactly the kind of ambitious thinking needed to tackle the space-junk mess. Several additional cleanup technologies are also under development. A separate Japanese-led team has proposed trapping and eliminating space debris with a huge [electromagnetic tether](http://www.academia.edu/1265073/Space_Demonstration_of_Bare_Electrodynamic_Tape-Tether_Technology_on_the_Sounding_Rocket_S520-25http:/). A European project called [e.DeOrbit](http://www.esa.int/Our_Activities/Space_Engineering_Technology/Clean_Space/How_to_catch_a_satellite) would snare big pieces of space junk using a net or harpoon and dispatch them Earthward. Other concepts under study would use puffs of [pressurized gas](http://www.nasa.gov/directorates/spacetech/niac/gregory_space_debris_elimination.html), large [magnetized nets](http://www.spacesafetymagazine.com/space-debris/debris-removal/electrodynamic-debris-eliminator-receives-funding/), or a [slingshot-style satellite](http://aero.tamu.edu/news/removing-space-debris-tamu-sweeper-sling-sat). The laser cannon has some obvious advantages over all of these options, however. It could tackle the small fry, not just the big pieces, and it could deal with far more targets than would be possible for any spacecraft that is going after them one by one. If all of these ideas sound a little wacky, there's a good reason: Getting rid of space junk is a really, really hard problem. There is a lot of space to scour for debris. The individual pieces are mostly small and nearly invisible, and they each follow a unique orbit. Hard problems call for creative (and sometimes wacky) solutions. Further complicating things, nobody has devoted much money to cleanup, and any mission that can remove space junk could potentially remove active satellites as well--a delicate political issue. **If the RIKEN laser cannon never happens, it will more likely be due to budget** and political **obstacles than to technical ones**. In the long run, the best way to deal with space junk is never to create it in the first place. One of the most important principles here is what is called [design for demise](http://www.esa.int/Our_Activities/Space_Engineering_Technology/Clean_Space/Space_debris_mitigation)--that is, engineering satellites so that they will automatically de-orbit and remove themselves from the trash pile within, say, 25 years of the end of their mission. A simple way to do this is to equip a satellite with a small sail that would pop open when it is no longer needed. The so-called [gossamer sail](https://theconversation.com/cleaning-up-space-debris-with-sailing-satellites-20384) would act like a space parachute, using the pressure of sunlight and the extremely thin traces of atmosphere in orbit to create drag. The drag would then pull the satellite down to a fiery demise. Simulated view of Earth from the Planetary Society's new LightSail, launched on May 20. Space sails could be used to clear away satellite debris--or to take humanity on great ventures of exploration. (Credit: Josh Spradling/Planetary Society) A gossamer sail is very similar in function to a solar sail--like the prototype [LightSail](http://sail.planetary.org/) launched today by the Planetary Society. That creates a neat kind of symmetry to the story. Powerful space lasers may be useful for clearing debris, but they could also be used to launch high-speed spacecraft. Solar sails could be used to de-orbit satellites, but they could also provide new ways to navigate to new worlds. In short, the kinds of technological solutions needed to clear a path through our local garbage dump could be the exact same ones needed to blaze a path to the stars.

#### Third plank solves ozone

Mortillaro 21 [Nicole Mortillaro, CBC News Senior Reporter, editor of the Journal of the Royal Astronomical Society of Canada, author of several books. "Rocket launches could be affecting our ozone layer, say experts." CBC, 4-22-2021, accessed 1-22-2022, https://www.cbc.ca/news/science/rocket-launches-environment-1.5995252] HWIC

There are different types of rocket propellants. Some, like liquid oxygen and liquid hydrogen, produce mainly water vapour and have little environmental impact. These were used in past shuttle launches and even in the Apollo-era Saturn V vehicles.

Then there are those that produce alumina particles in the stratosphere, such as those in solid rocket boosters, which were also used in past shuttle launches, and are still being used today by some launch companies.

Finally, there are those that deposit black soot in the stratosphere, such as kerosene used in SpaceX's Falcon 9 and Russia's Soyuz rockets.

It's the alumina and black soot that is most concerning to experts.

### Case – Cosmic Colonialism

#### They just pass the capitalist torch – spatial fix doesn’t stop

McKay 20

Tom McKay (Tom McKay is a journalist and breaking news reporter who specializes in politics, identities, civil rights and drug policy.), 9-10-2020, "NASA Is Soliciting Bids to Bring Capitalism to the Moon," https://gizmodo.com/nasa-is-soliciting-bids-to-bring-capitalism-to-the-moon-1845018404, // HW AW

Mankind’s quest to [really ~~fuck~~ [sic] up the Moon](https://gizmodo.com/trump-to-world-keep-your-grubby-hands-off-of-our-theor-1842742312) is taking another step. NASA has filed a “[request for quotations](https://beta.sam.gov/opp/77726177617a45d0a196e23a587d7c14/view)” for any company willing to scrape the lunar surface for the first off-world sale of space resources, in a sort of baby **step towards Moon Capitalism**. The project isn’t complicated: NASA is offering $15,000 to $25,000 for samples of rocks, lunar regolith (a fancy word for dust, debris and other Moon-crud), or ices, so long as they’re able to pack them in some type of container and provide photographic and textual proof of where it was culled from. Contractor(s) will have to provide their own transportation to the moon, and NASA isn’t even asking for the samples to be analyzed or returned to Earth. “The material(s) may be collected from any location on the Lunar surface as determined by the Contractor,” NASA wrote in the document. “Purchase is made on an ‘as-collected’ condition. The collected materials may be any combination of regolith types, rocks, and/or co-present species such as ices.: NASA wants the samples to be in the range of 50 to 500 grams (about the size of a full stick of butter), though it noted payment won’t depend “on the quantity of Lunar material collected.” The space agency wants the micro-mining Moon mission completed by the end of 2024, its target date for a manned mission to the moon. The paltry $15,000-$25,000 price tag per sample means any contract will almost certainly be undertaken as a sideline in some other type of mission to the lunar surface. It’s also mostly symbolic. [According to Ars Technica](https://arstechnica.com/science/2020/09/nasa-says-it-will-pay-private-companies-to-gather-moon-rocks), NASA admin Jim Bridenstine told the Secure World Foundation’s Summit for Space Sustainability on Thursday that the project is intended to set expectations for how resource exploitation in space will operate under the Outer Space Treaty, which disallows nations from making sovereign territorial claims in space. **The US position is that humans can take whatever the hell they want from space and declare it theirs**. Donald Trump issued an [executive order](https://gizmodo.com/trump-to-world-keep-your-grubby-hands-off-of-our-theor-1842742312) earlier this year denigrating the idea that space is a “global commons” and later proposed a [set of accords](https://www.theverge.com/2020/5/15/21259946/nasa-artemis-accords-lunar-exploration-moon-outer-space-treaty) that would create an international framework to explore the Moon and extract its resources. That prompted accusations from Russia’s space agency, Roscosmos, of [colonialism and efforts to privatize space](https://www.pcmag.com/news/russia-says-trumps-space-mining-order-is-an-attempt-to-seize-other-planets). On Thursday, Bridenstine made the comparison that, “you do not own the ocean, but you own the tuna.” (Earth’s oceans [have been devastated](https://www.theguardian.com/environment/2018/jul/26/just-13-of-global-oceans-undamaged-by-humanity-research-reveals) by this kind of arrangement, though to be fair, the Moon has no known ecosystems to damage.) NASA also has a stake in the moon due to its Artemis program, which intends to have “the first woman and the next man” on the Moon by 2024 to begin laying the groundwork for a sustained presence of capitalists humans there and, eventually, dispatch them to Mars. **Extracting lunar resources such as regolith for construction or water for drinking and rocket fuel would relieve NASA of having to send every single thing up there themselves.** “Next-generation lunar science and technology is a main objective for returning to the Moon and preparing for Mars,” Bridenstine [wrote in a blog post](https://blogs.nasa.gov/bridenstine/2020/09/10/space-resources-are-the-key-to-safe-and-sustainable-lunar-exploration). “Over the next decade, the Artemis program will lay the foundation for a sustained long-term presence on the lunar surface and use the Moon to validate deep space systems and operations before embarking on the much farther voyage to Mars. The ability to conduct in-situ resources utilization (ISRU) will be incredibly important on Mars, which is why we must proceed with alacrity to develop techniques and gain experience with ISRU on the surface of the Moon.”

#### No ozone impact

**Ridley 14** -- Matthew White Ridley, 5th Viscount Ridley DL FRSL FMedSci, known commonly as Matt Ridley, is a British journalist, businessman and author of popular science books. Since 2013 Ridley has been a Conservative hereditary peer in the House of Lords. “THE OZONE HOLE WAS EXAGGERATED AS A PROBLEM” http://www.rationaloptimist.com/blog/the-ozone-hole-was-exaggerated-as-a-problem.aspx

Serial hyperbole does the environmental movement no favours My recent [Times column](http://www.thetimes.co.uk/tto/opinion/columnists/article4206440.ece) argued that the alleged healing of the ozone layer is exaggerated, but so was the impact of the ozone hole over Antarctica: The ozone layer is healing. Or so said the news last week. Thanks to a treaty signed in Montreal in 1989 to get rid of refrigerant chemicals called chlorofluorocarbons (CFCs), the planet’s stratospheric sunscreen has at last begun thickening again. Planetary disaster has been averted by politics. For reasons I will explain, this news deserves to be taken with a large pinch of salt. You do not have to dig far to find evidence that the ozone hole was never nearly as dangerous as some people said, that it is not necessarily healing yet and that it might not have been caused mainly by CFCs anyway. The timing of the announcement was plainly political: it came on the 25th anniversary of the treaty, and just before a big United Nations climate conference in New York, the aim of which is to push for a climate treaty modelled on the ozone one. Here’s what was actually announced last week, in the words of a Nasa scientist, Paul Newman: “From 2000 to 2013, ozone levels climbed 4 per cent in the key mid-northern latitudes.” That’s a pretty small change and it is in the wrong place. The ozone thinning that worried everybody in the 1980s was over Antarctica. Over northern latitudes, ozone concentration has been falling by about 4 per cent each March before recovering. Over Antarctica, since 1980, the ozone concentration has fallen by [40 or 50 per cent each September](http://bigstory.ap.org/article/scientists-say-ozone-layer-recovering) before the sun rebuilds it. So what’s happening to the Antarctic ozone hole? Thanks to a diligent blogger named Anthony Watts, I came across a press release also from Nasa about nine months ago, which said: “ Two new studies show that signs of recovery are not yet present, and that temperature and winds are still driving any annual changes in ozone hole size.” As recently as 2006, Nasa announced, quoting Paul Newman again, that the Antarctic ozone hole that year was “the largest ever recorded”. The following year a paper in Nature magazine from Markus Rex, a German scientist, presented new evidence that suggested CFCs may be responsible for less than 40 per cent of ozone destruction anyway. Besides, nobody knows for sure how big the ozone hole was each spring before CFCs were invented. All we know is that it varies from year to year. How much damage did the ozone hole ever threaten to do anyway? It is fascinating to go back and read what the usual hyperventilating eco-exaggerators said about ozone thinning in the 1980s. As a result of the extra ultraviolet light coming through the Antarctic ozone hole, southernmost parts of Patagonia and New Zealand see about 12 per cent more UV light than expected. This means that the weak September sunshine, though it feels much the same, has the power to cause sunburn more like that of latitudes a few hundred miles north. Hardly Armageddon. The New York Times reported “an increase in Twilight Zone-type reports of sheep and rabbits with cataracts” in southern Chile. Not to be outdone, Al Gore wrote that “hunters now report finding blind rabbits; fisherman catch blind salmon”. Zoologists briefly blamed the near extinction of many amphibian species on thin ozone. Melanoma in people was also said to be on the rise as a result. This was nonsense. Frogs were dying out because of a fungal disease spread from Africa — nothing to do with ozone. Rabbits and fish blinded by a little extra sunlight proved to be as mythical as unicorns. An eye disease in Chilean sheep was happening outside the ozone-depleted zone and was caused by an infection called pinkeye — nothing to do with UV light. And melanoma incidence in people actually levelled out during the period when the ozone got thinner. Then remember that the ozone hole appears when the sky is dark all day, and over an uninhabited continent. Even if it persists into the Antarctic spring and spills north briefly, the hole allows 50 times less ultraviolet light through than would hit your skin at the equator at sea level (let alone at a high altitude) in the tropics. So it would be bonkers to worry about UV as you sailed round Cape Horn in spring, say, but not when you stopped at the Galapagos: the skin cancer risk is 50 times higher in the latter place. This kind of eco-exaggeration has been going on for 50 years. In the 1960s Rachel Carson said there was an epidemic of childhood cancer caused by DDT; it was not true — DDT had environmental effects but did not cause human cancers. In the 1970s the Sahara desert was said be advancing a mile a year; it was not true — the region south of the Sahara has grown markedly greener and more thickly vegetated in recent decades. In the 1980s acid rain was said to be devastating European forests; not true — any local declines in woodland were caused by pests or local pollution, not by the sulphates and nitrates in rain, which may have contributed to an actual increase in the overall growth rate of European forests during the decade. In the 1990s sperm counts were said to be plummeting thanks to pollution with man-made “endocrine disruptor” chemicals; not true — there was no fall in sperm counts. In the 2000s the Gulf Stream was said to be failing and hurricanes were said to be getting more numerous and worse, thanks to global warming; neither was true, except in a Hollywood studio. The motive for last week’s announcement was to nudge world leaders towards a treaty on climate change by reminding them of how well the ozone treaty worked. But getting the world to agree to cease production of one rare class of chemical, for which substitutes existed, and which only a few companies mainly in rich countries manufactured, was a very different proposition from setting out to decarbonise the whole economy, when each of us depends on burning carbon (and hydrogen) for almost every product, service, meal, comfort and journey in our lives. The true lesson of the ozone story is that taking precautionary action on the basis of dubious evidence and exaggerated claims might be all right if the action does relatively little economic harm. However, loading the entire world economy with costly energy, and new environmental risks based on exaggerated claims about what might in future happen to the climate makes less sense.

### Case – Tourism

1. Public sector alt cause
2. Many alt causes to warming – ie fossil fuel companies
3. Flying isn’t appropriation – they don’t prevent people from touring space –

#### Appropriation is a “Claim of sovereignity” – it’s about property rights

Melissa J. **Durkee**, J. Alton Hosch Associate Professor of Law, University of Georgia, **’19**, "Interstitial Space Law," Washington University Law Review 97, no. 2 423-482

Those answering this question in the affirmative have access to a strong textual argument. Article II of the Outer Space Treaty specifically references "national" **appropriation**.17 9 The context surrounding that appears to confirm that the prohibition of "national" appropriation is directed at nations, as only a nation could have a legitimate "claim of sovereignty." 180 Moreover, "occupation" refers to old international legal doctrines that once allowed nations to claim territory based on occupation. The historical context within which the treaty was drafted supports this position, as the concern of the time was colonization, not commercial use of space resources. As for private parties, they are specifically anticipated by the treaty: **Article VI states that States Parties bear international responsibility for activities by "non-governmental entities" as well as governmental agencies**.' 8 1 The fact that they are anticipated by the treaty but not included in the Article II prohibition on appropriation suggests that the treaty intended to prohibit only national appropriation of outer space resources.18 2 Those claiming that the treaty prohibits both national appropriation and appropriation by private parties can marshal their own textual argument. Article VI defines "national activities in outer space" to include both "activities . .. carried on by governmental agencies" and those carried on by "non-governmental entities." 8 3 This definition of "national" must inform Article II's prohibition on "national" appropriation and thus extend to a nation's citizens **and commercial entities** as well as governmental activities. Moreover, a contrary interpretation defies logic: **if nations themselves may not claim property rights to outer space objects, they have no power to confer those rights on their nationals.**184

### Case – Detritus

#### No space war – hotlines prevent miscalc from accidents

Banerjee 15 — Brinda Banerjee, is a researcher working on security, armed conflict and military policies. She holds a Bachelor’s in Journalism (with Honors), a Master’s in Peace and Conflict Studies and is currently pursuing her Ph.D. in state responses to internal conflict. Brinda writes extensively about current events, conflict resolution and geopolitical dynamics in the modern world, 11-27-2015 ("China, U.S. To Launch Space Hotline To Avoid Space War," ValueWalk, 11-27-2015, Available Online at http://www.valuewalk.com/2015/11/china-u-s-launch-space-hotline-avoid-space-war/, Accessed 6-23-2016, RJS)

That space is the new- perhaps even final- frontier is a widely acknowledged fact. Even as territorial expansionism and resource-driven ambitions continue to dominate international relations, the new-age marker of geopolitical supremacy is space. And China knows this. Which is why Beijing is working hard to establish China’s preeminence in space. However, security experts in China and elsewhere have clearly realized that the risk of in-space collisions and accidents is high and such an incident could easily lead to war back home on earth. Given that the relationship between China and the United States is particularly defined by the desire to outcompete one another, the possibility of a space collision is particularly worrying. And so, Beijing and Washington have decided to set up a “space hotline” to address these concerns. China, U.S. Start ‘Space Hotline’ The space hotline is going to allow direct communication between Beijing and Washington; The Financial Times reports that the hotline will enable the two governments to quickly and efficiently exchange information about each other’s projects and actions in space. The hotline has been conceptualized for the express purpose of avoiding run-ins and unintentional confrontations in space. Using the hotline, officials in China and the United states hope to be able to discuss plans, tests and the likelihood of their paths meeting in space. The hotline will serve as a conduit between military authorities and space program officials. An assistant secretary of state in the United States has shared that the U.S. hopes to cut down on the time it takes to be able to communicate effectively with China on space-related matters. Typically, if Washington wants to convey a message to Beijing, it will start with the Joint Space Operations Center (JspOC) contacting the Pentagon, from where the message is transmitted to the State Department and then onto the U.S. Embassy in Beijing, which will relay it to a Chinese contact and then, once an answer is confirmed, the message is sent back through the chain. The U.S. assistant secretary of state said that in the past Washington has had to “send notifications to the Chinese via their Ministry of Foreign Affairs” and the entire process of contacting the Chinese authorities and receiving a response takes too much time- and in some cases of space-related emergencies and enquiries, neither side has enough time to engage in bureaucratic protocol. In case an impending accident or possible threat is identified, authorities on both ends should be able to quickly reach other and enact a situation-appropriate response strategy without expending too much time on communication and clarification. It is believed that the space hotline will prove helpful in doing just that. The space hotline with China is not the first time the U.S. has chosen to pursue faster communications systems and cooperation with a rival power: in the post-Cold War era, Russia and the United States established a direct line between Moscow and Washington, known as the “red telephone”. Direct links such as these are developed to help traditional competitors avoid catastrophes because the tenuous nature of their ties may trigger off a conflict at any given moment. Authorities Want To Avoid Space Warfare As problematic as space collisions are as of themselves, Beijing and Washington are particularly worried about accidents being interpreted as acts of aggression. A chance encounter may create severe misunderstandings between the two countries and could be incorrectly understood as an act of war, thus inciting actual conflict between the states. The two governments have identified potential risks that may create such a misunderstanding; for instance, experts suggest that unintentionally harming another country’s orbiting satellites would render that country’s intelligence and other systems useless: while this may not, in fact, be a desired outcome it would no doubt be received badly and may force the affected state to enforce counter-measures or retaliate in kind. These concerns are informed by real-life experiences: in 2007, China inadvertently destroyed an orbiting satellite while testing its own anti-satellite weapons systems and the incident sparked off a raging debate on space warfare. The satellite in question was a non-operational weather satellite and while the incident itself did not pose a military threat, it did reveal potential for the same.

#### No tipping point

Von Fange 17

Daniel von Fange (systems engineer. Fond of charts), 5-21-2017, "Kessler Syndrome is Over Hyped," braino, http://braino.org/essays/kessler\_syndrome\_is\_over\_hyped/, // HW AW

Kessler Syndrome is overhyped. A chorus of online commenters greet any news of upcoming low earth orbit satellites with worry that humanity will to lose access to space. I now think they are wrong. What is Kessler Syndrome? Here’s the popular view on Kessler Syndrome. Every once in a while, a piece of junk in space hits a satellite. This single impact destroys the satellite, and breaks off several thousand additional pieces. These new pieces now fly around space looking for other satellites to hit, and so exponentially multiply themselves over time, like a nuclear reaction, until a sphere of man-made debris surrounds the earth, and humanity no longer has access to space nor the benefits of satellites. It is a dark picture. Is Kessler Syndrome likely to happen? I had to stop everything and spend an afternoon doing back-of-the-napkin math to know how big the threat is. To estimate, we need to know where the stuff in space is, how much mass is there, and how long it would take to deorbit. The orbital area around earth can be broken down into four regions. Low LEO - Up to about 400km. Things that orbit here burn up in the earth’s atmosphere quickly - between a few months to two years. The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, Low LEO doesn’t matter for Kessler Syndrome. If Low LEO was ever full of space junk, we’d just wait a year and a half, and the problem would be over. High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue. Mid Orbit - GPS satellites and other navigation satellites travel here in lonely, long lives. The volume of space is so huge, and the number of satellites so few, that we don’t need to worry about Kessler here. GEO - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. Usually the geostationary orbit is used by big weather satellites and big TV broadcasting satellites. (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, all the satellites here are moving the same direction at the same speed - debris doesn’t get free velocity from the speed of the satellites. Also, it’s quite expensive to get a satellite here, and so there aren’t many, only about one satellite per 1000km of the ring. Kessler is not a problem here. How bad could Kessler Syndrome in High LEO be? Let’s imagine a worst case scenario. **An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space? I’m guessing the world has launched about 10,000 tons of satellites total.** For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, **its odds of hitting that cube are tiny - less than 1 in 10,000**. **So even in the worst case, we don’t lose access to space.** Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits. In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment. Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely. Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner. Any collision will create large and small objects. **Small objects are much more affected by atmospheric drag and deorbit faster**, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided. The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler. Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting) So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect. **I’m removing Kessler Syndrome from my list of things to worry about.**

#### Asteroid mining is impractical and no one is going to try any time soon

Fickling 20

David Fickling (columnist covering commodities and industrial and consumer companies, reporter for Bloomberg, Dow Jones, WSJ, Financial Times, Guardian.; “We’re Never Going to Mine the Asteroid Belt”; *Bloomberg News*; December 21, 2020; <https://www.bloomberg.com/opinion/articles/2020-12-21/space-mining-on-asteroids-is-never-going-to-happen>; HW-EMJ

It’s wonderful that people are shooting for the stars — but those who declined to fund the expansive plans of the nascent space mining industry were right about the fundamentals. Space mining won’t get off the ground in any foreseeable future — and you only have to look at the history of civilization to see why. One factor rules out most space mining at the outset: gravity. On one hand, it guarantees that most of the solar system’s best mineral resources are to be found under our feet. Earth is the largest rocky planet orbiting the sun. As a result, the cornucopia of minerals the globe attracted as it coalesced is as rich as will be found this side of Alpha Centauri. Gravity poses a more technical problem, too. Escaping Earth’s gravitational field makes transporting the volumes of material needed in a mining operation hugely expensive. On Falcon Heavy, the large rocket being developed by Elon Musk’s SpaceX, transporting a payload to the orbit of Mars comes to as little as $5,357 per kilogram — a drastic reduction in normal launch costs. Still, at those prices just lofting a single half-ton drilling rig to the asteroid belt would use up the annual exploration budget of a small mining company. Power is another issue. The international space station, with 35,000 square feet of solar arrays, generates up to 120 kilowatts of electricity. That drill would need a similar-sized power plant — and most mining companies operate multiple rigs at a time. Power demands rise drastically once you move from exploration drilling to mining and processing. Bringing material back to Earth would raise the costs even more. Japan’s Hayabusa2 satellite spent six years and 16.4 billion yen ($157 million) recovering a single gram of material from the asteroid Ryugu and returning it to Earth earlier this month. What might you want to mine from space? Water is an essential component of most earth-bound mining operations and a potential raw material for hydrogen-oxygen fuel that could be used in space. The discovery in October of ice molecules in craters on the Moon was taken as a major breakthrough. Still, the concentrations of 100 to 412 parts per million are extraordinarily low by terrestrial standards. Copper, which typically costs about $4,500 per metric ton to refine, has an average ore grade of about 6,000 ppm. The more promising commodities are platinum, palladium, gold and a handful of rare related metals. Because of their affinity for iron, these so-called siderophile elements mostly sunk toward the metallic core of our planet early in its formation, and are relatively scarce in the Earth’s crust. Estimates of their abundance on some asteroids, such as the enigmatic Psyche 16 beyond the orbit of Mars, suggest concentrations several times higher than can be found in terrestrial mines. Still, human ingenuity is all about cutting our coat according to our cloth. If such platinum-group metals are going to justify the literally astronomical costs of space mining, they’ll need to count on sustained high prices for the decade or so that would be needed to get such an operation up and running — and that sort of situation is all but unheard-of in the materials industry. When prices of an essential commodity get excessively high, chemists get extraordinarily good at finding ways to avoid using it, scrap merchants improve their recycling rates, and miners discover new deposits that wouldn’t have been viable at lower prices. Even criminals get in on the game. That eventually pushes supply up and demand down, so that prices rebalance — a dynamic we’ve seen play out in the markets for rare earths, lithium and cobalt in recent years. The world mines about three times more platinum than it did in the early 1970s, but prices have barely changed once adjusted for inflation. That might sound a disappointing prospect to those looking for excuses for humanity to colonize space — but really it should be seen as a tribute to our ingenuity. Humanity’s failure to exploit extraterrestrial ore reserves isn’t a sign that we lack imagination. If anything, it’s a sign of the adaptive genius that put us in orbit in the first place.