# Speech 1NC Harvard RR Rd 2 vs Lexington 2-17 11AM

### 1

#### Interp – the affirmative must specify their epistemology of approaching outer space within a delineated text in the 1AC.

#### Epistemology is flexible – squo debates further dogma by smokescreening ideological differences.

Schwartz and Milligan summarize in 21 [Dr. James S.J. Schwartz (Assistant Professor of Philosophy at Wichita State University and author of The Value of Science in Space Exploration) and Dr. Tony Milligan (Senior Researcher in the Cosmic Visionaries Project, a member of the Department of Theology and Religious Studies at King’s College London). ‘“Space ethics” according to space ethicists’. The Space Review. February 1, 2021. Accessed 1/23/2022. <https://www.thespacereview.com/article/4117/1> //Xu]

3. Not only does space ethics help us figure out what is worth doing in space, it also helps us figure out the best way to do those things. Suppose, for example, we have agreed that there is an ethical obligation to exploit the water ice deposits in the permanently shadowed regions on the Moon. At that point we would face an entirely new set of ethical questions: How should this exploitation be conducted? What is a tolerable extraction efficiency level? Who should be permitted to conduct the exploitation? And so on. However, just because we agree on an outcome doesn’t mean we have figured out how to actually secure or bring about that outcome. If the legitimate goal of space resource exploitation is to improve human well-being, then not every mechanism or mining regime will be equally likely to accomplish this. If there are multiple legitimate goals, then how do we reach a consensus when they clash? Can either the state or an unfettered free market be trusted to produce reasonably just outcomes? Is the whole “market-versus-state” discourse the kind of thing that we want to be taking into space in the first place? Space ethics reminds us that dogmatic adherence to preferred economic and political systems will not help us resolve these kinds of disputes, one way or the other. Enthusiasm is no substitute for analysis, especially when lives and billions of dollars of public money are at stake.

#### Violation – they didn’t

#### Prefer –

#### 1] Stable Advocacy – they can shift out in the 1AR to reclarify their orientation on things like state-based policies, IR relations, or space control good which kills high-quality engagement, but we force them to defend the entirety of the 1AC instead of just a six second plan text – triggers presumption since their epistemology influences effective policy and is a prior question to the passing of the plan.

#### 2] Real World – policy makers aren’t born from the judge’s referendum on a hypothetical plan, but real-world movements are influenced by the subjectivity and scholarship introduced in debate.

#### ESpec isn’t regressive – its core topic lit for implementation, and you had infinite prep to choose your epistemology.

### 2

#### **Interp: Debaters must not defend the hypothetical implementation of an explicit actor or action**

#### Is means is Definition of is (Entry 1 of 4) present tense third-person singular of BE **dialectal present tense** first-person and third-person singular **of BE** dialectal present tense plural of BE

Webster ND Definition of IS," Merriam Webster, <https://www.merriam-webster.com/dictionary/is> IS

#### Dialectical present tense means logical coherence which implies no implementation

Your Dictionary ND, "Dialectical Meaning," No Publication, <https://www.yourdictionary.com/dialectical> Cho

The definition of dialectical is a discussion that includes logical reasoning and dialogue, or something having the sounds, vocabulary and grammar of a specific way of speaking. An example of something dialectical is a Lincoln Douglass style of debate, where both parties argue a point in a logical order. Of, or pertaining to dialectic; logically reasoned through the exchange of opposing ideas.

#### “BE” is a linking verb, not an action verb so implementation is incoherent

Grammar Monster ND "Linking Verbs," Grammar Monster, <https://www.grammar-monster.com/glossary/linking_verbs.htm> CHO

What Are Linking Verbs? (with Examples) A linking verb is used to re-identify or to describe its subject. A linking verb is called a linking verb because it links the subject to a subject complement (see graphic below). Infographic Explaining Linking Verb A linking verb tells us what the subject is, not what the subject is doing. Easy Examples of Linking Verbs In each example, the linking verb is highlighted and the subject is bold. Alan is a vampire. (Here, the subject is re-identified as a vampire.) Alan is thirsty. (Here, the subject is described as thirsty.)



#### Violation: They defend “\_\_\_\_\_\_\_” as the actor and implement an \_\_\_\_\_\_ which isn’t resolutional OR they are extra T

#### 1] Limits and Ground - justifies infinite unpredictable aff advantage ground and extra topical enforcement mechanisms which wreck research burdens while spiking core generics.

#### 2] Semantics o/w –

#### a] Precision – they can arbitrarily jettison words which decks ground and preparation because there is no stasis point

#### b] Jurisdiction – the judge doesn’t have the authority to vote aff if it wasn’t legitimate

#### c] Durability – grammatical correctness makes debaters effective academics and professionals

#### d] Legal ed –

Heath 06 Brad, reporter at USA Today. “Small mistakes cause big problems” November 21, 2006. http://usatoday30.usatoday.com/news/nation/2006-11-20-typo-problems\_x.htm IB

In the legislative world**, such** small errors**, while uncommon, can** carry expensive consequences. **In a few cases** around the nation **this year,** typos and **other** blunders have redirected millions of tax dollars or threatened to invalidate new laws.

#### 3] Phil Ed – creates better ethical subjectivity and critical thinking that o/ws on uniqueness to LD, switch to policy and LARP on the water topic – solves all your offense

#### TVA: Read a phil aff that affirms that private appropriation is unjust with a util FW and don’t defend implementation

#### Fairness – it’s a prereq to judge evaluation and substantive engagement

#### Education – it’s the only portable impact and why schools fund debate

#### CI – a) brightlines are arbitrary and self-serving which doesn’t set good norms b) it collapses since weighing between brightlines rely on offense defense

#### DTD – its key to deter future abuse and the abuse has already occurred

#### No RVI’s- a) chilling effect – people will be too scared to read theory because RVI’s encourage baiting theory b) clash – people go all in on theory which decks substance engagement c] Norm-setting—I shouldn’t be forced to keep advocating for a bad norm d] Illogical—doesn’t make sense to win just for being fair

### 3

#### Outer space policy has always been of militarization – debates between civilian and military use are two sides of the same coin that affectively polices society, culminating in total war.

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

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

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

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

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

#### US-Russian cooperation is a unique form of empire---leverages political weight to exacerbate inequality and block the interests of developing countries

Haris Durrani 19, JD/PhD candidate at Columbia Law School and Princeton University, winner of the Sacknoff Prize for Space History, 7/19/19, “Is Spaceflight Colonialism?” <https://www.thenation.com/article/apollo-space-lunar-rockets-colonialism/>

The signatories also proclaimed that American and Soviet dominance of space amounted to de facto claims of sovereignty—a “technological partition” of orbit. Today, the Colombian Constitution still contains a provision claiming sovereignty over the orbital segment above the country’s territory.

The Bogotà Declaration is one piece of a bigger story. Historically, Third World lawyers and diplomats have long sought to reshape international law to equitably reorder barriers to access in extraterritorial or transnational domains like space, the sea, and the electromagnetic spectrum (for telecommunications). They articulated these claims by portraying US and Soviet or Russian extraterritorial activity as a unique form of empire. They saw global inequality as a perpetuation of older, more formal colonial orders, and they argued that the “Great Powers” exploited such inequality as they shaped the laws that governed extraterritorial domains.

It is often forgotten that the Outer Space Treaty of 1967—the first and, to this day, most influential treaty governing spaceflight—arrived on the heels of decolonization. Article II of the Space Treaty, which famously proscribes “national appropriation by claim of sovereignty, by means of use or occupation, or by any other means” in space, is frequently interpreted by US, Soviet, and European lawyers as an artifact of a Cold War compromise between the United States and USSR. But during its drafting, developing countries had recently declared independence or were continuously staving off foreign intervention. In light of this historical context, the treaty’s ban on claims of sovereignty has probably meant something different to the majority of the 107 state parties to the treaty which might be considered developing countries. Meanwhile, the treaty came to ban only weapons of mass destruction in space, not militarization as a whole.

#### The Moon Treaty’s project of a “common heritage” is a trojan horse for instilling militaristic control – this managerial lens renders nature and humanity fungible.

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

With these considerations in mind, Argentina, France and Poland submitted a proposal in the following year,110 leading the legal sub-committee of COPUOS to embark upon a ten-year project to draft what was to become the, largely abortive, Moon Treaty of 1979. Whilst much of the text of the Moon Treaty tracked the parallel provisions in the Outer Space Treaty, the main area of contention concerned the question of resource exploitation. As early as 1967, the Argentinian representative, Aldo Armando Cocca, had argued that the wealth and natural resources of the moon and other celestial bodies could be used ‘solely for the benefit of mankind as a whole’,111 and had subsequently submitted a draft agreement to COPUOS proclaiming such resources to be the ‘common heritage of all mankind’.112 What this was generally understood to mean was not that outer space resources should be free from ownership or exploitation (as an early Soviet draft proposed113) but, rather, that, as and when they were exploited, it should be for the benefit of the entirety of humanity.114 From that point on, the debate stabilized around two alternative schemes: whether, on the one hand, states should be entitled to exploit the resources individually subject only to an obligation to distribute the benefits ‘to all’ or whether, in the alternative, the exploitation of resources was only to take place through the medium of an international regime/agency and, pending its establishment, be subject to a moratorium.115 The final agreement offered support for both positions.116 On the one hand, it declared the moon and its natural resources to be the common heritage of mankind and that the resources ‘in place’ should not become the property of any state, international organization, non-governmental entity or natural person. It also committed parties to ‘undertake to establish an international regime’ to govern exploitation as soon as it became feasible.117 On the other hand, by limiting the prohibition on ownership of surface and subsurface resources to those ‘in place’, it offered the possibility that they might nevertheless be claimed once removed. The absence of a vaunted ‘moratorium’ on extraction, furthermore, was to suggest that exploitation might proceed subject only to the principle of ‘equitable sharing’ until the moment at which the international regime came to be established.118 In the end, however, the Moon Treaty remained largely unratified as many of its vocal opponents in the USA objected to the way in which it appeared to inaugurate a ‘system of international socialism’,119 foreclosing ‘the commercial uses of outer space by American enterprise’.120 What is worth bringing out here is not the surface-level disagreement as to the relationship between collective and individual modes of extraction or, indeed, the way in which an ‘east–west adversarialism’ appeared to have given way to a dynamic of ‘north–south resource disparity’ but, rather, to the conditions under which the formation of the outer space commons was to appear.121 In the first place, as the Nigerian representative in COPUOS noted, the language of the ‘common heritage of mankind’ had facilitated a subtle shift from a language of exploration to that of exploitation.122 Outer space was no longer simply a site of speculative scientific endeavour or open to projects of exploration and discovery, but it had become a resource or, indeed, as Myres McDougal and others were to explain, a myriad of resources of varying kinds, in which everything from solar radiation, magnetic and gravitational forces, wave lengths, geostationary locations123 through to meteors tracking through the solar system came to be conceptualized in terms of their ultimate ‘value’ or ‘utility’.124 Once again, thus, one sees the presence of a particular technological rationality undergirding the outer space regime, in which the natural and human environments were to be understood to be the objects of an instrumental reasoning that concerned itself with how they might be manipulated, controlled, exploited and, ultimately, commodified, and in which the technology through which those ends were to be both conceived and achieved (space rockets, probes, telescopes, satellites, planetary rovers and so on) would take the form of a passive, neutral, medium – as mere machines and mechanisms or as ways of doing things.125 The embrace of this rationality may, on the face of it, be seen to have been utterly perverse: the ultimate outcome of a desire to avoid a competitive stripping of the resources of the moon and other celestial bodies, resolving itself in the creation of a regime in which that objective, and that way of thinking about our planetary environment, was not just dominant but also subordinate to everything else. The technology through which those projects were to be made thinkable, furthermore, was clearly only ‘neutral’ to the extent that one could separate its existence from the fact of its (largely exclusive) possession and control by two violent, competitive, superpowers.126 As Marcuse observed, however, that same rationality – common to both Western and Soviet state forms127 – cut deeper than this. On the one hand, the technologies of mass communication, surveillance and warfare were to profoundly shape the perception, experience and apprehension of everyday life, creating a ‘technological reality’ of an ‘object world’ conceived ‘as a world of instrumentalities’.128 On the other hand, however, that same rationality would serve to alienate the subject from their life world through their incorporation into the ‘technological community of the administered population’.129 The domination of nature that technology appeared to enable was thus only one side of a formation that had, as its complement, a human domination propagated through the technological ‘administration’ of the subject and the manufacture of human desires, needs and interests.130 To the extent, then, that the Moon Treaty embraced this rationality, it was one that was ultimately pacifying in effect, swallowing up and repulsing all alternatives, bringing all within the sway of the same totalitarian tendency. In the second place, and as an apparently countervailing measure, was the idea that access to, and the use of, outer space resources should be subject to an international regime, the ‘purposes’ of which were set out in Article 11(7). Just as the International Telecommunication Union managed the ‘technical’ distribution of wavelengths and frequencies, allocating slots in the geostationary orbit, and just as the World Meteorological Organization coordinated the collection and dissemination of meteorological data, so also it was envisaged that the resources of the moon should similarly be subject to the oversight of an international regime of rational administration. The anticipated regime, it was explained, would concern itself with the ‘orderly and safe development of the natural resources’, their ‘rational management’, ‘the expansion of opportunities in the use of those resources’ and an ‘equitable sharing of the benefits’. The model of administration imagined here was one clearly designed to displace the possibility of unrestricted pillage or of primitive accumulation, and the language deployed elicited a sense of distance from precisely those ideas. No mention is made of the practices of extraction, commodification or exploitation that might be enabled; rather, it is faintly suggested, the moon might be ‘improved’ through its ‘development’, terraformed perhaps into a site fit for tourism or colonization? Yet, by the same token, the arrangements seemed to be concerned merely with the transfiguration of relations of power into bureaucratic technique and, in doing so, maintained in place the very same conditions that underpinned the practices to which it was opposed. Certainly, it was clearly envisaged that a further agreement would follow, setting out in more detail the administrative arrangements required for the purposes of the ‘equitable sharing of benefits’. Certainly, it was also possible that such arrangements might include the transfer of technology, the sharing of science and the distribution of profits. But no measure of administration could avoid the observation that the regime was to authorize in space precisely the same operations that had been productive of the material inequalities on earth, albeit this time it was ‘colonization’ or ‘conquest’ in the name of humanity (‘mankind’) rather than some small subset of the same. Finally, and related to this, the very ‘commonness’ of humanity to which the regime gave expression was ultimately a vestigial one. Humanity was to be represented here, not as a universal community of free-willing subjects or as a set of values – of rights or needs – but, rather, through the mediate category of material ‘interests’; the exploration and use of the moon, as Article 4 puts it, ‘shall be carried out for the benefit and in the interests of all countries’. What humanity had in common, thus, and what defined it once one took away the categories of rule and ownership, was a fluid, economy of ‘interests’,131 the fulfilment of which was always more or less and which was open to be bargained, traded, sacrificed and exchanged. These ‘interests’ assumed the same metaphorical function of assets and liabilities in double-entry bookkeeping – as abstract quantities capable of being compiled, indexed, managed, balanced and administered in the same way as the material resources to which they appeared to relate. Whilst undoubtedly central to the foundations of both capitalism132 and liberal democratic thought,133 they bespoke, in the same measure, of a natural social mechanism or instinct that transcended time and place, that was universally operable and ascribable equally to ‘future generations’ as much as to those of the present. They were/are, in that sense, always ‘common’ and everywhere present, even if the plea to ‘commonness’ would frequently arrive in the form of a demand for their moderation. Their function, however, has been to rationalize social relations, describe their operative mechanics and authorize sovereignty, all in a manner akin to the market – in which human life, qua interests, is the formal subject matter of processes of transaction and exchange. If then the ultimate telos of the regime was to turn, by some bewitching magic, something that was not capable of being owned into something that might become so (through its removal), so also it seemed to imagine that this was also the case with respect to the category of ‘humanity’ that it ushered into existence. Humanity comes to be expressed, ultimately, in a metaphorically commodified form of life identified in and through its relationship to the resources over which it seeks to have control. To be human is to partake of the ‘interests’ in the resources of the moon and other planetary bodies in which all are deemed to share. Just as outer space was a site in which the distinction between peace and war became blurred so as to make warfare itself an illegible part of the regime, so also we might observe, in this context, another similar construction. Here, the regime takes on the character of that which it seeks to prevent or avoid – a system of resource extraction and of primitive accumulation, through which every other relationship humankind might have with the outer space environment, and, indeed, with itself, comes to be mediated. As the instrumental object of a regime of management that has the ‘use’ of nature as its operative configuration, outer space becomes enmeshed within the one-dimensional dynamics of the total administrative state that was central to its formation and, with it, the very meaning of what it is to be human in space.

#### Scientific innovation via satellites is conscripted as a tool to further militaristic ends.

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

For the most part, the integrated utility of scientific and military technology came to be expressed through the language of ‘dual use’; just as nuclear science was capable of use for both pacific and military purposes, so also were satellites, rockets and space stations equally capable of deployment in pursuit of scientific, as well as military, ends.87 Overtly, of course, the notion of dual use took as its starting point an idea of ‘pure science’ being concerned with the discovery or production of politically innocent knowledge, which might then be put to ‘use’ or be ‘applied’ for either civilian or military purposes. Aside from the fact that the degree of control and influence exercised by defence establishments over the direction of science within research institutions put in question any idea of there being such a thing as ‘innocent’ scientific knowledge,88 it was, as Marcuse has observed, a conception of science that was already fully instrumentalized. Its very claim to objectivity was a sign of its subordination to technology and to an instrumental logic of ends. As he put it: True, the rationality of pure science is value-free and does not stipulate any practical ends, it is ‘neutral’ to any extraneous values that may be imposed upon it. But this neutrality is a positive character. Scientific rationality makes for a specific societal organization precisely because it projects mere form … which can be bent to practically all ends.89 Whilst the scientific method allowed nature to be brought under human domination through the medium of an enabling technology, it was, in the same measure, a means for the domination ‘of man by man’ insofar as the human subject would always appear before it as a mere ‘object of organization’. Both the human and the natural worlds would thus become the calculable objects of a technological rationality that knew no limits – ‘in which society and nation, mind and body are kept in a state of permanent mobilization for the defense of this universe’.90 Marcuse’s critique of the totalitarian rationalities of what he saw to be the Cold War regimes of ‘total administration’ found particular expression in the fact that scientific knowledge itself was understood to be a facet of ideological competition in its own right.91 What was at stake was not just ballistic missiles and warheads but also a capacity for scientific or technological innovation that would, itself, demonstrate to the world at large the superior social merits of capitalism or communism, respectively. The shock experienced at the launch of Sputnik I, after all, was not that the Soviet Union had suddenly acquired command over outer space or imminently threatened the USA with annihilation but, rather, that it demonstrated the superiority of its scientific and technical expertise. It was apparent to both powers at that moment that such spectacular demonstrations of scientific achievement92 were an essential part of a competitive ideology of rule that required the broad enlistment of the population to enable it to function.93 Science had its part to play, in that sense, in the affective production of fear, awe and loyalty, all of which were necessary for the operations of the Cold War to remain in place.94

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

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

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

#### The alternative is *Worldism* – the refusal of international relations dictated by militarism in favor of interventions into space as ungoverned.

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

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

# 1AC

## UV

#### 1] Reject spikes not on top cuz I wait for the 1ac to finish to formulate a strategy since I don’t know what youre going to read which moots 6 min of prep

#### 2] Reject undisclosed spikes cuz it prevents rigorously testing norms and incentivizes surprise tactics

#### 4] New 2NR Responses- A] none of the spikes have a clear implication in the 1ac B] It’s key to robustly contest their norm

## FW

## Russia

#### No Escalation over Satellites:

#### 1] Planning Priorities

Bowen 18 Bleddyn Bowen 2-20-2018 “The Art of Space Deterrence” <https://www.europeanleadershipnetwork.org/commentary/the-art-of-space-deterrence/> (Lecturer in International Relations at the University of Leicester)//Elmer

Space is often an afterthought or a miscellaneous ancillary in the grand strategic views of top-level decision-makers. A president may not care that one satellite may be lost or go dark; it may cause panic and Twitter-based hysteria for the space community, of course. But the terrestrial context and consequences, as well as the political stakes and symbolism of any exchange of hostilities in space matters more. The political and media dimension can magnify or minimise the perceived consequences of losing specific satellites out of all proportion to their actual strategic effect.

#### 2] Military Precedent

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

PREVENTING AGGRESSION IN SPACE While deterrence and the Cold War are strongly linked in the public’s mind through the nuclear standoff between the United States and the Soviet Union, the fundamentals of deterrence date back millennia and deterrence remains relevant. Thucydides alludes to the concept of deterrence in his telling of the Peloponnesian War when he describes rivals seeking advantages, such as recruiting allies, to dissuade an adversary from starting or expanding a conflict.6F 6 Aggression in space was successfully avoided during the Cold War because both sides viewed an attack on military satellites as highly escalatory, and such an action would likely result in general nuclear war.7F 7 In today’s more nuanced world, attacking satellites, including military satellites, does not necessarily result in nuclear war. For instance, foreign countries have used highpowered lasers against American intelligence-gathering satellites8F 8 and the United States has been reluctant to respond, let alone retaliate with nuclear weapons. This shift in policy is a result of the broader use of gray zone operations, to which countries struggle to respond while limiting escalation. Beginning with the fundamentals of deterrence illuminates how it applies to prevention of aggression in space.

#### Russia doesn’t cause escalation they pulled out of Crime literally yesterday – if they don’t go to war over Ukraine they would never go to war over their space sector

### Nuke War Defense

#### 1. Counter-forcing – only a few million die.

Mueller 9 [Woody Mueller, Chair of National Security Studies, Professor of Political Science at Ohio State University, Cato Senior Fellow, 2009 “Atomic Obsession: Nuclear Alarmism from Hiroshima to Al-Qaeda,” *Google Books*, October 5th, p. 8] // Re-Cut Justin

To begin to approach a condition that can credibly justify applying such extreme characterizations as societal annihilation, a full-out attack with hundreds, probably thousands, of thermonuclear bombs would be required. Even in such extreme cases, the area actually devastated by the bombs' blast and thermal pulse effective **would be limited**: 2,000 1-MT explosions with a destructive radius of 5 miles each would directly demolish **less than 5 percent** of the territory of the United States, for example. Obviously, if major population centers were targeted, this sort of attack could inflict massive casualties. Back in cold war days, when such devastating events sometimes seemed uncomfortably likely, a **number of studies** were conducted to estimate the consequences of massive thermonuclear attacks. One of the **most prominent** of these considered several probabilities. The most likely scenario--one that could be perhaps considered at least to begin to approach the rational--was a "counterforce" strike in which well over 1,000 thermonuclear weapons would be targeted at America's ballistic missile silos, strategic airfields, and nuclear submarine bases in an effort to destroy the country’s strategic ability to retaliate. Since the attack **would not** directly **target population centers**, most of the ensuing deaths would be from radioactive fallout, and the study estimates that from 2 to 20 million, depending mostly on wind, weather, and sheltering, would perish during the first month.15 That sort of damage, which would kill less than 10 percent of the population, might or might not be enough to trigger words like “annihilation.”

#### 2. No winter – rainout is guaranteed because of conversion to hydrophilic black carbon---eliminates the entire climate effect---and that’s an overestimate.

Reisner et al. 18 [Jon Reisner, atmospheric researcher at LANL Climate and Atmospheric Sciences; Gennaro D'Angelo, UKAFF Fellow and member of the Astrophysics Group at the School of Physics of the University of Exeter, Research Scientist with the Carl Sagan Center at the SETI Institute, currently works for the Los Alamos National Laboratory Theoretical Division; Eunmo Koo, scientist in the Computational Earth Science Group at LANL, recipient of the NNSA Defense Program Stockpile Stewardship Program award of excellence; Wesley Even, R&D Scientist at CCS-2, LANL, specialist in computational physics and astrophysics; Matthew Hecht is a member of the Computational Physics and Methods Group in the Climate, Ocean and Sea Ice Modelling program (COSIM) at LANL, who works on modeling high-latitude atmospheric effects in climate models as part of the HiLAT project; Elizabeth Hunke, Lead developer for the Los Alamos Sea Ice Model, Deputy Group Leader of the T-3 Fluid Dynamics and Solid Mechanics Group at LANL; Darin Comeau, Scientist at the CCS-2 COSIM program, specializes in high dimensional data analysis, statistical and predictive modeling, and uncertainty quantification, with particular applications to climate science; Randall Bos is a research scientist at LANL specializing in urban EMP simulations; James Cooley is a Group Leader within CCS-2. 03/16/2018. “Climate Impact of a Regional Nuclear Weapons Exchange: An Improved Assessment Based On Detailed Source Calculations.” Journal of Geophysical Research: Atmospheres, vol. 123, no. 5, pp. 2752–2772] // Re-Cut Justin

\*BC = Black Carbon

The no-rubble simulation produces a significantly more intense fire, with more fire spread, and consequently a significantly stronger plume with larger amounts of BC reaching into the upper atmosphere than the simulation with rubble, illustrated in Figure 5. While the no-rubble simulation **represents the worst-case scenario** involving vigorous fire activity, **only a relatively small amount of carbon makes its way into the stratosphere** during the course of the simulation. But while small compared to the surface BC mass, stratospheric BC amounts from the current simulations are significantly higher than what would be expected from burning vegetation such as trees (Heilman et al., 2014), e.g., the higher energy density of the building fuels and the initial fluence from the weapon produce an intense response within HIGRAD with initial updrafts of order 100 m/s in the lower troposphere. Or, in comparison to a mass fire, wildfires will burn only a small amount of fuel in the corresponding time period (roughly 10 minutes) that a nuclear weapon fluence can effectively ignite a large area of fuel producing an impressive atmospheric response. Figure 6 shows vertical profiles of BC multiplied by 100 (number of cities involved in the exchange) from the two simulations. The total amount of BC produced is in line with previous estimates (about 3.69 Tg from no-rubble simulation); however, the majority of BC resides **below the stratosphere** (3.46 Tg below 12 km) and can be **readily impacted by scavenging from precipitation** either via pyro-cumulonimbus produced by the fire itself (not modeled) or other synoptic weather systems. While the impact on climate of these more realistic profiles will be explored in the next section, it should be mentioned that **these estimates are** still **at the high end**, considering the inherent simplifications in the combustion model that lead to **overestimating BC production**. 3.3 Climate Results Long-term climatic effects critically depend on the initial injection height of the soot, with larger quantities reaching the upper troposphere/lower stratosphere inducing a greater cooling impact because of longer residence times (Robock et al., 2007a). Absorption of solar radiation by the BC aerosol and its subsequent radiative cooling tends to heat the surrounding air, driving an initial upward diffusion of the soot plumes, an effect that depends on the initial aerosol concentrations. **Mixing and sedimentation** tend to **reduce this process**, and low altitude emissions are also significantly impacted by precipitation if aging of the BC aerosol occurs on sufficiently rapid timescales. But once at stratospheric altitudes, aerosol dilution via coagulation is hindered by low particulate concentrations (e.g., Robock et al., 2007a) and lofting to much higher altitudes is inhibited by gravitational settling in the low-density air (Stenke et al., 2013), resulting in more stable BC concentrations over long times. Of the initial BC mass released in the atmosphere, most of which is emitted below 9 km, **70% rains out within the first month** and 78%, or about 2.9 Tg, is removed within the first two months (Figure 7, solid line), with the remainder (about 0.8 Tg, dashed line) being transported above about 12 km (200 hPa) within the first week. This outcome differs from the findings of, e.g., Stenke et al. (2013, their high BC-load cases) and Mills et al. (2014), who found that most of the BC mass (between 60 and 70%) is lifted in the stratosphere within the first couple of weeks. This can also be seen in Figure 8 (red lines) and in Figure 9, which include results from our calculation with the initial BC distribution from Mills et al. (2014). In that case, only 30% of the initial BC mass rains out in the troposphere during the first two weeks after the exchange, with the remainder rising to the stratosphere. In the study of Mills et al. (2008) this percentage is somewhat smaller, about 20%, and smaller still in the experiments of Robock et al. (2007a) in which the soot is initially emitted in the upper troposphere or higher. In Figure 7, the e-folding timescale for the removal of tropospheric soot, here interpreted as the time required for an initial drop of a factor e, is about one week. This result compares favorably with the “LT” experiment of Robock et al. (2007a), considering 5 Tg of BC released in the lower troposphere, in which 50% of the aerosols are removed within two weeks. By contrast, the initial e-folding timescale for the removal of stratospheric soot in Figure 8 is about 4.2 years (blue solid line), compared to about 8.4 years for the calculation using Mills et al. (2014) initial BC emission (red solid line). The removal timescale from our forced ensemble simulations is close to those obtained by Mills et al. (2008) in their 1 Tg experiment, by Robock et al. (2007a) in their experiment “UT 1 Tg”, and © 2018 American Geophysical Union. All rights reserved. by Stenke et al. (2013) in their experiment “Exp1”, in all of which 1 Tg of soot was emitted in the atmosphere in the aftermath of the exchange. Notably, the e-folding timescale for the decline of the BC mass in Figure 8 (blue solid line) is also close to the value of about 4 years quoted by Pausata et al. (2016) for their long-term “intermediate” scenario. In that scenario, which is also based on 5 Tg of soot initially distributed as in Mills et al. (2014), the factor-of2 shorter residence time of the aerosols is caused by particle growth via coagulation of BC with organic carbon. Figure 9 shows the BC mass-mixing ratio, horizontally averaged over the globe, as a function of atmospheric pressure (height) and time. The BC distributions used in our simulations imply that the upward transport of particles is substantially less efficient compared to the case in which 5 Tg of BC is directly injected into the upper troposphere. The semiannual cycle of lofting and sinking of the aerosols is associated with atmospheric heating and cooling during the solstice in each hemisphere (Robock et al., 2007a). During the first year, the oscillation amplitude in our forced ensemble simulations is particularly large during the summer solstice, compared to that during the winter solstice (see bottom panel of Figure 9), because of the higher soot concentrations in the Northern Hemisphere, as can be seen in Figure 11 (see also left panel of Figure 12). Comparing the top and bottom panels of Figure 9, the BC reaches the highest altitudes during the first year in both cases, but the concentrations at 0.1 hPa in the top panel can be 200 times as large. Qualitatively, the difference can be understood in terms of the air temperature increase caused by BC radiation emission, which is several tens of kelvin degrees in the simulations of Robock et al. (2007a, see their Figure 4), Mills et al. (2008, see their Figure 5), Stenke et al. (2013, see high-load cases in their Figure 4), Mills et al. (2014, see their Figure 7), and Pausata et al. (2016, see one-day emission cases in their Figure 1), due to high BC concentrations, but it amounts to only about 10 K in our forced ensemble simulations, as illustrated in Figure 10. Results similar to those presented in Figure 10 were obtained from the experiment “Exp1” performed by Stenke et al. (2013, see their Figure 4). **In that scenario as well, somewhat less than 1 Tg of BC remained in the atmosphere after the initial rainout**. As mentioned before, the BC aerosol that remains in the atmosphere, lifted to stratospheric heights by the rising soot plumes, undergoes sedimentation over a timescale of several years (Figures 8 and 9). This mass represents the effective amount of BC that can force climatic changes over multi-year timescales. In the forced ensemble simulations, it is about 0.8 Tg after the initial rainout, whereas it is about 3.4 Tg in the simulation with an initial soot distribution as in Mills et al. (2014). Our more realistic source simulation involves the worstcase assumption of no-rubble (along with other assumptions) and hence serves as an upper bound for the impact on climate. As mentioned above and further discussed below, our scenario induces perturbations on the climate system similar to those found in previous studies in which the climatic response was driven by roughly 1 Tg of soot rising to stratospheric heights following the exchange. Figure 11 illustrates the vertically integrated mass-mixing ratio of BC over the globe, at various times after the exchange for the simulation using the initial BC distribution of Mills et al. (2014, upper panels) and as an average from the forced ensemble members (lower panels). All simulations predict enhanced concentrations at high latitudes during the first year after the exchange. In the cases shown in the top panels, however, these high concentrations persist for several years (see also Figure 1 of Mills et al., 2014), whereas the forced ensemble simulations indicate that the BC concentration starts to decline after the first year. In fact, in the simulation represented in the top panels, mass-mixing ratios larger than about 1 kg of BC © 2018 American Geophysical Union. All rights reserved. per Tg of air persist for well over 10 years after the exchange, whereas they only last for 3 years in our forced simulations (compare top and middle panels of Figure 9). After the first year, values drop below 3 kg BC/Tg air, whereas it takes about 8 years to reach these values in the simulation in the top panels (see also Robock et al., 2007a). Over crop-producing, midlatitude regions in the Northern Hemisphere, the BC loading is reduced from more than 0.8 kg BC/Tg air in the simulation in the top panels to 0.2-0.4 kg BC/Tg air in our forced simulations (see middle and right panels). The more rapid clearing of the atmosphere in the forced ensemble is also signaled by the soot optical depth in the visible radiation spectrum, which drops below values of 0.03 toward the second half of the first year at mid latitudes in the Northern Hemisphere, and everywhere on the globe after about 2.5 years (without never attaining this value in the Southern Hemisphere). In contrast, the soot optical depth in the calculation shown in the top panels of Figure 11 becomes smaller than 0.03 everywhere only after about 10 years. The two cases show a similar tendency, in that the BC optical depth is typically lower between latitudes 30º S-30º N than it is at other latitudes. This behavior is associated to the persistence of stratospheric soot toward high-latitudes and the Arctic/Antarctic regions, as illustrated by the zonally-averaged, column-integrated mass-mixing ratio of the BC in Figure 12 for both the forced ensemble simulations (left panel) and the simulation with an initial 5 Tg BC emission in the upper troposphere (right panel). The spread in the globally averaged (near) surface temperature of the atmosphere, from the control (left panel) and forced (right panel) ensembles, is displayed in Figure 13. For each month, the plots show the largest variations (i.e., maximum and minimum values), within each ensemble of values obtained for that month, relative to the mean value of that month. The plot also shows yearly-averaged data (thinner lines). The spread is comparable in the control and forced ensembles, with average values calculated over the 33-years run length of 0.4-0.5 K. This spread is also similar to the internal variability of the globally averaged surface temperature quoted for the NCAR Large Ensemble Community Project (Kay et al., 2015). These results imply that surface air temperature differences, between forced and control simulations, which lie within the spread may not be distinguished from effects due to internal variability of the two simulation ensembles. Figure 14 shows the difference in the globally averaged surface temperature of the atmosphere (top panel), net solar radiation flux at surface (middle panel), and precipitation rate (bottom panel), computed as the (forced minus control) difference in ensemble mean values. The sum of standard deviations from each ensemble is shaded. Differences are qualitatively significant over the first few years, when the anomalies lie near or outside the total standard deviation. Inside the shaded region, differences may not be distinguished from those arising from the internal variability of one or both ensembles. The surface solar flux (middle panel) is the quantity that appears most affected by the BC emission, with qualitatively significant differences persisting for about 5 years. The precipitation rate (bottom panel) is instead affected only at the very beginning of the simulations. The red lines in all panels show the results from the simulation applying the initial BC distribution of Mills et al. (2014), where the period of significant impact is much longer owing to the higher altitude of the initial soot distribution that results in longer residence times of the BC aerosol in the atmosphere. When yearly averages of the same quantities are performed over the IndiaPakistan region, the differences in ensemble mean values lie within the total standard deviations of the two ensembles. The results in Figure 14 can also be compared to the outcomes of other previous studies. In their experiment “UT 1 Tg”, Robock et al. (2007a) found that, when only 1 Tg of soot © 2018 American Geophysical Union. All rights reserved. remains in the atmosphere after the initial rainout, temperature and precipitation anomalies are about 20% of those obtained from their standard 5 Tg BC emission case. Therefore, the largest differences they observed, during the first few years after the exchange, were about - 0.3 K and -0.06 mm/day, respectively, comparable to the anomalies in the top and bottom panels of Figure 14. Their standard 5 Tg emission case resulted in a solar radiation flux anomaly at surface of -12 W/m2 after the second year (see their Figure 3), between 5 and 6 time as large as the corresponding anomalies from our ensembles shown in the middle panel. In their experiment “Exp1”, Stenke et al. (2013) reported global mean surface temperature anomalies not exceeding about 0.3 K in magnitude and precipitation anomalies hovering around -0.07 mm/day during the first few years, again consistent with the results of Figure 14. In a recent study, Pausata et al. (2016) considered the effects of an admixture of BC and organic carbon aerosols, both of which would be emitted in the atmosphere in the aftermath of a nuclear exchange. In particular, they concentrated on the effects of coagulation of these aerosol species and examined their climatic impacts. The initial BC distribution was as in Mills et al. (2014), although the soot burden was released in the atmosphere over time periods of various lengths. Most relevant to our and other previous work are their one-day emission scenarios. They found that, during the first year, the largest values of the atmospheric surface temperature anomalies ranged between about -0.5 and -1.3 K, those of the sea surface temperature anomalies ranged between -0.2 and -0.55 K, and those of the precipitation anomalies varied between -0.15 and -0.2 mm/day. All these ranges are compatible with our results shown in Figure 14 as red lines and with those of Mills et al. (2014, see their Figures 3 and 6). As already mentioned in Section 2.3, the net solar flux anomalies at surface are also consistent. This overall agreement suggests that the **inclusion of organic carbon aerosols, and** ensuing **coagulation** with BC, **should not dramatically alter the climatic effects** resulting from our forced ensemble simulations. Moreover, aerosol growth would likely **shorten the residence time of the BC particulate in the atmosphere** (Pausata et al., 2016), possibly **reducing the duration of these effects.**

## Warming

#### The gender-evasiveness of the 1AC locks in the worst impacts of climate change and guts adaptive effectiveness – vote neg to *center gender in climate policy*.

Nelson et al 02 [Bracketed for G-Lang. Valerie Nelson (Social Development Specialist), Kate Meadows (Gender and Development Specialist), Terry Cannon (Reader in Development Studies at the School of HumanitiesINRI), John Morton (Reader in Development Anthropology and Associate Research Director), and Adrienne Martin (Social Anthropologist and Head of Livelihoods and Institutions Group) form part of the Livelihoods and Institutions Group, Natural Resources Institute, University of Greenwich. “Uncertain Predictions, Invisible Impacts, and the Need to Mainstream Gender in Climate Change Adaptations”. Source: Gender and Development , Jul., 2002, Vol. 10, No. 2, Climate Change (Jul., 2002), pp. 51-59. Accessed 2/16/2022. <https://www.jstor.org/stable/pdf/4030574.pdf?refreqid=excelsior%3A7b26c6a241c970e8de0abf355caf6f98&ab_segments=&origin=> //Xu]

Further research is required to explore how climate changes will manifest themselves in different regions and on different time- scales, and how social and natural systems will co-evolve. There are no 'given or a priori sets of driving forces (such as technologies, markets, policy imperatives, or cultural values) that generate particular social arrangements or patterns of change, only complex sets of connectivities between material, cognitive, social, and non-human elements' (Long 1997, 109). This is why predictions in patterns of social change and future social arrangements resulting from (uncertain scenarios of) climate change are so difficult to identify. Feminist and environmental anthropology, and the already extensive body of knowledge on rural gender relations, will provide some insights as to potential social changes in rural areas and in agriculture. Studies on the global forces at work in shaping agricultural production, rural societies, and food production are also relevant. Further work is required to analyse climate change predictions as they improve, and to consider the potential impacts of climate change on humans. Rural livelihoods and gender and power relations are embedded in social, institutional, and cultural contexts. Context-sensitive studies focusing on on-going struggles over livelihoods, status, and resources are therefore needed. These should consider the types of changes that may be in store as a result of climate change. Poverty and environment linkages do not inevitably entail a downward spiral. There is a great deal of variability in the ways in which local people relate to and manage their environments. Local people may respond to environmental degradation by developing technical and institutional innovations in natural resource manage- ment to reduce risks or reverse processes of degradation (Leach and Mearns 1996). Some changes are not, however, easy to detect without modern technology (e.g. the spread of disease-carrying organisms). It is important to avoid assumptions about how people will adapt to environmental change, including climate change, and the consequences of this for gender relations. Public policies formed on the basis of the urgent need to adapt to climate change will only form a part of the actual response on the ground, since many are not enforced. Mechanisms are needed to ensure public participation in adaptive planning for climate change. Direct representation of poor people, particularly [womxn] women, in developing adaptation responses is critical if such responses are to be responsive to their interests. Whilst specific actors can make decisions, act, and innovate, different visions of the future and certain courses of action are legitimised by others (Long 1997). This is true of public policy-making and has to be borne in mind in terms of the kinds of adaptations that will be legitimised in relation to climate change, and how these might in turn affect equity in gender relations. For example, public policies could rely upon coping strategies that are dependent upon women's unpaid labour if gender-awareness is lacking. Deliberative democracy approaches, (participatory processes and mechanisms, such as citizen juries, which enable citizens to reflect upon and research issues of importance to them) have been used to encourage public debate about the conse- quences of complex scientific developments and political processes (e.g. genetically- modified organisms), and might be an option for increasing civil society awareness of, and engagement with, climate change. Donors have been slow to face up to the potential significance of climate change, but this is starting to change. The World Bank, United Nations Development Programme (UNDP), Department for International Development (DFID), and the European Union (EU) have recently commissioned work on how climate change could affect the achievement of the Millennium Development Goals.2 Since several of these goals relate to gender issues, it is hoped that the study will address gender issues. Technical research includes developing new crop varieties tolerant of salt, water, and heat stress, which could reduce women's workload (e.g. new West African rice varieties that smother weeds) (DFID 2002). Research analysing Kyoto-related projects has found that sustainable forestry, land use, and livelihood criteria need to be integrated into international carbon offset policies (DFID 2002). Gender main- streaming should be added to 'No-regrets' measures (providing benefits now and possibly in the future) are required. Measures are needed that promote increased resilience of poor peoples' livelihoods and that tackle gender inequality now, whilst increasing climate change 'preparedness' for the future. A great deal of work is on-going in areas such as sustainable agriculture, agro-ecology, advocacy for farmers' rights, and disaster planning, but more support for such work is required, and particularly for gender awareness to be integrated. Such measures should challenge stereotypes about gender roles, women's unpaid time, and their centrality in coping strategies, and take account of the varied and changing relationships between people, poverty, and their environments. Government and civil society capacity-building in poorer countries and vulnerable regions is urgently needed. Combined with context-specific vulnerability studies, this will assist in the identification of appropriate policy options, regional collaborations, and adaptation mechanisms. Importantly, such studies could also contribute to making visible the potential gender impacts of climate change - otherwise gender inequalities will be exacerbated. Conclusions The impacts of climate change on gender relations have not been widely studied to date - they therefore remain invisible. Despite the difficulties of prediction, it is clear that the impacts of climate change will be gendered, and that these require further research. Pre-existing vulnerability to natural hazards and long-term climate change means that those most at risk of, and least able to cope with, slow- or rapid- onset disasters and environmental change, are the poorest, including poor women. There are also possibilities for positive changes to occur, as we have seen in the aftermath of disasters, when women take on new roles, challenging gender stereotypes. Public policies need to ensure that gender analysis is fully integrated to avoid exacerbating gender inequalities and to promote gender equity.

### Adaption

#### Numerous thumpers – adaption fails.

Knittel 16 [Nina Knittel (junior researcher at the Wegener Center for Climate and Global Change in Graz. In her field of research so far, she focussed on climate change related policy strategies such as adaptation and mitigation. She studied economics at the University of Graz and obtained a Master of Arts in Economics). “Climate Change Adaptation: Needs, Barriers and Limits”. Climate Policy Info Hub (The Climate Policy Info Hub has been created within the POLIMP project which has received funding from the European Union's Seventh Framework Programme for Research, Technological Development and Demonstration). 10 February 2016. Accessed 1/29/2022. <https://climatepolicyinfohub.eu/climate-change-adaptation-needs-barriers-and-limits.html> //Xu]

3.1 Barriers to adaptation decision-making

Since public and private actors are involved in the implementation of adaptation measures, decision-making barriers may reduce the desired level of adaptation. From an economic point of view, there are several barriers that prevent governments from adaptation decision-making, such as transaction costs. Other barriers emerge due to market failures such as externalities, information asymmetries, and moral hazards. The 5th Assessment Report of the International Panel on Climate Change (IPCC) (2014) provides a comprehensive literature survey identifying the following economic barriers to adaptation decision-making6:

Transaction costs. These are mainly divided into information and adjustment costs. The former referring to the costs that occur when acquiring information and the latter to the costs that come along with replacement decisions of long-lived capital.

Market failures and missing markets. These include externalities, information asymmetries, and moral hazards. This is particularly the case when considering maladaptation if adaptation actions of one economic unit negatively affect the damages of one other unit (individual, firm, country, or sector). These market failures also include the problems that arise with insufficient incentive structure and therefore assign a major role to public authorities.

Behavioural obstacles to adaptation. Includes all behavioural issues that lead to irrational decisions without using all the available information and are time inconsistent. Social norms and cultural factors also have an inadequate influence on adaptation-decision making.

#### Data not key to solve warming – and it’s not used anwyays

Starr 14 - psychologist, journalist, and professor emeritus at the City University of New York, Brooklyn College (Bernard, “Our Oceans Are Dying: Mobilizing an Indifferent Public to Confront This Crisis,” Huffington Post, 6-27-14, http://www.huffingtonpost.com/bernard-starr/our-oceans-are-dying\_b\_5533322.html)

After an eighteen-month investigation, the Commission, made up of former heads of state, government officials, and prominent business leaders concluded that our oceans are dying from climate change, pollution, and over-fishing. The Commission proposes an eight point program to rescue the oceans over the next five years. Why should we be concerned? José María Figueres, Co-chair of the Commission and former president of Costa Rica, has summed up the dire situation with these words: "The ocean provides 50 percent of our oxygen and fixes 25 percent of global carbon emissions. Our food chain begins in that 70 percent of the planet." He added that "a healthy ocean is key to our well-being, and we need to reverse its degradation." He warned: "Unless we turn the tide on ocean decline within five years, the international community should consider turning the high seas into an off-limits regeneration zone until its condition is restored." A Commission video states the crisis even more starkly: "No ocean, no us!" In his brief talk at the reception, David Miliband, also co-chair of the Ocean Commission and former UK Foreign Secretary, urged politicians, scientists, journalists, and ordinary citizens to rally behind the salvation of our oceans and the planet -- and to get the message out to others. Will getting the message out turn the tide in the battle to save the planet? I doubt it. **We are swimming in information and messages**. Earlier the this year leading scientists declared that we are fast approaching the critical point of no return for climate change -- a point with predictable devastating consequences. But **who is listening?** The public continues to be **frighteningly indifferent**. Who among the public is willing to place the salvation of the planet over immediate personal concerns? That question was dramatically called to my attention recently when I presented a list of critical issues to a group of seniors enrolled in a life-long learning program and asked them which one they would place first. The list included: terrorism and national defense, global warming, jobs, vanishing icebergs, protecting Social Security, income inequality, ocean pollution, sustaining Medicare, protecting the Amazon rain forests, reducing fossil fuel emissions, regulating Wall Street and the banks, stopping fracking (shale gas drilling), protecting wildlife (elephants, lions, whales, etc.), eliminating genetically modified foods (GMOs), campaign finance reform, free college education for all, national healthcare (Medicare for all). I was particularly interested in the seniors' answers since popular wisdom says that seniors are more concerned than other age groups with the welfare of children, grandchildren, and future generations. And no issue is more vital for the well-being of future generations than the viability of life on the planet. Psychologist Erik Erikson called this concern of older adults "generativity." But the seniors defied conventional wisdom. Jobs, Social Security, and income inequality topped their listings. Only one person, toward the end of the discussion, cited climate change -- and his response seemed almost gratuitous in recognition that we were about to screen a documentary on the melting of icebergs. Perhaps I should not have been surprised. Politicians avoid talking about environmental issues for fear of losing favor with their constituents, who are clamoring for jobs, mortgage relief, and financial security. During the 2012 presidential debates between Barack Obama and Mitt Romney environmental issues took a far **back** seat; in fact, they were barely mentioned. Both candidates knew instinctively that in the throes of an economic crisis placing the salvation of the planet high on the national agenda would not generate votes. It might even take away votes from people who feared the candidate would be indifferent to their personal struggles. So where does this leave us? If more environmental studies and more alarming news will not mobilize leaders and the public for an all-out commitment to the preservation of our small vulnerable corner of the universe, what will? Perhaps we need to shift our focus from information to changing human behavior. Let's enlist leading behavioral scientists and psychological associations to address how to awaken the public to the urgency of protecting the planet. Let's launch a campaign to make this the number-one priority. And let's adopt these mantras: No planet, no jobs; no planet, no Social Security; no planet, no mortgages; no planet, no corporate bonus packages. No planet, no us.

## Debris

#### Squo debris thumps

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

Earth orbit is getting more and more crowded as the years go by. Humanity has launched about 12,170 satellites since the dawn of the space age in 1957, [according to the European Space Agency](https://www.esa.int/Safety_Security/Space_Debris/Space_debris_by_the_numbers) (ESA), and 7,630 of them remain in orbit today — but only about 4,700 are still operational. That means there are nearly 3,000 defunct spacecraft zooming around Earth at tremendous speeds, along with other big, dangerous pieces of debris like upper-stage rocket bodies. For example, orbital velocity at 250 miles (400 kilometers) up, the altitude at which the ISS flies, is about 17,100 mph (27,500 kph). At such speeds, even a tiny shard of debris can do serious damage to a spacecraft — and there are huge numbers of such fragmentary bullets zipping around our planet. ESA estimates that Earth orbit harbors at least 36,500 debris objects that are more than 4 inches (10 centimeters) wide, 1 million between 0.4 inches and 4 inches (1 to 10 cm) across, and a staggering 330 million that are smaller than 0.4 inches (1 cm) but bigger than 0.04 inches (1 millimeter). These objects pose more than just a hypothetical threat. From 1999 to May 2021, for example, the ISS conducted 29 debris-avoiding maneuvers, including three in 2020 alone, [according to NASA officials](https://www.nasa.gov/mission_pages/station/news/orbital_debris.html). And that number continues to grow; the station performed [another such move in November 2021](https://www.space.com/space-station-dodging-chinese-space-junk-spacex-crew-3), for example. Many of the smaller pieces of space junk were spawned by the explosion of spent rocket bodies in orbit, but others were more actively emplaced. In January 2007, for instance, China intentionally destroyed one of its defunct weather satellites in a much-criticized test of anti-satellite technology that

generated [more than 3,000 tracked debris objects](https://swfound.org/media/9550/chinese_asat_fact_sheet_updated_2012.pdf) and perhaps 32,000 others too small to be detected. The vast majority of that junk remains in orbit today, experts say. Spacecraft have also collided with each other on orbit. The most famous such incident occurred in February 2009, when Russia's defunct Kosmos 2251 satellite slammed into the operational communications craft Iridium 33, producing [nearly 2,000 pieces of debris](https://swfound.org/media/6575/swf_iridium_cosmos_collision_fact_sheet_updated_2012.pdf) bigger than a softball. That 2009 smashup might be evidence that the Kessler Syndrome is already upon us, though a cataclysm of "Gravity" proportions is still a long way off. "The cascade process can be more accurately thought of as continuous and as already started, where each collision or explosion in orbit slowly results in an increase in the frequency of future collisions," [Kessler told Space Safety Magazine in 2012](http://www.spacesafetymagazine.com/space-debris/kessler-syndrome/don-kessler-envisat-kessler-syndrome/).

### Nuke War

#### Edwards – links to all our indicts of Robock and Toon – inserted blue.

Edwards 17 [Paul N. Edwards, CISAC’s William J. Perry Fellow in International Security at Stanford’s Freeman Spogli Institute for International Studies. Being interviewed by EarthSky. How nuclear war would affect Earth’s climate. September 8, 2017. earthsky.org/human-world/how-nuclear-war-would-affect-earths-climate] **Note, we are only reading parts of the interview that are directly from Paul Edwards -- MMG** Recut Justin

In the nuclear conversation, what are we not talking about that we should be?

We are not talking enough about the climatic effects of nuclear war. The “nuclear winter” theory of the mid-1980s played a significant role in the arms reductions of that period. But with the collapse of the Soviet Union and the reduction of U.S. and Russian nuclear arsenals, this aspect of nuclear war has faded from view. That’s not good. In the mid-2000s, climate scientists such as Alan Robock (Rutgers) took another look at nuclear winter theory. This time around, they used much-improved and much more detailed climate models than those available 20 years earlier. They also tested the potential effects of smaller nuclear exchanges. The result: an exchange involving just 50 nuclear weapons — the kind of thing we might see in an India-Pakistan war, for example — could loft 5 billion kilograms of smoke, soot and dust high into the stratosphere. That’s enough to cool the entire planet by about 2 degrees Fahrenheit (1.25 degrees Celsius) — about where we were during the Little Ice Age of the 17th century. Growing seasons could be shortened enough to create really significant food shortages. So the climatic effects of even a relatively small nuclear war would be planet-wide. What about a larger-scale conflict? A U.S.-Russia war currently seems unlikely, but if it were to occur, hundreds or even thousands of nuclear weapons might be launched. The climatic consequences would be catastrophic: global average temperatures would drop as much as 12 degrees Fahrenheit (7 degrees Celsius) for up to several years — temperatures last seen during the great ice ages. Meanwhile, smoke and dust circulating in the stratosphere would darken the atmosphere enough to inhibit photosynthesis, causing disastrous crop failures, widespread famine and massive ecological disruption. The effect would be similar to that of the giant meteor believed to be responsible for the extinction of the dinosaurs. This time, we would be the dinosaurs. Many people are concerned about North Korea’s advancing missile capabilities. Is nuclear war likely in your opinion? At this writing, I think we are closer to a nuclear war than we have been since the early 1960s. In the North Korea case, both Kim Jong-un and President Trump are bullies inclined to escalate confrontations. President Trump lacks impulse control, and there are precious few checks on his ability to initiate a nuclear strike. We have to hope that our generals, both inside and outside the White House, can rein him in. North Korea would most certainly “lose” a nuclear war with the United States. But many millions would die, including hundreds of thousands of Americans currently living in South Korea and Japan (probable North Korean targets). Such vast damage would be wrought in Korea, Japan and Pacific island territories (such as Guam) that any “victory” wouldn’t deserve the name. Not only would that region be left with horrible suffering amongst the survivors; it would also immediately face famine and rampant disease. Radioactive fallout from such a war would spread around the world, including to the U.S. It has been more than 70 years since the last time a nuclear bomb was used in warfare. What would be the effects on the environment and on human health today? To my knowledge, most of the changes in nuclear weapons technology since the 1950s have focused on making them smaller and lighter, and making delivery systems more accurate, rather than on changing their effects on the environment or on human health. So-called “battlefield” weapons with lower explosive yields are part of some arsenals now — but it’s quite unlikely that any exchange between two nuclear powers would stay limited to these smaller, less destructive bombs.

#### 1] Their models are inaccurate representations.

Walker 18 – Robert Walker, M.Hum in Philosophy from York University, BA in Mathematics from York University, Software Developer, March 6, 2018, [“Debunked: Nuclear Winter and Radioactive Fallout myths,” Debunking Doomsday] Recut Justin

The Robok et all paper is based on a model of a limited exchange of nuclear weapons (say for Pakistan and India) - and this model was 3D and quite detailed. However they didn't model the actual fires themselves, or the way the cities burn, or lofting of soot into the atmosphere or the interactions of the soot with water vapour in the atmosphere. They just started their model with the atmosphere pre-loaded with soot and then ran it forward. It gets its data about the soot in the upper atmosphere from those earlier pre-Kuwaiti fire simulations. See Local Nuclear War, Global Suffering It’s an accurate bit of research based on those assumptions. They did study what would happen if the atmosphere was pre-loaded in that way. What they don’t do is discuss whether or not a nuclear war could lead to such a scenario. That is the very point that lead Carl Sagan and the others to revise their models. So - it has been way over reported as saying more than it does. It just says what would happen if the early views on the soot in the upper atmosphere were correct. It is simply not relevant if those views are incorrect as the other scientists say. It does not attempt an explanation of what happened during the Kuwaiti oil fires. WHAT WOULD REALY HAPPEN? The situation is complicated. Though many fires would break out in cities, some of them may burn for only a short time. This section is based largely on remarks by William Cohen in his 2007 book Would they combine together to make a firestorm? They didn't for Nagasaki which was a city built largely of wood and paper, which would not be permitted with a modern city. That suggests that an airburst like the one for Nagasaki would not produce a firestsorm. They did for Hiroshima but that is probably for other reasons such as widespread use of charcoal burners, as noted in a report back in 1951. But then they might be ground burst weapons, so what difference does that make? What would the end result be in the atmosphere of the complex pattern of many different fires? What would the vertical distribution be? So, there might not even be extensive fires. If there are, then going by the example of the Kuwait fires then most of the carbon was distributed in the first few kilometers and did not reach the stratosphere. Also water vapour is another complicating factor. The fires themselves produce water vapour during combustion and more is taken in from the atmosphere and lofted high where it may form clouds, which then will tend to keep the surface warmer than it would be. Also once the fires stop - and unlike the Kuwaiti oil fires they would not burn for months but be over in a short while like any other large fire (weeks at most if forests catch fire) - the excess moisture rains out taking soot and dust with it. And if forests do catch fire - then it is like the forest fires we get every year - and they do not cause global winter, or indeed, have any widespread cooling effect at all, even when they are extensive and rage for weeks. The whole thing is very complex. Here is William Cohen talking about it in his 2007 book. He is one of the experts who started off by supporting Carl Sagan’s nuclear winter models but doesn't any more. (Many of the pages are made available for public viewing via google books through that link - enough to get a good idea of his main points). He mentions other information about large scale fires such as the Dresden bombing and forest fires which again do not inject large amounts of soot into the stratosphere. So in short it's a wide ranging debate. Some think that some form of a "nuclear autumn" is possible. Many think that there would be no global climate effects at all. The idea of a true nuclear winter, turning summer into winter, is no longer on the table, except for Alan Robok, who as far as I know has not given a good reason based on modern views of how fire plumes work for their pre-loading of the upper atmosphere, the main point at contention. It's still not a literal doomsday if there is a nuclear autumn. It's rather similar to the idea of a volcanic winter after a super volcano, where you'd need to grow different crops, adapted for a colder climate until the temperatures recover. I don't mean that in the sense it is easy of course, but it is possible. It is a very similar situation to the situation after a supervolcano, so I cover that in the section What really happens if Yellowstone erupts as a supervolcano, or if some other supervolcano erupts? But many would say that it wouldn’t even lead to a nuclear autumn. Just a local cooling for as long as the fires last, like the Kuwaiti case, and that as soon as the soot rains out, the whole thing is over.

#### 2] They just assume the smoke ends up the atmosphere.

Seitz 6 – Visiting Scholar at Harvard’s Center of International Affairs (Russell, “The ‘Nuclear Winter’ Meltdown” <http://adamant.typepad.com/seitz/2006/12/preherein_honor.html>) Recut Justin

Dark smoke clouds in the lower atmosphere don’t last long enough to spread across the globe. Cloud droplets and rainfall remove them. Rapidly washing them out of the sky in a matter of days to weeks- not long enough to sustain a global pall. Real world weather brings down particles much as soot is scrubbed out of power plant smoke by the water sprays in smoke stack scrubbers. **Robock acknowledges this- not** even **a single degree of cooling results when soot is released at lower elevations in his models**. The workaround is to inject the imaginary aerosol at truly Himalayan elevations - pressure altitudes of 300 millibar and higher , where the computer model's vertical transport function modules pass it off to their even higher neighbors in the stratosphere , where it does not rain and particles linger. The new studies like the old suffer from the disconnect between a desire to paint the sky black and the vicissitudes of natural history. As with many exercise in worst case models both at invoke rare phenomena as commonplace, claiming it prudent to assume the worst. But the real world is subject to Murphy's lesser known second law- if everything must go wrong, don't bet on it. In 2006 as in 1983 firestorms and forest fires that send smoke into the stratosphere rise to alien prominence in the modelers re-imagined world , but in the real one remains a very different place, where though every month sees forest fires burning areas the size of cities - 2,500 hectares or larger , stratospheric smoke injections arise but once in a blue moon. So how come these neo-nuclear winter models feature so much smoke so far aloft for so long? The answer is simple- the modelers intervened. Turning off vertical transport algorithms may make Al Gore happy- he has bet on reviving the credibility Sagan's ersatz apocalypse , but there is no denying that in some of these scenarios human desire, not physical forces accounts for the vertical hoisting of millions of tons of mass ten vertical kilometers into the sky.to the level at which the models take over , with results at once predictable --and arbitrary. This is not physics, it is computer gamesmanship carried over to a new generation of X-Box. I must now return to getting and vetting the new papers and their references- this has been a prelimnary examination of what the public has been told, and more detailed critiques of the science will doubtless be direected to the journals were the new work appeared . This time round , the details are scarcely worth arguing, because the global frost made famous by the original 'TTAPS' model has disappeared . From the truly frigid 7,000 degree-day "baseine case" advertised as hard science in 1983 to a tepid results of today, "Nuclear Winter has well and truly melted down. The 1986 review of TTAPS reception follows. *The Melting of 'Nuclear Winter'*

#### 3] They conduct their study in a continent where it doesn’t rain.

Robock and Toon 10 (Alan, professor of cliatology in the Department of Environmental Sciences at Rutgers University and the associate director of the Center for Environmental Prediction and Owen, “Local Nuclear War, Global Suffering” Scientific American, Jan 2010, Vol. 302, Issue 1 pg 74-81)

Robock and his colleagues, being conservative, put five teragrams of smoke into their modeled upper troposphere over India and Pakistan on an imaginary May 15. The model calculated how winds would blow the smoke around the world and how the smoke particles would settle out from the atmosphere. The smoke covered all the continents within two weeks. The black, sooty smoke absorbed sunlight, warmed and rose into the stratosphere. Rain never falls there, so the air is never cleansed by precipitation; particles very slowly settle out by falling, with air resisting them. Soot particles are small, with an average diameter of only 0.1 micron (µm), and so drift down very slowly. They also rise during the daytime as they are heated by the sun, repeatedly delaying their elimination. The calculations showed that the smoke would reach far higher into the upper stratosphere than the sulfate particles that are produced by episodic volcanic eruptions. Sulfate particles are transparent and absorb much less sunlight than soot and are also bigger, typically 0.5 µm. The volcanic particles remain airborne for about two years, but smoke from nuclear fires would last a decade.