### 1AR – Extension

#### Space is the new frontier for endless capitalist expansion ensuring mass launch--

#### 1] UV floods cause the elimination of all human microbial resistance. Viruses become pathogenic and resistant to immune response which is existential—1AC Surpiya.

#### 2] Mass launch injects the stratosphere with black carbon and alumina which is exponentially more heat-trapping than CO2, setting off irreversible feedback loops of warming, ozone depletion, and ocean acidification—accelerates environmental destruction and ensures extinction—1AC Karieva.

#### 3] Independently, appropriation justifies mass racialized surveillance and magnifies inequality in space—1AC Stockwell, which is a tiebreaker and breaks down cooperation

### 1AR – AT: Cap Good

#### 1] Top level--No link – we say corporate colonialism in space is bad, and the onus is on them to prove that ending markets in space dismantles cap on Earth.

#### 2] No circumvention – the res doesn’t have an actor or implied action. Cap inevitable doesn’t disprove the res AND we don’t need to win all cap bad to prove that cap in space makes appropriation unjust.

#### 3] Unsustainable--Growth results in warming and can’t solve it.

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Green growth – alternatively, the ‘green economy’ (UNEP 2011) or the ‘green transition’ (AASA 2011) – is a recent and increasingly popular (Jacobs 2013) addition to climate policy frameworks. Green growth is distinct from sustainable development as it casts off notions of social justice, democratization, and traditional regulation of industry central to the sustainable development narrative (Dale et al. 2016). Along with the belief that environmental pressure and GHG emissions can be decoupled from economic growth – familiar in similar ideas such as ecological modernization theory, the environmental Kuznets curve, and weak sustainability theories – the more distinctive claim of green growth is that there are a series of ‘synergies’ between environmental protection and economic growth, or, economic capital can benefit from the protection of ‘natural capital’ (Bowen & Frankhauser 2011; Hallegatte et al. 2011; Jacobs 2013; Jänicke 2012; Mathews 2012). Highlighting the economic benefits of environmental protection has gained traction through reports and recommendations from a number of international institutions: the EU Commission (2010), the Association of Academies of Sciences in Asia (AASA 2011), the United Nations Environmental Programme (UNEP 2011), the Organization for Economic Co-operation and Development (OECD) (e.g. 2011), and the World Bank (e.g. 2012) (for summary of some of these major reports, see Jänicke 2012). We argue that the green growth strategy dilutes both the capital-climate and technical potential-productive relations contradictions.

Green growth is believed to be possible through three policy mechanisms: (1) green stimulus packages, (2) market-corrective or price-based policies (discussed in section ‘The ideological greening of markets via misunderstanding’), and (3) green industrial innovation (discussed in section ‘The ideological greening of technology via displacement’) (Jacobs 2013; for overlapping green growth strategy typologies, see Bowen & Frankhauser 2011; Hallegatte et al. 2011; OECD 2011). Green Keynesian stimuluses in environmental industries were adopted by a number of national governments following the 2008 financial crisis and recession (Jacobs 2013). The argument is that all three policy mechanisms are good for the economy and the climate. In short, ‘[g]reen growth is about making growth processes resource-efficient, cleaner, and more resilient without necessarily slowing them’ (Hallegatte et al. 2011: 3). When compared to other climate policy frameworks, what differentiates green growth is its ability to draw from nonclassical economic perspectives (e.g. Keynesian) (Bowen & Frankhauser 2011) and, as stressed above, framing environmental protection as an economic opportunity, rather than an economic burden. Additionally, green growth thinkers are less naïve than some climate change economists, from an ecological perspective: they argue for urgent and immediate action (Hallegatte et al. 2011; Jacobs 2013; OECD 2011) and ‘moderate’ growth rates (Jänicke 2012; UNEP 2011).

Despite its unique and promising features as a policy framework, green growth has been met with criticisms (e.g. Dale 2015; Hoffmann 2011; Santarius 2012; Yun 2010; for collection of leading critics, see Dale et al. 2016). In the context of climate change, Hoffmann (2011) provides a number of reasons that green growth is an ‘illusion’ of ‘false hopes’. Greening growth at the scale and pace needed to limit global warming to 2°C by 2050 is unfeasible for a number of reasons, including (1) carbon intensity would need to be reduced by at least 21 times (assuming 2% gross domestic product (GDP) increases per year, a low estimate) and up to 128 times (assuming 2% GDP increases per year coupled with developing countries ‘catching up’ to developed countries) – reductions that seem unfeasible through green growth mechanisms; (2) efficiency increases in a given developed country often result from outsourcing environmentally destructive industries (cf. Santarius 2012); (3) it is highly unlikely that renewable energy will completely displace fossil fuels (cf. York 2012); (4) consumption habits will need to be radically altered; and (5) increased efficiency may increase the consumption of fossil fuel resources (i.e. the Jevons paradox discussed above; cf. Santarius 2012). Furthermore, since the implementation of South Korea’s National Strategy for Green Growth – the case study of green growth policy (Mathews 2012) – carbon dioxide emissions and energy use have increased (Bluemling & Yun 2016: 125; Gunderson & Yun 2017).

These limitations of green growth stem from its masking over of the capital-climate and the technical potential-productive relations contradictions. Green growth is the union of the ideological greening of markets and technology, coupled with a supposedly environmentally conscious and exceedingly technocratic Keynesianism. Thus, all of the criticisms developed in the previous two sections also apply to the green growth strategy. It is ‘sustainable development without the tears’ (Dale et al. 2016: 6) and ecological modernization without appeals to other modern values beyond growth through technological progress and market expansion. Above, we highlighted Larrain’s (1982) concept of dilution as a form of contradiction concealment: a contradiction is recognized but there is an attempt to weaken the contradiction by reconciling irreconcilable elements. The common example of contradiction dilution in Marxist scholarship is the continually undercut and disappointed attempt by labor to improve relations with capital (i.e. to find ‘win–win’ policies). The claim is that these policies often fail to make long-lasting and significant changes, with capital usually triumphant because the interests of labor and capital are irreconcilable. We find a similar situation with the green growth strategy, which recognizes that there is a tension between capital and the climate, but attempts to conceptually weaken the contradiction by reconciling elements that are irreconcilable in reality (i.e. continued economic growth and adequate reduction in GHG emissions). Furthermore, it recognizes that the technical potential for a sustainable society exists, yet attempts to sustain the institutionalized social relations that block this potential. The very notion of ‘green growth’ epitomizes ‘a solution in the mind to contradictions which cannot be solved in practice; it is the necessary projection in consciousness of man’s practical inabilities’, that is, an ideology (Larrain 1979: 46).

#### 4] Big Tech corrupts conservation projects and greenlights ecocide.

Hogan 18 – Mél Hogan is an Assistant Professor of Environmental Media, CMF, University of Calgary. (“Big data ecologies, 2018, pg. 644-649) julian

Ecology is the broadest but youngest of sciences. It was first conceived during the 18C as an ‘economy of nature’ by Swedish botanist Carolus Linnaeus who observed and documented the interactions of plants and animals. In 1866, ‘Ecology’ got its official name from German biologist, Ernst Haeckel, as the concept shifted from the lab to the field. Early ecology produced food chain diagrams and animal pyramids as means to interpret and explain the various support systems at play in specific contexts. In the 1920 and 1930s, ecological work became quantified and partitioned in order to be explored scientifically, where principles of physical chemistry could be applied to nature. However, the ideas that ended up most transforming the field were the recognition of organisms as part of a physical environment, and the observation of competition among species. Modern ecology emerged in the 1970s, developed as a utilitarian and serviced-based approach to generate public interest in environmental conservation. Through these reconfigurations, the field shifted again, from ‘ecology’ to ‘ecosystems,’ or ‘systems ecology.’ By the 1990s, ecosystems management became more overtly a method to estimate the economic value of natural resources: nature as commodity. As we see with Big Tech, land and water in particular have become incorporated into trade mechanisms.

Before ecosystems management became a utilitarian deployment of science, the environment was largely considered to be in ‘natural production’ offering ‘non-appropriable gifts of nature’ (Gómez-Baggethun et al., 2010). Nature was not something owned, and as such, had no inherent monetary value, nor was it perceived as serving humans in any useful way. But the mainstreaming through science and policy making of ecosystems management by the late 1990s saw the value of global natural capital and ecosystem services become interlinked. This approach: ‘stressed human dependency not only on ecosystem services, but also on the underlying ecosystem functioning, contributing to make visible the role of biodiversity and ecological processes in human well-being.’ (Gómez-Baggethun et al., 2010: 1214) Incentives for conservation became baked into the economy – monetized, appropriated and exchanged – coinciding with the expansion of neoliberalism. Now, the connection between neoliberalism and dataism becomes crucial to understanding this potentially new wave of ecosystems management.

This new wave will reinforce the idea of control – of a control society – or a society controlled by scientific logics, which is increasingly determined by Big Data and its push to quantify every aspect of existence as a way to be better managed. This is key. If we have Big Data determining our needs, we also need to create the Big Data Ecologies to maintain them. It becomes not only more difficult to opt out of this system, but also more difficult to see outside of this frame. However, the idea of an ecosystem was shaped early on according to a budding machine logic, where elements of the ecosystem were understood and manipulated as nodes in a complex system of interrelationships that can be ‘datafied’ – mapped, observed, intercepted and interpolated. Now the machine (and its logics) has changed – it is algorithmically larger and more powerful, and it is learning from ‘itself’ in a manner we term ‘artificial’ intelligence.

While Ecology as a discipline has long been focused on the interrelationships between living organisms and the environments in which they live, the concept of ‘media ecology’ has denoted different theoretical intentions, though arguably circling back to this always vexing concept of nature. Marshall McLuhan (1962, 1964) developed the concept of ‘media ecology’ in the late 1960s to explain the various eras of humanity according to the role of technology in social transformations. Neil Postman (1970) carried on this intellectual legacy and used the concept of media ecology to draw attention to processes and structures of media rather than to its content or to textual analysis. Matthew Fuller (2007) pluralised the concept, as ‘media ecologies,’ and invited readers to a kind of multiplicitous materiality, complicating perceptions about the physicality of information. Since then, numerous important interrelated concepts have emerged to reinstate more overtly the ideas of nature and materiality within a mediated ecological frame: Stacy Alaimo’s desire to ‘track’ ‘environmental traces’ in texts (2011), Jussi Parikka’s (2012) ‘medianature’ – borrowed from Donna Haraway’s (2003) earlier idea of ‘naturecultures,’ – both pointing to the complex weaving of meaning and materiality. Serenella Iovino and Serpil Oppermann’s (2014) ‘material ecocriticism,’ further suggests that stories (are) matter, those generated by material agencies and phenomena and, most importantly to the argument, scholars who put into question the universality of the Anthropocene, such as Ruth Irwin (2013), Sheena Wilson (2014), Jason W. Moore (2015) or Zoe Todd (2016), who position the geological era in question as a neoliberal undoing, rather than generalisable human impact. These scholarly interventions come to represent a reformulation of media theory by complicating matter at the heart of both technology and the environment, as neither distinct nor separable. In particular, by suggesting that media objects (and their affects/effects) have agency this (new) materialist turn in media and communication studies allows for a rethinking of the traditional ecological framework in favour of ‘Big Data Ecologies’ that bear a particular pointedness – a responsibility and an accountability.

Who has power, who benefits, who suffers, and how those choices are justified by the meanings attributed to ‘nature’ and innovation vary according to conditions at different technological junctures. This task of deciphering those power dynamics is, in part, the work reserved for critical scholars. Communication infrastructures elicit something important about our shared cultural values, structures, and histories that cannot be measured by Big Data or science alone. Big Data becomes the site of justification for, rather than a byproduct of, the natural disasters and effects of global warming that we must now all endure despite our positionality, philosophical ideals, material access, or place of power in the world. As such, an expanded and more readily interdisciplinary adaptation of the concept of Big Data Ecologies can be employed to advance our understanding of Big Tech as a Western convenience, where waste and polluting processes are most often done in an unacknowledged ‘elsewhere,’ as a system that relies heavily on disjunctures and contradictions (for discursive/greenwashing purposes in particular), and on the public perception of communications infrastructure as cloud-like, as immaterial and ephemeral. Conversely, Big Tech’s hypervisibility around their data centers and their greening efforts fail to consider the implications outside of the economic perspective that sets value, inclusive of human worth and/in relation to primary resources (Kaika and Swyngedouw, 2014). As Wilson explains, by imagining ways to salvage capitalism and the environment as though the survival of one is not reliant on the destruction of the other, we fail to see beyond the superficial offerings of greening initiatives by Big Tech. In line with Wilson my overall argument is about how the so-called ‘greening' of Big Data Ecologies are thin narratives that deploy textual and visual rhetorical strategies intended to obfuscate and overwrite resource exploitation.

With the Google Water and Apple Forest examples, I have carefully accounted for the ways in which Big Tech, and their data centers in particular, have come to monumentalize consumption, and have set in motion a means by which expansion – especially of green energy alternatives – are a symbol of technological success and survival. And yet no matter how green data centers become, and no matter how innovative renewable energy is, there is a larger media ecosystem undergirding it – a world of limited natural resources, techno-trash, toxic bodies, and e-waste – driven by ideals of innovation based on the perpetual marketing of the new. Public relations and marketing need to go beyond common branding tactics, where greening mechanisms are themselves used to perpetuate a sustainable future. What is revealed in both examples is that the goals of Big Tech are fundamentally at odds with the business of these companies, whether it is device manufacture in East Asia, delivery of goods from warehouses across North America, or the cooling operations required of massive always-on server farms.

While more environmentally sound in the immediate sense, green alternatives situated in proximity to sites of consumption, but not of production, ultimately cannot inherently resolve questions of social accountability or enlightened governance that are crucial in terms of current policy debates. Indeed, it is extremely problematic to ask these companies to take on a central role in the debate of what constitutes the public good when they have other very real objectives, such as providing returns to stockholders. So part of the problem here – a big part – is the erosion of regional, national and international public policy that could set and attain ‘good’ energy goals through policy and legislation, rather than leave it to the good graces of a company, which is subject to the fickle winds of public perception. As the now widely used concept of the Anthropocene has suggested, human impact has become central to our notion and assessment of progress in relation to nature (Brown and Timmerman, 2015). We must, however, further consider how economic incentives have changed since the world was still largely unmapped (in the settler sense), imagined by many of its explorers as undepletable, offering abundant resources to all, for all times. At our current juncture, however, green alternatives further evade cause in that they allow us to stall and deflect on the question of both consumption and production, even at our breaking point (Zehner, 2012).

Instead of dealing with consumption at the site of production, Big Tech is investing in large swaths of land, public infrastructure and in the management and containment of natural resources primarily in its marketplaces, as discursively enclosed ecosystems. Just as Houston’s sprawling housing and industrial developments on vulnerable waterways could not stand in the way of a so-called 100-year storm, Hurricane Harvey, Big Tech is building containment systems that will not achieve the same goals in data management. It does this in order to counter competition for the growing rarity of natural resources, to control its sources of energy, and to keep up with ever-growing consumption demands. It is grabbing at natural resources, water and land, and also the wind and sun, to seem self-sufficient and also, by way of a complex definition, self-contained. This pairing is not necessarily new nor specific to new media economies. However, these examples do demonstrate the ways in which Big Tech becomes a spawning species of its own doing: at once predatory, fungal, feral and invasive.

While Big Tech has always relied upon nature in the production of technologies and is increasingly attempting to manage itself as an ecosystem, that is, as a self-sustaining complex network of interdependent and interconnected nodes in a system, it nevertheless fails to reconsider the impact of the very demand on which its supply depends. While implementing material physical infrastructures toward ecosystemic ends, it deploys a capitalist modality of nature to assert itself as green and environmentally-friendly. Natural resources are necessary to the operations of Big Tech, even if, by any calculation, online consumption (McKeown, 2013) – as social media, surveillance, communication, and entertainment – simply cannot be materially supported at today’s data-driven expansion rates (Nye, 1996). The problem, however, is that while the concept of a global ecosystem is necessary to make a case against greed and overconsumption, it is also a re-invocation of the same scientific regimes that have long rationalized the domination of machine logics over nature.

We entrust technology with the task to solve the problems it creates, even if water, forests, and rare earth minerals are inherently – and ultimately – counter-commercially sustainable. I

n other words, the planet can never replenish the raw materials that have been extruded, and once disused, returned as waste to the ecosystem. Forest, and ecosystems more generally, are said to have a tipping point after which they will not replenish on their own. The time lag of the effects and repercussions of hasty and greedy human interventions – causing animal extinction or forest depletion – take significantly longer to manifest than capitalism invests in managing those same resources. Natural resources are transformed for quick and immediate economic profit. As such, they require rationing policies and practices or they otherwise risk becoming (too quickly) overused and too carelessly dumped elsewhere, determined also by oversimplified economic calculations. In economic terms, value is independent of the resource itself. Nature comes to belong to the highest bidder. This, in turn, means the ecosystemic logic is one based on present and potential utility, with little to no concern for the long term, or for future generations. Big Tech must be repositioned within a Big Data ecosystemic framework to acknowledge technological progress and innovation as a complex player in the transformation of nature and its management, rather than simply either its abuser or its custodian.

## AT

### 1AR – AT: Implementation Mechanism

#### Counterinterp – We can defend the resolution as a general principle if the resolution does not have an actor or implied action. We don’t have to defend anything beyond the words of the resolution

On their card-- no action so there is nothing to enact – double bind – either affirming the words is enough to be legislation or their definition is wrong

#### 1. Limits – lack of action implied by the resolution means that their interp justifies any plan that is related to the resolution – a] forces us to be extra T and implement additional mechanisms which decks neg prep and engagement and b] allows affs to defend policies that fiat out of neg ground, e.g., bans on space activity altogether – there is no non-arbitrary limit to what we can and can’t implement

#### 2. Arbitrariness – their interp justifies infinite T debates that force the affirmative to be marginally more fair/educational – independently justifies reasonability with a brightline of substantive engagement because meeting the words of the resolution should be enough

### 1AR – AT: REM PIC

#### 1] It links to the net benefit---mandating sole American pursuit of REMs outerspace would obviously anger China who views it as their only leading industry ahead of the US. China will lash out as a last resort.

#### **2] PICs are a voting issue – creates vague plan writing that undermines topic education and steals the 1AC by refocusing the debate unpredictably which obviates the core topic controversy – disads solve their offense**

3] Permuation do the aff and The United States should fund the appropriation of outer space for the mining of rare earth metals from asteroids by private entities—solves the aff b/c it maintains american lead over china, no quantifiable DA to the perm means case outweighs

#### 4] PICs don’t negate this topic-- don’t prove the falsity of the resolution since there’s no justification for why US REM being good proves why private space appropriation is just.

#### 5] Perm do the counterplan -- the aff isn’t an action, we’re making a declarative statement that the rez is true on a general principle, that means PICs and process CPs can happen too. No mutual exclusivity to the aff

#### 7] Doesn’t solve case – solvency concerns aren’t relevant to the CP since we’re outlining why private space appropriation is unjust, not describing a solvency mechanism

#### 8] Decline and Chinese LIO inevitable – the US either ushers in multipolarity or breaks into Sino-US war

**Layne 18** [(Christopher, Robert M. Gates Chair in Intelligence and National Security at the George Bush School of Government and Public Service at Texas A&M University) “The US–Chinese power shift and the end of the Pax Americana.” International Affairs Vol 94, 2018, <https://www.chathamhouse.org/sites/files/chathamhouse/images/ia/INTA94_1_6_249_Layne.pdf>]

The fate of international orders is closely linked to power transition dynamics. Throughout modern international history the prevailing international order has reflected the balance of power that existed at the time of its creation. When that balance changes sufficiently, the old order will be replaced by a new one. Viewed from this perspective, what are the Pax Americana’s prospects? How will China’s rise, and America’s decline, affect the international order in the years ahead? The surprising answer given by top US security studies scholars is: ‘Not much.’ The United States, so the argument goes, can ‘lock in’ the Pax Americana’s essential features, including its rules, norms and institutions.65 John Ikenberry, Stephen Brooks and William Wohlforth are the leading proponents of the lock-in thesis. Ikenberry was the first to set out the concept, arguing in After victory that a hegemon, by building an institutionalized, rules-based international order, ‘can lock-in favorable arrangements that continue beyond the zenith of its power’.66 In other words, the international order can remain intact even after the hegemonic power that created it has lost its pre-eminent position in the international political system. On this point, Ikenberry echoes Robert Keohane’s argument in After hegemony that, once a liberal international order has been established by a hegemonic power, if the hegemon declines it is possible for a small group of Great Powers to take the place of the former hegemon and collectively manage the international system.67 That is, under certain conditions ‘hegemonic stability’ can exist even if there is no hegemonic power. In Liberal Leviathan, Ikenberry built on this logic to argue that, even if the Pax Americana were to wither completely, the LRBIO would nevertheless survive. As Ikenberry put it: ‘America’s position in the global system may decline but the international order it leads can remain the dominating logic of the twenty-first century.’68 Ikenberry’s view seems to have evolved, however. In jointly authored articles in International Security and Foreign Affairs, Brooks, Ikenberry and Wohlforth embrace hegemonic stability theory.69 That is, they contend that, like all international orders, the post-1945 international order does, in fact, require a hegemonic power to maintain it—and not just any hegemon, but the United States. The logic of their argument is that the LRBIO and the Pax Americana are one and the same, and that US pre-eminence is a necessary condition for the LRBIO. According to them, the United States must exercise ‘global leadership’—the US foreign policy establishment’s code phrase for hegemony—by acting as a security provider and geopolitical stabilizer; by maintaining an open, liberal international economy; and by promoting global cooperation through upholding and revising the post-1945 liberal order—which is both ‘institutional and normative’—created by the Pax Americana.70 They also claim that the post-1945 Pax Americana ‘allows the United States to … wrap its hegemonic rule in a rules-based order’.71 This helps to conceal the actual motives of self-interest and realpolitik that underlie American hegemony. Read together, the International Security and Foreign Affairs articles by Brooks, Ikenberry and Wohlforth make clear the authors’ view that the post-1945 LRBIO is inextricably linked to US hegemony; that is, to the Pax Americana. This is in keeping with the common understanding of hegemonic stability theory. As they see it, the post-1945 international order based on American pre-eminence ‘has served the US well for the past six decades and there is no reason to give it up now’.72 The argument has special force given that, according to the— correct—logic of their argument (and of hegemonic stability theory), if American hegemony goes, the LRBIO goes with it. In their preference for maintaining the post-1945 hegemonic American international order, Brooks, Ikenberry and Wohlforth echo the renowned late nineteenthcentury British statesman Lord Salisbury. Presiding over a hegemonic Britain that was already perceptibly declining, he famously said: ‘Whatever happens will be for the worse. Therefore, it is in our interest that as little should happen as possible.’ The post-1945 international order is (or was) a concrete manifestation of America’s hegemonic status. So, of course, the US foreign policy establishment wants as little change as possible in international politics. Why would it wish otherwise, when change would inevitably be both the cause and effect of diminishing American power and influence? The United States has every incentive for wanting to prolong the post-1945 international order. After all, for most of the last 70 years or so, the US has occupied the geopolitical penthouse (‘when America ruled the world’). From that lofty height, however, the only direction it can go is down. The lock-in strategy is seductive because it holds out (or appears to hold out) the possibility that the United States can preserve the status quo—the post-1945 international order—even as the geopolitical status quo of American hegemony is changing. Lock-in is attractive—superficially—because it assumes that China’s rise will not effect a major change in the international system. Specifically, lock-in holds that China’s rise can be managed by integrating it into the post-1945 international order, and ensuring that the exercise of Chinese power takes place within that order’s rules and institutions.73 By doing so, it is claimed, the United States can offset its declining power and ‘ensure the international order it leads can remain the dominating logic of the twenty-first century’.74 Lock-in assumes that China has no interest in overturning—or significantly modifying—the post-1945 international order in which it rose and became wealthy. Certainly, China did rise within the Pax Americana’s LRBIO. However, China did not rise to preserve that American-dominated order. For some three decades (beginning with Deng Xiaoping’s economic reforms) China took a low profile in international politics, and avoided confrontation both with the United States and with its regional neighbours. Integration into the open international economy spurred China’s rapid growth. China’s self-described ‘peaceful rise’ followed the script written by Deng Xiaoping: ‘Lie low. Hide your capabilities. Bide your time.’ However, the fact that China bandwagoned with the United States in joining the international economic order did not mean that its longer-term intention was—or is—to preserve the post-1945 international order. In joining the liberal economic order, Beijing’s goal was not simply to get rich; by integrating itself into the post-1945 international order, China was able to avoid conflict with the United States until it became wealthy enough to acquire the military capabilities necessary to compete with America for regional hegemony in east Asia.75 Judging from Xi Jinping’s policy pronouncements, China’s days of biding its time and hiding its capabilities are over. Lock-in proponents argue that even as the Sino-American military and economic balance continues to tilt increasingly in Beijing’s favour, the post-1945 international order’s rules, institutions and norms will offset America’s loss of hard power. There is historical evidence that suggests this is wishful thinking. Take the case of Britain after the Second World War. Despite the dramatic weakening of Britain’s economic and financial clout caused by its efforts in the two world wars, after 1945 British leaders believed that the United Kingdom could remain one of three major world powers. In pursuit of this goal, they formulated their own version of lock-in. As the historian John Darwin puts it, officials in London thought that by transforming the Commonwealth, Britain could transition ‘from an empire of rule to an empire of influence’.76 Specifically, they believed that ‘free from the authoritarian, acquisitive and exploitative traditions of the old version of empire’, the reconfigured Commonwealth ‘would make the British connection voluntary, democratic, and mutually beneficial’.77 The reformed Commonwealth therefore would serve as the institutional instrument of continuing British world power, within which shared values and norms would bind Britain’s former colonies and dominions to London’s leadership.78 The reasons why British policy makers bought into this vision sound an awful lot like the reasons why the presentday American proponents of lock-in think it will preserve the United States’ global leadership even as its hard power erodes. Lock-in did not work for Britain following the Second World War, and there is scant reason to think it will work for the United States in the coming years of the twenty-first century. The lock-in strategy also assumes that if the Pax Americana’s institutions are reformed, Beijing (and other non-western emerging powers) will find it more attractive to remain in the post-1945 international order than to overturn it. That assumption, however, is logically flawed: achieving lock-in by reforming the existing international order presumes that the United States can have its cake (preserving the Pax Americana) and eat it too (reforming the current international system’s legacy institutions). But, as we all know, when the cake is eaten, it’s gone. Reform—at least, any kind of reform that would appeal to China—would mean the United States yielding significant power in international institutions to accommodate Beijing. However, doing so would reduce US ability to shape outcomes, diminish Washington’s voice in international institutions, and impose constraints on US autonomy in foreign and domestic policy.79 As University of Birmingham lecturer Sevasti-Eleni Vezirgiannidou observes with respect to institutional reform: ‘It is questionable whether this will really preserve US influence or rather, on the contrary, diminish it, as the United States will have to share power in a reformed order and thus will be restricted in its ability to act unilaterally.’80 The US foreign policy establishment may talk the talk of reforming the international order (and the institutions that underpin it), but it is doubtful it will walk the walk with respect to reform, because that would mean accepting a downsized American role in international politics. On the contrary, Washington’s opposition to the AIIB indicates that the United States is not prepared to see its influence in the international order diminished. And, with respect to reforming the post-1945 international order to accommodate the reality of a risen China, this is the nub of the problem: instead of preserving the Pax Americana, reform would lead to changes in the international order that would undermine it. Of course, regardless of whether there is institutional reform, the coming decades are likely to witness major changes in the international order irrespective of America’s preferences. What will happen to the international order as China continues to rise, and America’s relative power continues to decline? As Yogi Berra, the greatest of all American philosophers (immortalized in baseball’s Hall of Fame), said: ‘Making predictions is hard. Especially about the future.’ However, one thing seems pretty certain: China is not on the verge of either of ruling the world, or becoming a global hegemon comparable to the United States after the Second World War; not yet, anyway. Thus, for the next several decades (at least) it will be neither China’s world nor America’s: international leadership will be contested.81 During this period, China can be expected to act pretty much as one would expect any Great Power to act while making the shift from rising to risen: it will use its newfound power to seek a much greater voice in managing—and shaping—the international order, and its underlying norms. For example, China will want others to acknowledge its ‘core interests’, including respect for its territorial integrity and its sovereignty. Beijing has expanded the geographic scope of its core interests beyond Tibet and Taiwan to include the South and East China Seas and Xinjiang. And, reflecting its insistence that states should refrain from intervening in others’ internal affairs, preservation of its political, economic and social systems also has been defined as a core interest.82 During the period of contested international leadership there is unlikely to be wholesale abandonment of the post-1945 international institutions. For example, as one of the five permanent members of the UN Security Council, Beijing is an acknowledged part of the Great Power club. Similarly, we should not expect to see a dramatic overhaul of the international economic system. As the world’s top-ranking exporter and trading state, China benefits hugely from economic openness. However, the state plays a much greater role in China’s economy than it does in the United States and Europe. Beijing will want rules that protect its semimercantilist economic policies and also ensure that its state-owned industries are not disadvantaged. Beijing will continue pressing for an even greater voice, both for itself and for the developing world, in institutions such as the IMF and World Bank (unless or until they are superseded by new ‘made in China’ institutions). In this respect, China will position itself as the developing world’s champion—a role for which it is well suited. Like many nations in the developing world— but unlike the United States—China has been a victim of western Great Power policies of imperialism and colonialism. As such, China has a claim to prominence in constructing a new international order that reflects the values of the developing world rather than those of the United States and the West.83 Even though the international economy will remain (more or less) open, in other respects the international system is likely to become much less liberal politically. The Chinese Communist Party’s 19th Congress demonstrated that China is not converging with the West: it is not going to become a democracy any time soon—if ever. Consequently, as China’s role in shaping the international agenda increases, democracy and human rights will become less salient. China will almost certainly try to change the norms that favour democracy promotion, ‘humani tarian’ intervention, human rights and the Responsibility to Protect. Beijing will resist norms that divide states into two camps, ranging democratic ‘good guys’ against non-democratic ‘bad guys’.84 Instead, it will offer its policy of ‘market authoritarianism’ to developing states as a better model of political, social and economic development than the US model based on the Washington Consensus. As its power continues to increase, China will seek to recast the world order in a way that not only advances its interests but also acknowledges both its enhanced power and its claims to status and prestige equal to those of the declining hegemon.85 For now, Beijing is (mostly) ‘working within the system’ to revise the post-1945 international order while simultaneously laying the groundwork for an alternative international order that eventually could displace the Pax Americana. As a 2007 report by the Center for a New American Security concluded: Rather than seeking to weaken or confront the United States directly, Chinese leaders are pursuing a subtle, multifaceted, long-term grand strategy that aims to derive as many benefits as possible from the existing international system while accumulating the economic wherewithal, military strength, and soft power resources to reinforce China’s emerging position as at least a regional great power.86 Even as it stays within the post-1945 international order, Beijing is not doing so to preserve it. In this sense, as Martin Jacques has observed, China is playing a double game. It is operating ‘both within and outside the existing international system while at the same time, in effect, sponsoring a new China-centric international system which will exist alongside the present system and probably slowly begin to usurp it’.87 The creation of the AIIB, which Beijing intends should ultimately eclipse the IMF and World Bank, is a good example of this strategy. American scholars and policy-makers believe that a lock-in strategy can be employed to head off any Chinese attempt to create a new international order, or to create a parallel order. They believe this because they have imbued the concept of a ‘rules-based, institutionalized, liberal international order’ with a talismanic quality. In so doing they have air-brushed Great Power politics out of the picture. As they see it, rules and institutions are politically neutral and, ipso facto, beneficial for all. Hence, they can be an effective substitute for declining hard power. However, rather than existing separately from the balance of power, rules, norms and institutions reflect it. Hence the world is no more likely to continue upholding the Pax Americana once US power declines than Britain’s dominions and former colonies were inclined to perpetuate the empire after the Second World War. The fate of the Pax Americana, and that of the international order, will be determined by the outcome of the Sino-American rivalry As the British scholar E. H. Carr observed, a rules-based international order ‘cannot be understood independently of the political foundation on which it rests and the political interests which it serves’.88 The post-Second World War international order is an American order that privileges US interests.89 Even the discourse of ‘liberal order’ cannot disguise this fact. Today, the ground is shifting beneath the Pax Americana’s foundations. Those who believe that lock-in can work view international politics as being, in essence, geopolitically antiseptic. For them, Great Power competition and conflict are transcended by international institutions, rules and norms. This is not how the real world works, however.90 Great Power politics is about power. Rules and institutions do not exist in a vacuum, hermetically sealed off from Great Power politics. Nor are they neutral. Rather, they reflect the distribution of power in the international system. In international politics, who rules makes the rules. In his classic study of international relations between the world wars, The Twenty years’ crisis, Carr analysed the political crisis of the 1930s caused by the breakdown of the post-First World War order symbolized by the Versailles Treaty.91 The Versailles system cracked, Carr argued, because of the widening gap between the order it represented and the actual distribution of power in Europe. Carr used the events of the 1930s to make a larger geopolitical point. International orders reflect the balance of power that exists at time of their creation. Over time, however, the relative power of states changes, and eventually the international order no longer reflects the actual distribution of power between or among the leading Great Powers. When that happens, the legitimacy of the prevailing order is called into question, and it will be challenged by the rising power(s). When the balance of power swings—or is perceived to swing—in its direction, a rising power becomes increasingly dissatisfied with the international order, and seeks to revise it. The challenger wants to change the rules embodied in the existing international order—rules written, of course, by the once dominant but now declining Great Power that created it. It also wants the allocation of prestige and status changed to reflect its newly acquired power. The incumbent hegemon, of course, wants to preserve the existing international order as is—an order that it midwifed to advance, and consolidate, its own interests. The E. H. Carr Moment presents the incumbent hegemon with a choice. It can dig in its heels and try to preserve the prevailing order—and its privileged position therein; or it can accede to the rising challenger’s demands for revision. If it chooses the former course of action, it runs the risk of war with the dissatisfied challenger. If it chooses the latter, it must come to terms with the reality of its decline, and the end of its hegemonic position. The E. H. Carr Moment is where the geopolitical rubber meets the road: the status quo power(s) must choose between accommodating or opposing the revisionist demands of the rising power(s). Liberal internationalists such as John Ikenberry argue that China will not challenge the current international order, even as the distribution of power continues to shift in its favour. This is a doubtful proposition. The geopolitical question—the E. H. Carr Moment—of our time is whether the declining hegemon in east Asia, the United States, will try to preserve a status quo that is becoming increasingly out of sync with the shifting distribution of power, or whether it can reconcile itself to a rising China’s revisionist demands that the international order in east Asia be realigned to reflect the emerging power realities. Unless the United States can adjust gracefully to this tectonic geopolitical shift, the chances of a Sino-American war are high—as they always are during power transitions.92 However, whether change comes peacefully or violently, the Pax Americana’s days are numbered.

#### No hegemony impact – empirics and political psychology prove US posture is unrelated to great power peace

Christopher Fettweis 17, associate professor of political science at Tulane University. 5/8/17, “Unipolarity, Hegemony, and the New Peace” http://www.tandfonline.com/doi/pdf/10.1080/09636412.2017.1306394?needAccess=true

Both strains of the hegemonic-stability explanation assume not only that US power is benevolent, but that others perceive it that way. Hegemonic stability depends on the perceptions of other states to be successful; it has no hope to succeed if it encounters resistance from the less powerful members of the system, or even if they simply refuse to follow the rules. Relatively small police forces require the general cooperation of large communities to have any chance of establishing order. They must perceive the sheriff as just, rational, and essentially nonthreatening. The lack of balancing behavior in the system, which has been puzzling to many realists, seems to support the notion of widespread perceptions of benevolent hegemony.101 Were they threatened by the order constructed by the United States, the argument goes, smaller states would react in ways that reflected their fears. Since internal and external balancing accompanied previous attempts to achieve hegemony, the absence of such behavior today suggests that something is different about the US version.

Hegemonic-stability theorists purport to understand the perceptions of others, at times better than those others understand themselves. Complain as they may at times, other countries know that the United States is acting in the common interest. Objections to unipolarity, though widespread, are not “very seriously intended,” wrote Kagan, since “the truth about America’s dominant role in the world is known to most observers. And the truth is that the benevolent hegemony exercised by the United States is good for a vast portion of the world’s population.” 102 In the 1990s, Russian protests regarding NATO expansion—though nearly universal—were not taken seriously, since US planners believed the alliance’s benevolent intentions were apparent to all. Sagacious Russians understood that expansion would actually be beneficial, since it would bring stability to their western border.103 President Clinton and Secretary of State Warren Christopher were caught off guard by the hostility of their counterparts regarding the issue at a summit in Budapest in December 1994.104 Despite warnings from the vast majority of academic and policy experts about the likely Russian reaction and overall wisdom of expansion itself, the administration failed to anticipate Moscow’s position.105 The Russians did not seem to believe American assurances that expansion would actually be good for them. The United States overestimated the degree to which others saw it as benevolent.

Once again, the culture of the United States might make its leaders more vulnerable to this misperception. The need for positive self-regard appears to be particularly strong in North American societies compared to elsewhere.106 Western egos tend to be gratified through self-promotion rather than humility, and independence rather than interdependence. Americans are more likely to feel good if they are unique rather than a good cog in society’s wheel, and uniquely good. The need to be perceived as benevolent, though universal, may well exert stronger encouragement for US observers to project their perceptions onto others.

The United States almost certainly frightens others more than its leaders perceive. A quarter of the 68,000 respondents to a 2013 Gallup poll in sixty-five countries identified the United States as the “greatest threat to world peace,” which was more than three times the total for the second-place country (Pakistan).107 The international community always has to worry about the potential for police brutality, even if it occurs rarely. Such ungratefulness tends to come as a surprise to US leaders. In 2003, Condoleezza Rice was dismayed to discover resistance to US initiatives in Iraq: “There were times,” she said later, “that it appeared that American power was seen to be more dangerous than, perhaps, Saddam Hussein.” 108 Both liberals and neoconservatives probably exaggerate the extent to which US hegemony is everywhere secretly welcomed; it is not just petulant resentment, but understandable disagreement with US policies, that motivates counterhegemonic beliefs and behavior.

To review, assuming for a moment that US leaders are subject to the same forces that affect every human being, they overestimate the amount of control they have over other actors, and are not as important to decisions made elsewhere as they believe themselves to be. And they probably perceive their own benevolence to be much greater than do others. These common phenomena all influence US beliefs in the same direction, and may well increase the apparent explanatory power of hegemony beyond what the facts would otherwise support. The United States is probably not as central to the New Peace as either liberals or neoconservatives believe.

In the end, what can be said about the relationship between US power and international stability? Probably not much that will satisfy partisans, and the pacifying virtue of US hegemony will remain largely an article of faith in some circles in the policy world. Like most beliefs, it will remain immune to alteration by logic and evidence. Beliefs rarely change, so debates rarely end.

For those not yet fully converted, however, perhaps it will be significant that corroborating evidence for the relationship is extremely hard to identify. If indeed hegemonic stability exists, it does so without leaving much of a trace. Neither Washington’s spending, nor its interventions, nor its overall grand strategy seem to matter much to the levels of armed conflict around the world (apart from those wars that Uncle Sam starts). The empirical record does not contain strong reasons to believe that unipolarity and the New Peace are related, and insights from political psychology suggest that hegemonic stability is a belief particularly susceptible to misperception. US leaders probably exaggerate the degree to which their power matters, and could retrench without much risk to themselves or the world around them. Researchers will need to look elsewhere to explain why the world has entered into the most peaceful period in its history.

The good news from this is that the New Peace will probably persist for quite some time, no matter how dominant the United States is, or what policies President Trump follows, or how much resentment its actions cause in the periphery. The people of the twenty-first century are likely to be much safer and more secure than any of their predecessors, even if many of them do not always believe it.

#### Unipolarity is specifically responsible for the globalization of extremism – that makes heg unsustainable.

Ibrahimi 18 (2/19/18; S. Yaqub Ibrahimi, [researcher and instructor of political science. PhD @ Carleton University] “Unipolar politics and global peace: a structural explanation of the globalizing jihad”; taylor and francis <https://www.tandfonline.com/doi/pdf/10.1080/17467586.2018.1428763?needAccess=true)>

* JSG = Jihadi-Salafi Groups

Three conclusions can be drawn from this paper. First, the peacefulness of the contemporary unipolar system could be discussed beyond the interstate conflict and the likelihood of great powers competition debate. The new forms of asymmetric warfare, particularly the emergence of JSGs and their violent activities at different levels of the global order, could be assessed as another variable in debates on the peacefulness of the system. These actors DYNAMICS OF ASYMMETRIC CONFLICT 59 emerged and operate under the unipolarity conditions. Unipolarity, in this sense, has generated conflict-producing mechanisms and nonstate actors that drove sovereign states in lengthy wars against JSGs. This argument makes a significant contribution to the unipolarity-peace puzzle, which is conventionally addressed from the interstate conflict perspective. Second, unipolarity transformed Islamist-oriented terrorism from domestic to global. In addition to other conflict-generating conditions produced under unipolarity, the United States’ unipolar policies in Muslim regions transformed the traditional near-enemy-centric narrative of jihad into a far-enemy-centric ideology. As a result of the transformation of this doctrine, new forms of JSGs emerged that posed a threat to peace and security at all levels. Finally, because of the unipolarity of the system, global peace depends largely on the sole great power’s foreign and military policies. The US interventionism, due to the absence of a challenging great power, might not generate interstate conflict. However, it would engage the US in asymmetric warfare with nonstate actors that would emerge independently or on behalf of states to disrupt the US hegemony through insurgency, terrorism, and other forms of violence at different levels. These all might not challenge the durability of unipolarity, drastically, but they would disrupt peace and security at all domestic, regional, and global levels.

#### Terrorism causes global nuclear war—collapses internal AND external stability

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But the consequences would go far beyond the effects in the target country, however, and promptly propagate worldwide. Global and national security, economy and finance, international governance and its framework, national political systems, and the behavior of governments and individuals would all be put under severe trial. The severity of the effects at a national level, however, would depend on the countries’ level of development, geopolitical location, and resilience. Global security and regional/national defense schemes would be strongly affected. An increase in global distrust would spark rising tensions among countries and blocs, that could even lead to the brink of nuclear weapons use by states (if, for instance, a sponsor country is identified). The consequences of such a shocking scenario would include a decrease in states’ self-control, an escalation of present conflicts and the emergence of new ones, accompanied by an increase in military unilateralism and military expenditures. Regarding the economic and financial impacts, a severe global economic depression would rise from the attack, likely lasting for years. Its duration would be strongly dependent on the course of the crisis. The main results of such a crisis would include a 2 percent fall of growth in global Gross Domestic Product, and a 4 percent decline of international trade in the two years following the attack (cf. Figure 3). In the case of developing and less-developed countries, the economic impacts would also include a shortage of high-technology products such as medicines, as well as a fall in foreign direct investment and a severe decline of international humanitarian aid toward low-income countries. We expect an increase of unemployment and poverty in all countries. Global poverty would raise about 4 percent after the attack, which implies that at least 30 million more people would be living in extreme poverty, in addition to the current estimated 767 million. In the area of international relations, we would expect a breakdown of key doctrines involving politics, security, and relations among states. These international tensions could lead to a collapse of the nuclear order as we know it today, with a consequent setback of nuclear disarmament and nonproliferation commitments. In other words, the whole system based on the Nuclear Non- Proliferation Treaty would be put under severe trial. After the attack, there would be a reassessment of existing security doctrines, and a deep review of concepts such as nuclear deterrence, no-firstuse, proportionality, and negative security assurances. Finally, the behavior of governments and individuals would also change radically. Internal chaos fueled by the media and social networks would threaten governance at all levels, with greater impact on those countries with weak institutional frameworks. Social turbulence would emerge in most countries, with consequent attempts by governments to impose restrictions on personal freedoms to preserve order – possibly by declaring a state of siege or state of emergency – and legislation would surely become tougher on human rights. There would also be a significant increase in social fragmentation – with a deepening of antagonistic views, mistrust, and intolerance, both within countries and towards others – and a resurgence of large-scale social movements fostered by ideological interests and easily mobilized through social media.

#### Pursuit of hegemony leads to Sino-Russia alliance and is unsustainable.

Porter, DPhil, 19

(Patrick, ModernHistory@Oxford, ProfInternationalSecurityAndStrategy@Birmingham, Advice for a Dark Age: Managing Great Power Competition, The Washington Quarterly, 42:1, 7-25)

Even the United States cannot prudently take on every adversary on multiple fronts. The costs of military campaigns against these adversaries in their backyards, whether in the Baltic States or Taiwan, would outstrip the losses that the U.S. military has sustained in decades. Short of all-out conflict, to mobilize for dominance and risk escalation on multiple such fronts would court several dangers. It would overstretch the country. The U.S. defense budget now approaches $800 billion annually, not including deficit-financed military operations. This is a time of ballooning deficits, where the Congressional Budget Office warns that “the prospect of large and growing debt poses substantial risks for the nation.”27 If in such conditions, current expenditure is not enough to buy unchallengeable military preponderance—and it may not be—then the failure lies not in the failure to spend even more. Neither is the answer to sacrifice the quality of civic life at home to service the cause of preponderance abroad. The old “two war standard,” a planning construct whereby the United States configures its forces to conduct two regional conflicts at once, would be unsustainably demanding against more than one peer competitor, or potentially with a roster of major and minor adversaries all at once.28 After all, the purpose of American military power is ultimately to secure a way of life as a constitutional republic. To impose ever-greater debts on civil society and strip back collective provision at home, on the basis that the quality of life is expendable for the cause of hegemony, is perversely to set up power-projection abroad as the end, when it should be the means. The problem lies, rather, in the inflexible pursuit of hegemony itself, and the failure to balance commitments with scarce resources. To attempt to suppress every adversary simultaneously would drive adversaries together, creating hostile coalitions. It also may not succeed. Counterproliferation in North Korea is difficult enough, for instance, but the task becomes more difficult still if U.S. enmity with China drives Beijing to refuse cooperation over enforcing sanctions on Pyongyang. Concurrent competitions would also split American resources, attention and time. Exacerbating the strain on scarce resources between defense, consumption and investment raises the polarizing question of whether preponderance is even worth it, which then undermines the domestic consensus needed to support it. At the same time, reduced investment in infrastructure and education would damage the economic foundations for conducting competition abroad in the first place. Taken together, indiscriminate competition risks creating the thing most feared in traditional U.S. grand strategy: a hostile Eurasian alliance leading to continuous U.S. mobilization against hostile coalitions, turning the U.S. republic into an illiberal garrison state. If the prospect for the United States as a great power faces a problem, it is not the size of the defense budget, or the material weight of resources at the U.S. disposal, or popular reluctance to exercise leadership. Rather, the problem lies in the scope of the policy that those capabilities are designed to serve. To make the problem smaller, Washington should take steps to make the pool of adversaries smaller.

### 1AC – Cosmic Colonialism

#### Resolved: The appropriation of outer space by private entities is unjust.

#### The Advantage is Cosmic Colonialism.

#### Private appropriation of outer space expands corporate colonialism.

Shammas and Holen 19 [(Victor L, a sociologist working at the Department of Sociology and Human Geography, University of Oslo; Tomas B., independent scholar in Oslo, Norway) “One giant leap for capitalistkind: private enterprise in outer space,” 1-29-2019, pg. 3-5] TDI

The 2010s may very well be remembered as the ‘Age of NewSpace', the decade when outer space was turned into a capitalist space, when private corporations pushed the price of launches, satellites, and space infrastructure downwards, exerting what industry insiders call the ‘SpaceX effect' (Henry, 2018), centered on the technological achievement of ‘reusability', recovering used rocket boosters for additional launches, promising to drastically reduce the price of going to space (Morring, 2016). As one report observes, ‘Not only has the number of private companies engaged in space exploration grown remarkably in recent years, these companies are quickly besting their government-sponsored competitors' (Houser, 2017). What the rockets, shuttles, ships, and landing pods will carry beneath their payload fairing or in their cargo hold, however, along with supplies and satellites, is the capitalist worldview, a particular ideology—just as Robinson Crusoe, in Marx’s ironic retelling in Capital, ‘having saved a watch, ledger, ink and pen from the shipwreck… soon begins, like a good Englishman, to keep a set of books' (Marx, 1976, p. 170), brings with him English political economy—'Freedom, Equality, Property and Bentham', as Marx (1976, p. 280) says elsewhere— to his desert island.

In early 2018, astronomers across the world learned that a New Zealand start-up, Rocket Lab, which aimed to launch thousands of miniature satellites into orbit around Earth (so-called ‘smallsats'), had planned to launch a giant, shining ‘disco ball'—the ‘Humanity Star'—into orbit around Earth. It was an elaborate marketing stunt masked by humanistic idealism. ‘No matter where you are in the world, or what is happening in your life', said Rocket Lab CEO Peter Beck, ‘everyone will be able to see the Humanity Star in the night sky' (Amos, 2018). Many astronomers expressed outrage at these plans, fearing that the light from the Human Star would threaten their ability to carry out scientific observations. But while these astronomers were incensed by the idea of a bright geodesic object disrupting their ability to carry out observations, concerns with the effects of the arrival of capitalistkind on their ability to collect data were non-existent. The astronomical community was angered by the idea of a material, concrete, visible object polluting “pure” scientific data, but it paid less attention to the (invisible and abstract) recuperation of the night sky as it was brought into the fold of capitalism.

In an interview, Beck was quizzed about the Humanity Star and asked by a reporter about the difficulties of generating profits in space (Tucker, 2018). To this Beck replied, ‘It has always been a government domain, but we’re witnessing the democratization of it…[I]t [is] turning into a commercially dominated domain'. Beck established an equivalence established between the dissolution of space as the rightful domain of states and the advent of profitmaking ventures as signs of ‘democratization'. In space, according to Beck’s logic, democratization involves the disappearance of the state and the rise of capital. The argument, of course, is impeccably post-statist: on this account, states are monolithic, conservative Leviathans beyond the reach of popular control; corporations, on the other hand, are in principle representatives of the everyman: in the age of the start-up, any humble citizen could in theory become an agent of disruption, a force for change, an explorer of space, and a potential member of the cadre of capitalistkind. Following this logic, the question for the entrepreneurs of NewSpace is how to monetize outer space, which means turning space into a space for capital; their question is how they can deplanetarize capital and universalize it, literally speaking, that is, turn the Universe into a universe for capital. In this light, Peter Beck’s distortion of democratic ideals appears eminently sensible, equating democratization with monetization, that is, capital liberated from its earthly tethers.

Emblematic of this capitalist turn in space was the founding of Moon Express in 2011, composed of a ‘team of prominent Silicon Valley entrepreneurs…shooting for the moon with a new private venture aimed at scouring the lunar surface for precious metals and rare metallic elements' (Hennigan, 2011). Following Google’s Lunar XPRIZE—an intertwining of Silicon Valley and NewSpace’s capitalistkind—which promised a $20 million prize for the first private company to land a spacecraft on the Moon, travel 500 meters, and transmit high-definition images back to Earth, all by March 2018,9 Moon Express claimed that it would be capable of landing on the lunar surface and earn the cash prize. Their stated goal was twofold: first, to mine rare resource like Helium-3 (a steadily dwindling scarce resources on Earth), gold, platinum group metals, and water, and, second, to carry out scientific work that would ‘help researchers develop human space colonies for future generations' (Ioannou, 2017). The ordering is telling: first profits, then humanity. These were the hollow, insubstantial promises of a venture-capitalized NewSpace enterprise: in early 2018, Google announced that none of the five teams competing for the Lunar XPRIZE, including Moon Express, would reach their stated objectives by the 31 March deadline and they were taking their money back (Grush, 2018). In this sense, it was typical for NewSpace in its formative years: a corporate field populated by (overly exuberant) private enterprises who promised more than they could deliver. But the belief in NewSpace is real enough. In a tome bursting with the optimism of NewSpace, Wohlforth and Hendrix claim that ‘the commercial spaceflight industry is transforming our sense of possibility. Using Silicon Valley’s money and innovative confidence, it will soon bring mass space products to the market' (2016, p. 7).

The trope of humanity plays a key role in the rhetoric of the adherents of NewSpace. To fulfill the objectives of NewSpace, including profit maximization and the exploitation of celestial bodies, the symbolic figure of a shared humanity serves a useful purpose, camouflaging the conquest of space by capitalism with a dream of humanity boldly venturing forth into the dark unknown, thereby also providing the legitimacy and enthusiasm needed to support bolster the legitimacy of NewSpace. So long as the stargazers and SpaceX watchers are permitted their fill of ‘collective effervescence', to use Durkheim’s (1995, p. 228) concept, capitalist entrepreneurs will be able to pursue their business interests more or less as they please. The spectacle of outer space is crucial in this regard.

Crucially, however, and despite this spectacle, SpaceX’s technology might not necessarily be more sophisticated than its competitors or predecessors. Some industry insiders have rebuffed some of the more the spectacular claims of NewSpace’s proponents, arguing that launch vehicle reusability requires a (perhaps prohibitively) expensive refurbishing of the rocket engines involved in launches: ‘The economics will depend on how many times a booster can be flown, and how much the individual expense will be to refurbish the booster…each time' (Chang, 2017). Reusability may be a technological dead-end because of the inherently stressful effects of a rocket launch on the launch vehicle’s components, with extreme limitations on reusability beyond second-use as well as added risks of malfunctions that customers and insurers are likely to wish to avoid. Furthermore, the Falcon Heavy still has not matched the power and payload capacity of NASA’s Saturn V, a product of 1960s military-industrial engineering and Fordist state spending programs. What SpaceX and other NewSpace corporations do with great ingenuity, however, is to manage the spectacle of outer space, producing outpourings of public fervor, aided by a widespread adherence to the ‘Californian Ideology' (Barbrook and Cameron, 1996), or post-statist techno-utopianism, in many postindustrialized societies.

The very centrality of these maneuvers has initiated a new phase in the history of capitalist relations, that of ‘charismatic accumulation'—certainly not in the sense of any ‘objective' or inherent charismatic authority, but with a form of illusio, to speak with Bourdieu, vested in the members of capitalistkind by their uncanny ability to spin mythologizing self-narratives. This has always been part of the capitalist game, from Henry Ford and onwards, but the charismatic mission gains a special potency in the grandiose designs of NewSpace’s entrepreneurs. Every SpaceX launch is a quasi-religious spectacle, observed by millions capable of producing a real sense of wonder in a condition of (legitimizing) collective effervescence.

Outer space necessarily reduces inter-human difference to a common denominator or a shared species-being. An important leitmotiv in many Hollywood science fiction movies, including Arrival (2016), is that a first encounter with an alien species of intelligent beings tends to flatten all human difference (including ethnoracial and national categories), thereby restoring humankind to its proper universality (see also Novoa, 2016). Ambassadors of Earth as a whole, not representatives of particular nations, step forth to meet alien emissaries. But even in the absence of such an encounter, the search for habitable domains (or rather, profitable locales) beyond Earth will necessarily forge a shared conception of the human condition, initiated with the Pale Blue Dot photograph in 1990. Typical of this sentiment are the words of the astronomer Carl Sagan, who famously observed of this photograph: ‘On it everyone you love, everyone you know, everyone you ever heard of, every human being who ever was, lived out their lives'.

This naïvely humanistic vision has been one of the dominant tropes in the discourse on space since the 1950s, and it remains strong today, as with the claims of the United Nations Office for Outer Space Affairs (UNOOSA) that their task is to ‘uphold the vision of a more equitable future for all humankind through shared achievements in space'. This representational tendency mobilizes humanism to generate enthusiasm about space-related activities. But such representations are increasingly being recuperated by capitalist enterprise, so that it is not humankind but its modulation by space capitalists that will launch into the dark unknown. It is not humankind but capitalistkind that ventures forth. In early 2018, NASA was set to request $150 million in its 2019 budget to ‘enable the development and maturation of commercial entities and capabilities which will ensure that commercial successors to the ISS…are operational when they are needed', only one of many signs that space is becoming a space for capitalism. According to one estimate, the value of just one single asteroid would be more than $20 trillion in rare earth and platinum-group metals (Lewis, 1996), a precious prize indeed for profit-hungry corporations.10 Even the UNOOSA spoke vociferously in favor of the commercialization of space, appealing variously to the ‘industry and private sector' and elevating the ‘space economy' to a central pillar in its Space2030 Agenda (including the ‘use of resources that create and provide value and benefits to the world population in the course of exploring, understanding and utilizing space'), even as the UN agency falls back on a humanistic, almost social-democratic vision of the equitable distribution of benefits (and profits) from space mining, exploration, and colonization (UNOOSA, 2018).

We find evidence of this strategic humanism in all manner of pronouncements from NewSpace entrepreneurs. To take but one example: Naveen Jain, the chairman and co-founder of MoonEx, a lunar commercialization firm, has claimed that ‘from an entrepreneur’s perspective, the moon has never truly been explored'. The moon, Jain has claimed, ‘could hold resources that benefit Earth and all humanity' (Hennigan, 2011). We should note the recourse to the trope of all of humanity by this NewSpace entrepreneur, mimicked in the 1979 Moon Agreement, a UN treaty, which also held that the Moon’s resources are ‘the common heritage of mankind' (Tronchetti, 2013, p. 13).11 In a purely factual sense, of course, Jain is wrong: Google Moon offers high-resolution images of the lunar surface,12 and the moon has already been explored, in the sense of being mapped, albeit rudimentarily and with room for further data collection. Crucially, however, these cartographic techniques have not been put to capitalist uses: mapping minerals, for instance, or producing detailed schemata that might one day turn the Moon into a ‘gas station' for commercial space ventures, as Wilbur Ross, Trump’s Secretary of Commerce, has proposed (Bryan, 2018). What is lacking, in short, are capitalist maps of the Moon, i.e., a cartography for capital. But as Klinger (2017: 199) notes, even though no one is ‘actively mining the Moon' at present, at least ‘six national space programs, fifty private firms, and one graduate engineering program, are intent on figuring out how to do so'; furthermore, Klinger draws attention to mapping efforts that have revealed high an abundance of rare earth metals, thorium, and iron in the Moon’s ‘Mare Procellarum KREEP' region (Klinger, 2017, p. 203).

We have already noted that it is not humanity, conceived as species-being, a Gattungswesen, that makes its way into space. The term Gattungswesen, of course, has a long intellectual pedigree, harking back to Hegel, Feuerbach, Marx, and others. The term can ‘be naturally applied both to the individual human being and to the common nature or essence which resides in every individual man and woman', Allan Wood (2004, p. 17) writes, as well as ‘to the entire human race, referring to humanity as a single collective entity or else to the essential property which characterizes this entity and makes it a single distinctive thing in its own right'. Significantly, the adherents of NewSpace often resort to the idea of humanity in its broad universality (e.g., Musk, 2017), but this denies and distorts the modulation of humanity by its imbrication with the project of global (and post-global, i.e., space-bound) capitalism. It is precisely the sort of false universality implied in the humanism of the supporters of NewSpace that Marx subjected to a scathing critique in the sixth of his Theses on Feuerbach. Here Marx noted that the human essence is not made up of some ‘abstraction inherent in each single individual' (1998, p. 570). Instead, humans are defined by the ‘ensemble of social relations' in which they are enmeshed. Under NewSpace, it is not humanity, plain and simple, that ventures forth, but a specific set of capitalist entrepreneurs, carrying a particular ideological payload, alongside their satellites, instruments, and supplies, a point noted by other sociologists of outer space, or ‘astrosociologists' (Dickens and Ormrod, 2007a, 2007b).

#### The insistence on outer space as corporate capital’s spatial fix accelerates environmental degradation.

Shammas and Holen 19 [(Victor L, a sociologist working at the Department of Sociology and Human Geography, University of Oslo; Tomas B., independent scholar in Oslo, Norway) “One giant leap for capitalistkind: private enterprise in outer space,” 1-29-2019, pg. 6-8] julian

As Earth’s empty spaces are filled, as our planet comes to be shorn of blank places, capitalistkind emerges to rescue capitalism from its terrestrial limitations, launching space rockets, placing satellites into orbit, appropriating extraterrestrial resources, and, perhaps one day, building colonies on distant planets like Mars. But why limit ourselves to Mars? As of mid-2017, NASA’s Kepler observatory had discovered more than 5000 exoplanets—planets that seem like promising alternatives to Earth, located at an appropriate distance from their respective suns in the famed ‘Goldilocks zone'. These ‘planetary candidates', as they are known —that is, candidates for the replacement of Earth, capable of supporting human life with only minimal technological augmentation or cybernetic re-engineering—are above all viable candidates for selection by specific capitalists seeking to discover new profitable ventures beyond the limits of an Earth-bound capitalism. Space reveals the impotence of the neoliberal, postFordist state, its incapacity and unwillingness to embark on gigantic infrastructural projects, to project itself outwards, and to fire the imagination of (actual) humankind. Capitalistkind steps in to fill the vacuum left behind by a state that lacks what Mann (2012, p. 170) calls ‘infrastructural power'. The old question, the question of Old Space, was quite simply: is this planet a viable site for humankind, a suitable homeland for the reproduction of human life away from Earth? But the new question, the question for NewSpace, will be: can this celestial body support capitalistkind? Will it support the interests of capitalist entrepreneurs, answering to the capitalist desire for continued accumulation?

While some elements of the astrosociological community, such as the Astrosociology Research Institute (ARI),14 insist on elucidating the “human dimension” in outer space, Dickens and Ormrod recognize that this humanization-through-capitalism really involves the ‘commodification of the universe' (2007b, p. 2). While Dickens and Ormrod develop similar arguments to those sketched here—from their concept of an ‘outer spatial fix' to their argument about outer space becoming woven into circuits of capital accumulation—they were writing at a time when their remarks necessarily remained speculative: the commercialization of space was still in its infancy. In an inversion of Hegel’s owl of Minerva, reality has since largely confirmed their ideas and caught up with theory. Above all, when considering the various ventures ongoing in space today, it is not so much the universalizing human dimension as the specifically capitalist dimension that is striking. With the advent of NewSpace, outer space is becoming not the domain of a common humanity but of private capital.

The arguments laid out above mirror an ongoing turn in critical scholarship away from the notion of the Anthropocene towards a more rigorously political-economic concept of Capitalocene, premised on the ‘claim that capitalism is the pivot of today’s biospheric crisis' (Moore, 2016, p. xi). Just as the exponents of the concept of Capitalocene emphasize that it is capitalism, and not humanity as such, that is the driving force behind environmental transformation, so too does the notion of capitalistkind emphasize that it is not humankind tout court but rather a set of specific capitalist entrepreneurs who are acting as the central transformative agents of and in outer space, with the ‘ever-increasing infiltration of capital' into what was formerly the domain of the state (Dickens and Ormrod, 2007a, p. 6). We can also think about these issues in terms of what Philippopoulos-Mihalopoulos (2015) terms ‘spatial justice'. This concept captures the fact that struggles over justice are often struggles to occupy space, as the term is more conventionally understood, as with urban battles over the ‘right to the city' (Harvey, 2008), to provide just one example. But the same also holds true for outer space: there is an ongoing struggle over the right to take up space in outer space. So far, the capitalist side appears to be winning. As the proto-communism of the Cold War-era Outer Space Treaty is abandoned—in tandem with the increased technological feasibility of exploiting resources and accumulating profits in outer space—spatial justice in outer space increasingly comes to mean the ‘justice' of capital, capitalistkind taking the place of humankind. It is comparatively easy to declare that outer space is a commons, as the Outer Space Treaty did in the late 1960s, when that domain is, for all practical purposes, inaccessible to capital; with the heightened accessibility of outer space, however, it is unsurprising that central political agents, such as President Trump’s administration, should seek to dismantle this regulatory framework and ensure the smooth functioning of capital accumulation beyond the terrains of Earth.

What kind of capitalism is being projected into space? The complexity of state-market relations is sufficient to force us to hedge against a simplified reading of space commercialization: it is not a matter of states against markets, as if the two were mutually exclusive. Instead, as Bratton (2015) suggests, we are witnessing the emergence of a ‘stack', a complex intertwining of commercial, geopolitical, and technological concerns, which challenges previous notions of state sovereignty. This can be seen as a hybridized state-market form, with technology playing a central role in reciprocal processes of political and economic transformation. On the one hand, outer space was in some sense always already the domain of marketization, albeit to a limited extent, even during the Cold War, from the first commercial satellite launch in the early 1960s to President Ronald Reagan’s implementation of the Commercial Space Launch Act of 1984, which aimed to encourage private enterprise to take an interest in an emerging launch market. As Hermann Bondi, the head of the European Space Organization, wrote in the early 1970s, ‘It is clear…that there must be three partners in space, universities and research institutions on the one hand, the government on the second and industry on the third' (Bondi, 1971, p. 9).

On the other hand, outer space still remains firmly within the domain of the state and is likely to do so for the foreseeable future, with the likely continued importance of military uses of satellite technology and the weaponization of Earth’s orbit— crucially, the Outer Space Treaty only prohibits nuclear arms and other ‘weapons of mass destruction' in space, not conventional weapons, such as ballistic missiles. One novel element in this phase of capitalism-in-space is the interrelationship between Silicon Valley, NewSpace, and the state (see, e.g., Vance, 2015). Silicon Valley’s capitalist class, including Amazon’s Jeff Bezos, play an outsize role in NewSpace. Behind and around these figures, however, remains the state—through its weighty fiscal, regulatory, military, and symbolic investments.15 To take but one example: In June 2018, SpaceX won a $130 million contract with the U.S. Air Force to launch an ‘Air Force Space Command' satellite onboard a Falcon Heavy rocket (Erwin, 2018).

Fredric Jameson’s (2003, p. 76) oft-quoted observation that it is easier to imagine the end of humankind than the end of capitalism, is realized in the ideals and operations of capitalistkind. Elon Musk has observed that the goal of SpaceX is to establish humankind as a ‘multiplanetary species with a self-sustaining civilization on another planet' whose purpose is to counteract the possibility of a ‘worst-case scenario happening and extinguishing human consciousness' (Vance, 2015, p. 5). But couldn’t we view this idealistic assertion on behalf of humanity in another way? It is not human consciousness, over and against what the writer Kim Stanley Robinson (2017, p. 2) calls ‘mineral unconsciousness' (i.e., the mute, geological reality of the natural universe), so much as a specifically capitalist consciousness that is at stake. While the actions of capitalistkind may primarily be aimed at ensuring the future survival of the human species, an additional result is to ensure that the very idea of capitalism itself will outlive a (distantly) possible extinction event. Capitalism is a self-replicating system, pushing to expand ever outwards, using a territorializing strategy of survival. As David Harvey notes, ‘a steady rate of growth is essential for the health of a capitalist economic system, since it is only through growth that profits can be assured and the accumulation of capital be sustained' (1990, p. 180). In this respect, outer space is ideal: it is boundless and infinite. As Earth comes to be blanketed by capital, it is only to be expected that capital should set its sights on the stars above. The actions of capitalistkind serve to bolster the capitalist mode of production and accumulation: it is not only life but capital itself that must outlive Earth—even into the darkness of space.

#### Environmental degradation causes extinction.

Dr. Peter Kareiva 18, Ph.D. in Ecology and Applied Mathematics from Cornell University, Director of the Institute of the Environment and Sustainability at UCLA, Pritzker Distinguished Professor in Environment & Sustainability at UCLA, et al., September 2018, “Existential Risk Due To Ecosystem Collapse: Nature Strikes Back”, Futures, Volume 102, p. 39-50

In summary, six of the nine proposed planetary boundaries (phosphorous, nitrogen, biodiversity, land use, atmospheric aerosol loading, and chemical pollution) are unlikely to be associated with existential risks. They all correspond to a degraded environment, but in our assessment do not represent existential risks. However, the three remaining boundaries (climate change, global freshwater cycle, and ocean acidification) do pose existential risks. This is because of intrinsic positive feedback loops, substantial lag times between system change and experiencing the consequences of that change, and the fact these different boundaries interact with one another in ways that yield surprises. In addition, climate, freshwater, and ocean acidification are all directly connected to the provision of food and water, and shortages of food and water can create conflict and social unrest.

Climate change has a long history of disrupting civilizations and sometimes precipitating the collapse of cultures or mass emigrations (McMichael, 2017). For example, the 12th century drought in the North American Southwest is held responsible for the collapse of the Anasazi pueblo culture. More recently, the infamous potato famine of 1846–1849 and the large migration of Irish to the U.S. can be traced to a combination of factors, one of which was climate. Specifically, 1846 was an unusually warm and moist year in Ireland, providing the climatic conditions favorable to the fungus that caused the potato blight. As is so often the case, poor government had a role as well—as the British government forbade the import of grains from outside Britain (imports that could have helped to redress the ravaged potato yields).

Climate change intersects with freshwater resources because it is expected to exacerbate drought and water scarcity, as well as flooding. Climate change can even impair water quality because it is associated with heavy rains that overwhelm sewage treatment facilities, or because it results in higher concentrations of pollutants in groundwater as a result of enhanced evaporation and reduced groundwater recharge. Ample clean water is not a luxury—it is essential for human survival. Consequently, cities, regions and nations that lack clean freshwater are vulnerable to social disruption and disease.

Finally, ocean acidification is linked to climate change because it is driven by CO2 emissions just as global warming is. With close to 20% of the world’s protein coming from oceans (FAO, 2016), the potential for severe impacts due to acidification is obvious. Less obvious, but perhaps more insidious, is the interaction between climate change and the loss of oyster and coral reefs due to acidification. Acidification is known to interfere with oyster reef building and coral reefs. Climate change also increases storm frequency and severity. Coral reefs and oyster reefs provide protection from storm surge because they reduce wave energy (Spalding et al., 2014). If these reefs are lost due to acidification at the same time as storms become more severe and sea level rises, coastal communities will be exposed to unprecedented storm surge—and may be ravaged by recurrent storms.

A key feature of the risk associated with climate change is that mean annual temperature and mean annual rainfall are not the variables of interest. Rather it is extreme episodic events that place nations and entire regions of the world at risk. These extreme events are by definition “rare” (once every hundred years), and changes in their likelihood are challenging to detect because of their rarity, but are exactly the manifestations of climate change that we must get better at anticipating (Diffenbaugh et al., 2017). Society will have a hard time responding to shorter intervals between rare extreme events because in the lifespan of an individual human, a person might experience as few as two or three extreme events. How likely is it that you would notice a change in the interval between events that are separated by decades, especially given that the interval is not regular but varies stochastically? A concrete example of this dilemma can be found in the past and expected future changes in storm-related flooding of New York City. The highly disruptive flooding of New York City associated with Hurricane Sandy represented a flood height that occurred once every 500 years in the 18th century, and that occurs now once every 25 years, but is expected to occur once every 5 years by 2050 (Garner et al., 2017). This change in frequency of extreme floods has profound implications for the measures New York City should take to protect its infrastructure and its population, yet because of the stochastic nature of such events, this shift in flood frequency is an elevated risk that will go unnoticed by most people.

4. The combination of positive feedback loops and societal inertia is fertile ground for global environmental catastrophes.

Humans are remarkably ingenious, and have adapted to crises throughout their history. Our doom has been repeatedly predicted, only to be averted by innovation (Ridley, 2011). However, the many stories of human ingenuity successfully addressing existential risks such as global famine or extreme air pollution represent environmental challenges that are largely linear, have immediate consequences, and operate without positive feedbacks. For example, the fact that food is in short supply does not increase the rate at which humans consume food—thereby increasing the shortage. Similarly, massive air pollution episodes such as the London fog of 1952 that killed 12,000 people did not make future air pollution events more likely. In fact it was just the opposite—the London fog sent such a clear message that Britain quickly enacted pollution control measures (Stradling, 2016). Food shortages, air pollution, water pollution, etc. send immediate signals to society of harm, which then trigger a negative feedback of society seeking to reduce the harm.

In contrast, today’s great environmental crisis of climate change may cause some harm but there are generally long time delays between rising CO2 concentrations and damage to humans. The consequence of these delays are an absence of urgency; thus although 70% of Americans believe global warming is happening, only 40% think it will harm them (http://climatecommunication.yale.edu/visualizations-data/ycom-us-2016/). Secondly, unlike past environmental challenges, the Earth’s climate system is rife with positive feedback loops. In particular, as CO2 increases and the climate warms, that very warming can cause more CO2 release which further increases global warming, and then more CO2, and so on. Table 2 summarizes the best documented positive feedback loops for the Earth’s climate system. These feedbacks can be neatly categorized into carbon cycle, biogeochemical, biogeophysical, cloud, ice-albedo, and water vapor feedbacks. As important as it is to understand these feedbacks individually, it is even more essential to study the interactive nature of these feedbacks. Modeling studies show that when interactions among feedback loops are included, uncertainty increases dramatically and there is a heightened potential for perturbations to be magnified (e.g., Cox, Betts, Jones, Spall, & Totterdell, 2000; Hajima, Tachiiri, Ito, & Kawamiya, 2014; Knutti & Rugenstein, 2015; Rosenfeld, Sherwood, Wood, & Donner, 2014). This produces a wide range of future scenarios.

Positive feedbacks in the carbon cycle involves the enhancement of future carbon contributions to the atmosphere due to some initial increase in atmospheric CO2. This happens because as CO2 accumulates, it reduces the efficiency in which oceans and terrestrial ecosystems sequester carbon, which in return feeds back to exacerbate climate change (Friedlingstein et al., 2001). Warming can also increase the rate at which organic matter decays and carbon is released into the atmosphere, thereby causing more warming (Melillo et al., 2017). Increases in food shortages and lack of water is also of major concern when biogeophysical feedback mechanisms perpetuate drought conditions. The underlying mechanism here is that losses in vegetation increases the surface albedo, which suppresses rainfall, and thus enhances future vegetation loss and more suppression of rainfall—thereby initiating or prolonging a drought (Chamey, Stone, & Quirk, 1975). To top it off, overgrazing depletes the soil, leading to augmented vegetation loss (Anderies, Janssen, & Walker, 2002).

Climate change often also increases the risk of forest fires, as a result of higher temperatures and persistent drought conditions. The expectation is that forest fires will become more frequent and severe with climate warming and drought (Scholze, Knorr, Arnell, & Prentice, 2006), a trend for which we have already seen evidence (Allen et al., 2010). Tragically, the increased severity and risk of Southern California wildfires recently predicted by climate scientists (Jin et al., 2015), was realized in December 2017, with the largest fire in the history of California (the “Thomas fire” that burned 282,000 acres, https://www.vox.com/2017/12/27/16822180/thomas-fire-california-largest-wildfire). This catastrophic fire embodies the sorts of positive feedbacks and interacting factors that could catch humanity off-guard and produce a true apocalyptic event. Record-breaking rains produced an extraordinary flush of new vegetation, that then dried out as record heat waves and dry conditions took hold, coupled with stronger than normal winds, and ignition. Of course the record-fire released CO2 into the atmosphere, thereby contributing to future warming.

Out of all types of feedbacks, water vapor and the ice-albedo feedbacks are the most clearly understood mechanisms. Losses in reflective snow and ice cover drive up surface temperatures, leading to even more melting of snow and ice cover—this is known as the ice-albedo feedback (Curry, Schramm, & Ebert, 1995). As snow and ice continue to melt at a more rapid pace, millions of people may be displaced by flooding risks as a consequence of sea level rise near coastal communities (Biermann & Boas, 2010; Myers, 2002; Nicholls et al., 2011). The water vapor feedback operates when warmer atmospheric conditions strengthen the saturation vapor pressure, which creates a warming effect given water vapor’s strong greenhouse gas properties (Manabe & Wetherald, 1967).

Global warming tends to increase cloud formation because warmer temperatures lead to more evaporation of water into the atmosphere, and warmer temperature also allows the atmosphere to hold more water. The key question is whether this increase in clouds associated with global warming will result in a positive feedback loop (more warming) or a negative feedback loop (less warming). For decades, scientists have sought to answer this question and understand the net role clouds play in future climate projections (Schneider et al., 2017). Clouds are complex because they both have a cooling (reflecting incoming solar radiation) and warming (absorbing incoming solar radiation) effect (Lashof, DeAngelo, Saleska, & Harte, 1997). The type of cloud, altitude, and optical properties combine to determine how these countervailing effects balance out. Although still under debate, it appears that in most circumstances the cloud feedback is likely positive (Boucher et al., 2013). For example, models and observations show that increasing greenhouse gas concentrations reduces the low-level cloud fraction in the Northeast Pacific at decadal time scales. This then has a positive feedback effect and enhances climate warming since less solar radiation is reflected by the atmosphere (Clement, Burgman, & Norris, 2009).

The key lesson from the long list of potentially positive feedbacks and their interactions is that runaway climate change, and runaway perturbations have to be taken as a serious possibility. Table 2 is just a snapshot of the type of feedbacks that have been identified (see Supplementary material for a more thorough explanation of positive feedback loops). However, this list is not exhaustive and the possibility of undiscovered positive feedbacks portends even greater existential risks. The many environmental crises humankind has previously averted (famine, ozone depletion, London fog, water pollution, etc.) were averted because of political will based on solid scientific understanding. We cannot count on complete scientific understanding when it comes to positive feedback loops and climate change.

#### Our internal link is reverse causal. The “spatial fix” ensures infinite environmental destruction.

Shammas and Holen 19 [(Victor L, a sociologist working at the Department of Sociology and Human Geography, University of Oslo; Tomas B., independent scholar in Oslo, Norway) “One giant leap for capitalistkind: private enterprise in outer space,” 1-29-2019, pg. 5-6] julian

No longer terra nullius, space is now the new terra firma of capitalistkind: its naturalized terroir, its next necessary terrain. The logic of capitalism dictates that capital should seek to expand outwards into the vastness of space, a point recognized by a recent ethnography of NewSpace actors (Valentine, 2016, p. 1050). The operations of capitalistkind serve to resolve a series of (potential) crises of capitalism, revolving around the slow, steady decline of spatial fixes (see e.g., Harvey, 1985, p. 51–66) as they come crashing up against the quickly vanishing blank spaces remaining on earthly maps and declining (terrestrial) opportunities for profitable investment of surplus capital (Dickens and Ormrod, 2007a, p. 49–78).

A ‘spatial fix' involves the geographic modulation of capital accumulation, consisting in the outward expansion of capital onto new geographic terrains, or into new spaces, with the aim of filling a gap in the home terrains of capital. Jessop (2006, p. 149) notes that spatial fixes may involve a number of strategies, including the creation of new markets within the capitalist world, engaging in trade with non-capitalist economies, and exporting surplus capital to undeveloped or underdeveloped regions. The first two address the problem of insufficient demand and the latter option creates a productive (or valorizing) outlet for excess capital. Capitalism must regularly discover, develop, and appropriate such new spaces because of its inherent tendency to generate surplus capital, i.e., capital bereft of profitable purpose. In Harvey’s (2006, p. xviii) terms, a spatial fix revolves around ‘geographical expansions and restructuring…as a temporary solution to crises understood…in terms of the overaccumulation of capital'. It is a temporary solution because these newly appropriated spaces will in turn become exhausted of profitable potential and are likely to produce their own stocks of surplus capital; while ‘capital surpluses that otherwise stood to be devalued, could be absorbed through geographical expansions and spatio-temporal displacements' (Harvey, 2006, p. xviii), this outwards drive of capitalism is inherently limitless: there is no end point or final destination for capitalism. Instead, capitalism must continuously propel itself onwards in search of pristine sites of renewed capital accumulation. In this way, Harvey writes, society constantly ‘creates fresh productive powers elsewhere to absorb its overaccumulated capital' (Harvey, 1981, p. 8).

Historically, spatial fixes have played an important role in conserving the capitalist system. As Jessop (2006, p. 149) points out, ‘The export of surplus money capital, surplus commodities, and/or surplus labour-power outside the space(s) where they originate enabled capital to avoid, at least for a period, the threat of devaluation'. But these new spaces for capital are not necessarily limited to physical terrains, as with colonial expansion in the nineteenth century; as Greene and Joseph (2015) note, various digital spaces, such as the Internet, can also be considered as spatial fixes: the Web absorbs overaccumulated capital, heightens consumption of virtual and physical goods, and makes inexpensive, flexible sources of labor available to employers. Greene and Joseph offer the example of online high-speed frequency trading as a digital spatial fix that furthers the ‘annihilation of space by time' first noted by Marx in his Grundrisse (see Marx, 1973, p. 524).

Outer space serves at least two purposes in this regard. In the short-to medium-term, it allows for the export of surplus capital into emerging industries, such as satellite imaging and communication. These are significant sites of capital accumulation: global revenues in the worldwide satellite market in 2016 amounted to $260 billion (SIA, 2017, p. 4). Clearly, much of this activity is taking place ‘on the ground'; it is occurring in the ‘terrestrial economy'. But all that capital would have to find some other meaningful or productive outlet were it not for the expansion of capital into space. Second, outer space serves as an arena of technological innovation, which feeds back into the terrestrial economy, helping to avert crisis by pushing capital out of technological stagnation and innovation shortfalls.

In short, outer space serves as a spatial fix. It swallows up surplus capital, promising to deliver valuable resources, technological innovations, and communication services to capitalists back on Earth. This places outer space on the same level as traditional colonization, analyzed in Hegel’s Philosophy of Right, which Hegel thought of as a product of the ‘inner dialectic of civil society', which drives the market to ‘push beyond its own limits and seek markets, and so its necessary means of subsistence, in other lands which are either deficient in the goods it has overproduced, or else generally backward in creative industry, etc.' (Hegel, 2008, p. 222). In this regard, SpaceX and related ventures are not so very different from maritime colonialists and the trader-exploiters of the British East India Company. But there is something new at stake. As the Silicon Valley entrepreneur Peter Diamandis has gleefully noted: ‘There are twenty-trillion-dollar checks up there, waiting to be cashed!' (Seaney and Glendenning, 2016). Capitalistkind consists in the naturalization of capitalist consciousness and practice, the (false) universalization of a particular mode of political economy as inherent to the human condition, followed by the projection of this naturalized universality into space—capitalist humanity as a Fukuyamite ‘end of history', the end-point of (earthly) historical unfolding, but the starting point of humanity’s first serious advances in space.

What role, then, for the state? The frontiersmen of NewSpace tend to think of themselves as libertarians, pioneers beyond the domain of state bureaucracy (see Nelson and Block, 2018). ‘The government should leave the design work and ownership of the product to the private sector', the author of a 2017 report, Capitalism in Space, advocates. ‘The private companies know best how to build their own products to maximize performance while lowering cost' (Zimmerman, 2017, p. 27). One ethnographer notes that ‘politically, right-libertarianism prevails' amongst NewSpace entrepreneurs (Valentine, 2016, p. 1047–1048). Just as Donald Rumsfeld dismissed the opponents to the Iraq War as ‘Old Europe', so too are state entities’ interests in space exploration shrugged off as symptoms of ‘Old Space'. Elon Musk, we are told in a recent biography, unlike the sluggish Big State actors of yore, ‘would apply some of the start-up techniques he’d learned in Silicon Valley to run SpaceX lean and fast…As a private company, SpaceX would also avoid the waste and cost overruns associated with government contractors' (Vance, 2015, p. 114). This libertarianism-in-space has found a willing chorus of academic supporters. The legal scholar Virgiliu Pop introduces the notion of the frontier paradigm (combining laissez-faire economics, market competition, and an individualist ethic) into the domain of space law, claiming that this paradigm has ‘proven its worth on our planet' and will ‘most likely…do so in the extraterrestrial realms' as well (Pop, 2009, p. vi). This frontier paradigm is not entirely new: a ‘Columbus mythology', centering on the ‘noble explorer', was continuously evoked in the United States during the Cold War space race (Dickens and Ormrod, 2016, pp. 79, 162–164).

But the entrepreneurial libertarianism of capitalistkind is undermined by the reliance of the entire NewSpace complex on extensive support from the state, ‘a public-private financing model underpinning long-shot start-ups' that in the case of Musk’s three main companies (SpaceX, SolarCity Corp., and Tesla) has been underpinned by $4.9 billion dollars in government subsidies (Hirsch, 2015). In the nascent field of space tourism, Cohen (2017) argues that what began as an almost entirely private venture quickly ground to a halt in the face of insurmountable technical and financial obstacles, only solved by piggybacking on large state-run projects, such as selling trips to the International Space Station, against the objections of NASA scientists. The business model of NewSpace depends on the taxpayer’s dollar while making pretensions to individual self-reliance. The vast majority of present-day clients of private aerospace corporations are government clients, usually military in origin. Furthermore, the bulk of rocket launches in the United States take place on government property, usually operated by the US Air Force or NASA.13

This inward tension between state dependency and capitalist autonomy is itself a product of neoliberalism’s contradictory demand for a minimal, “slim” state, while simultaneously (and in fact) relying on a state reengineered and retooled for the purposes of capital accumulation (Wacquant, 2012). As Lazzarato writes, ‘To be able to be “laissez-faire”, it is necessary to intervene a great deal' (2017, p. 7). Space libertarianism is libertarian in name only: behind every NewSpace venture looms a thick web of government spending programs, regulatory agencies, public infrastructure, and universities bolstered by research grants from the state. SpaceX would not exist were it not for state-sponsored contracts of satellite launches. Similarly, in 2018, the US Defense Advanced Research Projects Agency (DARPA)—the famed origin of the World Wide Web—announced that it would launch a ‘responsive launch competition', meaning essentially the reuse of launch vehicles, representing an attempt by the state to ‘harness growing commercial capabilities' and place them in the service of the state’s interest in ensuring ‘national security' (Foust, 2018b).

This libertarianism has been steadily growing in the nexus between Silicon Valley, Stanford University, Wall Street, and the Washington political establishment, which tend to place a high value on Randian ‘objectivism' and participate in a long American intellectual heritage of individualistic ‘bootstrapping' and (allegedly) gritty self-reliance. But as Nelson and Block (2018, p. 189–197) recognize, one of the central symbolic operations of capitalistkind resides in concealing its reliance on the state by mobilizing the charm of its entrepreneurial constituents and the spectacle of space. There is a case to be made for the idea that SpaceX and its ilk resemble semi-private corporations like the British East India Company. The latter, “incorporated by royal charter from Her Majesty Queen Elizabeth I in 1600 to trade in silk and spices, and other profitable Indian commodities,” recruited soldiers and built a ‘commercial business [that] quickly became a business of conquest' (Tharoor, 2017). SpaceX, too, is increasingly imbricated with an attempt on the part of a particular state, the United States, to colonize and appropriate resources derived from a particular area, that of outer space; it, too, depends on the infrastructure, contracts, and regulatory environment that thus far only a state seems able to provide. Its private character, like that of the East India Company, is troubled by being deeply embedded in the state. As one commentator has observed of SpaceX, ‘If there’s a consistent charge against Elon Musk and his high-flying companies…it’s that they’re not really examples of independent, innovative market capitalism. Rather, they’re government contractors, dependent on taxpayer money to stay afloat' (cit. Nelson and Block, 2018, p. 189).

Perhaps this should not come as a surprise. As Bourdieu (2005, p. 12) observed, ‘The economic field is, more than any other, inhabited by the state, which contributes at every moment to its existence and persistence, and also to the structure of the relations of force that characterize it'. The state lays out the preconditions for market exchanges. Under neoliberalism, the state is the preeminent facilitator of markets. The neoliberal state is not so much a Minimalstaat, night watchman state, or slim state as it is the prima causa of market society (see, e.g., Wacquant, 2012). Similarly, in the political theory of Deleuze and Guattari, any economic development presupposes the political differentiation caused by the state (Deleuze and Guattari, 2004a, p. 237–238). Even in the global environment of contemporary capitalism, the market cannot operate without the state becoming integrated with capitalism itself, as ‘it is the modern state that gives capitalism its models of realization' (Deleuze and Guattari, 2004b, p. 480). For capitalism to survive in outer space, the state must create a regulatory environment, subsidize infrastructure, and hand down contracts – in short, assemble outer space as a domain made accessible in legal, technical, and economic ways.

#### Corporate colonialism concentrates society around collective effervescence, which effaces safeguards to capital’s negative externalities.

Shammas and Holen 19 [Victor L, a sociologist working at the Department of Sociology and Human Geography, University of Oslo; Tomas B., independent scholar in Oslo, Norway) “Capitalism and Outer Space: Replies to an Interlocutor” Dr. Victor Lund Shammas Blog, https://www.victorshammas.com/blog/2019/12/17/capitalism-and-outer-space, 12/18/2019] RM

The geographer David Harvey draws on Karl Marx’s idea of surplus capital to suggest that this fundamental tendency in capitalism explains why capitalism pushed out from beyond the narrow radius of Manchester’s cotton mills in the first half of the nineteenth century to become a global, planetary-level economic system. Capital is always seeking restlessly the next great investment opportunity, and that means seeking out new places: new mines in Congo, new sweatshops in Vietnam, and so on. Capital is about appropriating more space. Places that lived under traditional, non-capitalist economic systems tend to be colonized and gobbled up, as it were, by capital. David Harvey calls this a spatial fix: Faced with the problem of mounting surplus capital, capitalists seek out new spaces to invest their capital and thereby keep the wheels of the economy going.

Outer space, then, is just one more, final space in a long line of spaces that have served as fixes to capital’s need for expansion. But because outer space is potentially limitless, it is also the ultimate spatial fix. Capitalism has expanded from Manchester to Western Europe, to cover essentially all continents on Earth, with a few notable exceptions and pockets of more traditionalist economies here and there. Now that Earth has been more or less emptied out of capital-free spaces, outer space remains as one great, final virgin territory, so to speak.

Outer space is terra incognita: we do not know what is out there. But it is also terra nullius: land without ownership. Finally, it is terra pericolosa, dangerous land, a site of extreme risk. All of this combines to make it a very difficult and yet enticing place for capitalists to invest in.

Similarly, can you define “charismatic accumulation?

As a capitalist, you cannot simply be an impersonal machine that allocates capital. To be a truly successful capitalist requires an additional human supplement: a personality, a certain charisma, to use the German sociologist’s Max Weber’s key concept. This has always been a part of the capitalist game, from Henry Ford through Steve Jobs and onward. But there’s something about outer space that seems to concentrate the capitalist mind along these lines. Since the days of the Babylonian astronomers and ancient Egyptian sky-worshipping polytheism, outer space has been a crucial site for the free play of the human imagination. Adept entrepreneurs know full well that playing up to this all-too-human longing for the transcendent can be a very useful strategy in building buzz for their brand. While the novelty has worn off a little by now, for the first couple of years every SpaceX launch was something like a quasi-religious spectacle, watched by hundreds of thousands of people, online and in real-time. Launch events were—and still are to a certain degree—capable of producing a real sense of wonder: what the French sociologist Emile Durkheim called “collective effervescence,” a kind of bubbling-up of human fellow-feeling. Space seems to offer the possibility that this terrestrial life is not all there is. This is a huge selling point in the overcrowded marketplace of ideas.

At the same time, launching these expensive, complex products into space is a highly technical feat of human engineering. It allows people like Elon Musk to sell themselves to the public as purveyors of nerd capitalism: Bill Gates, Steve Jobs, and Mark Zuckerberg initiated and exploited the trend of geeky entrepreneurs, combining business savvy and dorm-room or basement-dwelling studiousness. The form of charismatic accumulation specific to high-tech industries like outer space seems to spin off this basic Silicon Valley personality type, combined with a heavy dose of engineering derring-do. While Richard Branson’s Virgin Galactic space enterprise emphasizes the “risk-all” madness of launching into space, Musk plays up to the more traditional love of Silicon Valley geeky obsessiveness. Whatever form it takes, the basic point is that the high-tech capitalism of our age seems to love a strong personality: It’s good for business, because it attracts investors, customers, and the media.

As the German philosopher Peter Sloterdijk says, we live in an age of general excitability. If you’re not excited, you’re not alive to all the possibilities of the world, and are therefore in some sense dead to the world: “Excitability is now the foremost duty of all citizens,” Sloterdijk writes. Excitability is a kind of currency in an all-too drab, workaday world, beset with worries about crippling student debt, mortgage payments or rent, low wages, and unstable jobs. Charismatic space capitalists promise to break the monotony of this terrestrial life and feed the desire for excitement and the duty of excitability.

#### Corporate colonialism necessitates mass launch.

Shammas and Holen 19 [Victor L, a sociologist working at the Department of Sociology and Human Geography, University of Oslo; Tomas B., independent scholar in Oslo, Norway) “Capitalism and Outer Space: Replies to an Interlocutor” Dr. Victor Lund Shammas Blog, https://www.victorshammas.com/blog/2019/12/17/capitalism-and-outer-space, 12/18/2019] RM

When speaking of viability, one aspect that gets underplayed are the significant ecological effects of launching into space. For instance, SpaceX is developing the idea of Earth-to-Earth space flight, which might entail moving passengers from any point on Earth to any other point within, say, half an hour. What would be the ecological consequences of burning tremendous amounts of rocket fuel to escape Earth’s gravity well, just so that a London-based billionaire could get to Sydney in 30 minutes? There is something perverse about the idea that all the rest of us are being enjoined to cut back on flying, even as Musk and his cronies tinker away to make life easy for the hyper-rich.

Of course, this would be just one more step in a general tendency under capitalism that the geographer David Harvey calls time-space compression: The speed at which capital circulates increases and along with it life also accelerates. Both space and time are compressed by new technologies. One unfortunate consequence of Earth-to-Earth space flight, if it is ever realized, would be its damaging effects on our already CO2-saturated atmosphere. But perhaps more worrying, according to some rocket engineers, is the trail of soot and alumina left in the wake of rockets that could accumulate in the stratosphere and deplete our fragile ozone layer. The United Nations’ 2018 Quadrennial Global Ozone Assessment is the first annual UN report to take this threat seriously. Ironically, as Musk dreams of shuttling humans off Earth to Mars as a species-preserving measure, he could be co-responsible for accelerating the very destruction of Earth that he purportedly fears.

In a radically decarbonized future, heavy caps on emissions might be enough to shutter the space industry - or at least seriously rein it in. This might not be a bad thing, because as a report from the non-profit Aerospace Corporation recently noted, emissions from rockets “inherently impact the stratosphere in a way that no other industrial activity does.” Reaching space on a grand scale might entail tearing open and ripping apart our own atmosphere in the process. This is why we may need to rethink our future in space—perhaps even holding off from launching too many rockets into space—precisely in order to preserve life here on Earth.

#### That depletes the ozone layer, open the floodgates for existential UV floods, and leaves residual black carbon.

Grush 17 [Loren Grush, Loren Grush is a science reporter for The Verge, the technology and culture brand from Vox Media, where she specializes in all things space—from distant stars and planets to human space flight and the commercial space race. The daughter of two NASA engineers, she grew up surrounded by space shuttles and rocket scientists—literally. She is also the host of Space Craft, an original online video series that examines what it takes to send people to space. Before joining The Verge, Loren published stories in Popular Science, The New York Times, Nautilus Magazine, Digital Trends, Fox News, and ABC News.) “Why it’s time to study how rocket emissions change the atmosphere: Get the data now before the problem gets worse” The Verge, May 31, 2018] RM

Every time a rocket launches, it produces a plume of exhaust in its wake that leaves a mark on the environment. These plumes are filled with materials that can collect in the air over time, potentially altering the atmosphere in dangerous ways. It’s a phenomenon that’s not well-understood, and some scientists say we need to start studying these emissions now before the number of rocket launches increases significantly.

It’s not the gas in these plumes that’s most concerning. Some rockets do produce heat-trapping greenhouse gases, like carbon dioxide, but those emissions are negligible, according to experts. “The rocket business could grow by a factor of 1,000 and the carbon dioxide and water vapor emissions would still be small compared to other industrial sources,” Martin Ross, a senior project engineer at the Aerospace Corporation who studies the effects of rockets on the atmosphere, tells The Verge.

Instead, it’s tiny particles that are produced inside the trail that we need to watch out for, Ross says. Small pieces of soot and a chemical called alumina are created in the wakes of rocket launches. They then get injected into the stratosphere, the layer of Earth’s atmosphere that begins six miles up and ends around 32 miles high. Research shows that this material may build up in the stratosphere over time and slowly lead to the depletion of a layer of oxygen known as the ozone. The ozone acts like a big shield, protecting Earth against the Sun’s harmful ultraviolet radiation. However, the magnitude of this ozone depletion isn’t totally known, says Ross.

“IT’S A CALL FOR MORE RESEARCH IN THIS AREA TO KNOW EXACTLY WHAT WE’RE PUTTING INTO THE UPPER ATMOSPHERE AND IN WHAT QUANTITIES.”

That’s why he and others at the Aerospace Corporation, a nonprofit that provides research and guidance on space missions, are calling for more studies. They say it’s especially important now since the private space industry is at the early stages of a launch revolution. Currently, the number of launches each year is relatively small, around 80 to 90, so the aerospace industry’s impact on the atmosphere is not much of a concern. But in a new paper published in April, Ross and his colleague Jim Vedda argue that as launches increase, policymakers will eventually want to know what kind of damage these vehicles are causing to the environment and if regulations are necessary. When that time comes, it will be better to have as much data as possible to make the best decisions.

“It’s a call for more research in this area to know exactly what we’re putting into the upper atmosphere and in what quantities,” Vedda, a senior policy analyst at the Aerospace Corporation, tells The Verge. “So when the debates start, we have the good hard data that says, ‘Here’s a well-defined model of what’s actually happening.’”

So far, the research we have about these emissions mostly comes from lab experiments, modeling, and some direct detections of rocket plumes. At the turn of the century, a few high-altitude planes equipped with sensors flew through plumes created by the Space Shuttle and other vehicles to figure out what was inside.

It turns out that all kinds of rockets produce these emissions, but some types of vehicles produce more than others. Rockets that run on solid propellants produce a higher amount of alumina particles, a combination of aluminum and oxygen that is white and reflective. Most orbital rockets don’t run on solid propellants these days, though some launch companies like the United Launch Alliance do add solid rocket boosters to vehicles to give them extra thrust. Meanwhile, rockets that run on liquid kerosene, a type of refined oil, produce more of the dark soot particles, what is known as black carbon. Kerosene is used as a propellant for rockets such as ULA’s Atlas V and SpaceX’s Falcon 9.

ALL KINDS OF ROCKETS PRODUCE THESE EMISSIONS, BUT SOME TYPES OF VEHICLES PRODUCE MORE THAN OTHERS

Alumina and black carbon from rockets can stick around in the stratosphere for three to five years, according to Ross. As these materials collect high above the Earth, they can have interesting effects on the air. Black carbon forms a thin layer that intercepts and absorbs the sunlight that hits Earth. “It would act as a thin, black umbrella,” says Ross. That may help keep the lower atmosphere cool, but the intercepted energy from the Sun doesn’t just go away; it gets deposited into the stratosphere, warming it up. This warming ultimately causes chemical reactions that could lead to the depletion of the ozone layer.

The reflective alumina particles can also affect the ozone but in a different way. Whereas the soot acts like a black umbrella, the alumina acts like a white one, reflecting sunlight back into space. However, chemical reactions occur on the surface of these white particles, which, in turn, destroy the ozone layer, Ross says.

Black carbon and alumina have actually been proposed by scientists as possible geoengineering agents or tools for cooling down our warming climate. But while they may keep the lower atmosphere cool, geoengineering agents may have other unwanted side effects, too. They might interact with jet streams, causing droughts or more tropical storms. That’s why many scientists have criticized the idea of geoengineering to combat climate change.

However, rockets are putting these particles into the air no matter what, and this byproduct of ozone loss is particularly concerning for Ross and Vedda. As the ozone diminishes, more of the Sun’s harmful radiation could reach the ground. These UVB rays can cause skin cancer and cataracts. “That’s what we need to understand — the ozone depletion aspect of this because protection of the ozone layer is an international imperative,” says Ross. The 1987 Montreal Protocol, for example, is an international agreement to phase out materials that deplete the ozone.

Right now, Ross estimates that rocket launches around the world inject 10 gigagrams, or 11,000 tons, of soot and alumina particles into the atmosphere each year. But that number could be going up. SpaceX has vowed to increase the number of launches it does each year, and numerous other companies are going to start launching their own vehicles soon. What kind of impact that will have on the atmosphere is unclear. That’s why Ross and Vedda suggest the government and universities invest in a series of research programs, in which scientists collect more data on rocket particles from aircraft and satellites.

“WE WANT TO BE PROACTIVE BEFORE THIS TIPPING POINT OCCURS.”

#### **Ozone collapse causes extinction.**

Simmons 20 [Carla Simmons,, The Science Times, "A Repeat of One of the Biggest Extinctions Caused by Ozone Layer Erosion 359M Years Ago Possible, Warn Scientists | Science Times", May 27, 2020, https://www.sciencetimes.com/articles/25838/20200527/repeat-one-biggest-extinctions-caused-ozone-layer-erosion-359m-years.htm] BD

University of Southampton researchers have delved deeper into an extinction event that occurred about 360 million years ago. According to their research, the ozone layer's breakdown caused by ultraviolet (UV) radiation vanquished much of the Earth's marine life and greenery. Moreover, their discovery led to weighty indications for today's continually warming Earth.

Numerous episodes of mass extinction occurred in the geological past. One of the most notorious ones caused the extinction of dinosaurs about 66 million years ago. Their destruction was believed to have been caused by an asteroid hitting the Earth.

Additionally, two chapters were caused by large-scale volcanic eruptions that created the imbalance of oceans and atmospheres in the planets. Another one happened during the end of Permian Great Dying, which, according to Stanford, wiped out 96% of the Earth's aquatic species.

Scientists have discovered evidence pointing to high levels of UV radiation responsible for collapsing forest ecosystems and killing off water animal species during the Devonian geological period about 359 million years ago.

Their research revealed that warming temperatures after an intense ice age could have caused the ozone to collapse. The researchers suggest that the Earth might possibly reach comparable temperatures, thus might face the same consequences that occurred in the past.

The findings of their study are published in the journal Science Advances. Additionally, the research was partly funded by a grant from the National Geographic Society. It was also regulated in collaboration with The Sedgwick Museum of Earth Sciences at the University of Cambridge.

The team collected various rock samples during expeditions in locations in South America. They formed clues as to what was happening at the edge of the melting Devonian ice sheet, which allowed them to compare between the extinction event close to the pole and near the equator.

The rocks were then dissolved in hydrofluoric acid back in the laboratory. The dissolved rocks released microscopic plant spores, which were preserved for hundreds of millions of years. On microscopic examination, the scientists found many of the spores had bizarrely formed spines on their surface.

According to the researchers, the spikes were due to UV radiation damaging their DNA. Furthermore, they found that many spores had dark pigmented walls. These walls were thought to be a protective 'shield' against the increasing and damaging UV levels.

From their findings, the scientists have concluded that during a time of expeditious global warming, the ozone layer collapsed for a short while. Moreover, the ozone collapse exposed life on Earth to harmful UV radiation levels and, therefore, triggered a mass extinction event. This affected life on land and in shallow water at the Devonian-Carboniferous boundary.

From Climate Change to Climate Emergency

Professor John Marshall, the lead researcher from the University of Southampton's School of Ocean and Earth Science, said that our ozone layer is currently in a state of alteration. He adds that they have seen this pattern in the past, where a stimulant or impetus was unnecessary for the phenomenon to kick in.

He also says that current approximate calculations suggest that the Earth will reach similar global temperatures to those of 360 million years ago. Furthermore, they say it is possible that a similar collapse of the ozone layer could occur again, dangerously exposing surface and shallow sea life to harmful radiation.

#### UV floods cause extinction—no defense assumes rampant UV poisoning.

Lucas et al 14 (R. M. Lucas (National Centre for Epidemiology and Population Health, The Australian National University, Canberra 2601, Australia, Telethon Kids Institute, University of Western Australia, Perth 6008, Australia), M. Norval (Biomedical Sciences, University of Edinburgh Medical School, Edinburgh EH8 9AG, Scotland, UK), R. E. Neale (QIMR Berghofer Medical Research Institute, Brisbane 4029, Australia), A. R. Young (King's College London (KCL), St John's Institute of Dermatology, London SE1 9RT, UK), F. R. de Gruijl (Department of Dermatology, Leiden University Medical Centre, P.O. Box 9600, NL-2300 RC Leiden, The Netherlands), Y. (Akita University Graduate School of Medicine, Akita-shi, Akita Prefecture, Japan, National Institute for Minamata Diseases, Minamata-sh, Kumamoto Prefecture, Japan) and J. C. van der Leun (iEcofys, Kanaalweg 16G, NL-3526 KL Utrecht, The Netherlands), “The consequences for human health of stratospheric ozone depletion in association with other environmental factors”, November 10th, 2014, <https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b>) CS

Effects of solar UV radiation on immune function and consequences for disease Mechanisms UV photons penetrate the epidermis and upper dermis162 and are absorbed by chromophores ([Table 2](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#tab2)), which then **initiate a cascade leading to changes in immune responses**. Table 2 Cutaneous chromophores involved in the initiation of UV-induced changes in immune function (reviewed in [ref. 163](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit163)While much of this information has been gathered from studies in vitro or in rodent models, less is known about humans. However, an action spectrum for the UV-induced suppression of the human immune response to a previously-encountered antigen (termed memory or recall immune responses) has been constructed: it has two peaks, one within the UV-B waveband at 300 nm and one at 370 nm in the UV-A waveband.[164,165](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit164) There is also evidence from studies in both humans and mice that interactive and additive effects between wavebands can occur.[166–168](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit166) Briefly, exposure to UV radiation causes up-regulation of some innate immune responses, **and down-regulation of** some acquired primary and memory **immune responses**, mainly through effects on T cell activity (reviewed in Gibbs & Norval,[163](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit163) Schwarz & Schwarz,[169](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit169) and Ullrich & Byrne[170](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit170)). The up-regulation includes the production of several antimicrobial peptides (AMPs) in the epidermis,[171,172](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit171) possibly through a vitamin D pathway (see below). The AMPs provide immediate protection against a variety of pathogens (bacteria, fungi, and viruses having a viral envelope) and they are also involved in the promotion of cell growth, healing, and angiogenesis. In contrast to these stimulatory functions, exposure to UV radiation induces T regulatory cells (Tregs) and other cell types which contribute to immunosuppression and help to restore cutaneous homeostasis.[172,173](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit172) Mediators such as platelet-activating factor, prostaglandin E2, histamine, and tumour necrosis factor-α are produced locally at the irradiated site. These alter the migration patterns and functions of various populations of immune cells. The end result is the generation of cell subsets with suppressive activity which are thought to remain for the life-time of the individual.[174,175](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit174) The UV-induced alterations in the normal immune response can be beneficial for some human diseases and detrimental for others. Vitamin D, synthesised following exposure of the skin to UV-B radiation, also has positive and negative effects on immune-related diseases. Indeed, it is difficult to distinguish between immunoregulation by vitamin D and other mediators induced by UV radiation,[176–180](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit176) since the downstream effects on immune parameters are similar. For clarity, the effects of UV radiation and those of vitamin D have been assessed separately in the sections below. We first focus on the effects of UV radiation on immunity, and address vitamin D-related effects on immune function in the section specifically on vitamin D. Polymorphic light eruption Polymorphic light eruption (PLE) is the commonest of the photodermatoses, with a prevalence of up to 20%.[181](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit181) PLE manifests as an intermittent itchy red skin eruption which resolves without scarring after a few days to weeks. It occurs 2–3 times more frequently in women than in men, with onset typically in the first three decades of life,[181](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit181) and is found predominantly in those with fair skin, although all skin types can be affected.[181](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit181) A recent study of Indian patients with dark skin phototypes (IV and V) who suffered from various photodermatoses revealed that PLE was the commonest of these, affecting 60% of the group.[182](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit182) The lesions occur most often in the spring and early summer or during a sunny holiday, following the first exposure to a large dose of sunlight. After repeated exposures, the lesions are less likely to occur. This process, called photohardening, is used therapeutically with good results. Recent investigations indicate that key events in photohardening include a decrease in the number of Langerhans cells in the epidermis and recruitment of mast cells into the dermis,[183](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit183) together with changes in systemic cytokine levels.[184](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit184) PLE is immunologically-mediated as a result of a failure to establish the normal suppression of immune responses following exposure to UV radiation. The antigen involved has not been identified but is likely to be novel, induced by the **DNA damaging properties of UV radiation**. Various abnormalities in the cutaneous immune response following UV radiation have been demonstrated in people with PLE compared with controls.[185,186](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit185) This disease therefore illustrates the positive evolutionary advantage of UV-induced immunosuppression in individuals who are not susceptible to PLE and what can happen if it is absent. Asthma **Asthma** comprises a group of diseases that evidence as wheeze, chest tightness, or shortness of breath, occurring as a result of obstruction of the airways and restriction of airflow that is usually reversible. The level of severity, frequency of symptoms, age of onset, main inflammatory phenotypes, and triggers and pathways are variable. This heterogeneity may explain the current lack of consistency in results from studies examining the relationship between UV radiation and the risk of asthma. There are anecdotal accounts that sunny holidays or living at high altitude decrease asthma symptoms. The prevalence of asthma was inversely associated with the intensity of UV radiation,[187](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit187) or past personal exposure to solar UV radiation.[188](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit188) However, in a study where different sub-types of asthma were considered, residence at latitudes closer to the equator (and with greater intensity of UV-B radiation) was associated with an increased risk of having asthma in atopic participants (with a history of allergic responses to specific antigens) but a decreased risk in those without atopy.[189](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit189) These findings highlight the importance of differentiating between subtypes of asthma in examining associations with exposure to UV radiation. Nevertheless, individual-level exposure to UV radiation was not measured (only latitude and ambient UV radiation), so the results could reflect exposure to other latitude-associated factors such as temperature and indoor heating. Infection and vaccination Studies over the past 20 years have shown that **exposure to solar UV radiation suppresses** microbe-specific acquired **immune responses in** animal models of **infection**. This modulation can lead to an **increased microbial load, reactivation from latency, and more severe symptoms, including death** (reviewed in Norval et al.[190](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit190)). A recent study showed that spending 8 or more hours outdoors per week when the UV Index was ≥4 was associated with an increased risk of ocular recurrence of herpes simplex virus (HSV) infection resulting in eruptive lesions.[191](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit191) **UV radiation prior to vaccination** causes a **less effective immune response** in several mouse models (reviewed in Norval & Woods[192](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit192)), but whether exposure to UV radiation adversely affects the course of infections and the efficacy of vaccination in humans remains an open question. Despite the paucity of new information, there remains the possibility that UV-induced immunosuppression could **convert an asymptomatic infection into a symptomatic one**, **reactivate** a range of **persistent infections**, increase the oncogenic potential of microbes, and **reduce the memory immune response,** for example after vaccination, so that it is no longer protective. Autoimmune diseases Many autoimmune diseases are considered to have both environmental and genetic risk factors. Evidence to support the importance of environmental exposures comes from geographical variation (changing incidence with changing latitude), temporal patterns (such as variations in incidence with season or season-of-birth) and results from observational epidemiological studies. Several studies show an inverse association between exposure to UV radiation and immune-mediated diseases, suggesting that the UV may be protective. In many cases, the assumed pathway has been through enhanced synthesis of vitamin D (see section on Vitamin D below). However, this evidence is now being re-evaluated in light of possible alternative pathways, including UV-induced immune modulation and altered susceptibility to relevant viral infections, and non-UV pathways such as changes in the secretion of melatonin (reviewed in Hart et al.[193](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit193)). While there have been suggestions that exposure to UV radiation may be important for conditions such as inflammatory bowel disease (for example, Nerich et al.[194](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit194)), type 1 diabetes,[195](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit195) and rheumatic diseases (including rheumatoid arthritis, systemic lupus erythematosus, dermatomyositis, and others),[196](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit196) the strongest evidence is for multiple sclerosis. Multiple sclerosis. Many studies (but not all) have shown that the prevalence, incidence, or mortality from multiple sclerosis (MS) increases with increasing latitude and decreasing altitude or intensity of ambient UV radiation, in predominantly fair-skinned populations (reviewed in Hewer et al.[197](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit197)). In the US Nurses Health Studies, a latitudinal gradient present in a cohort of female nurses born before 1946 was not apparent in a similar cohort born after 1946.[198](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit198) The findings reflected an increase in incidence in the south in the later cohort (rather than a decrease in the north). One explanation given to explain this change was that increasing sun-protective behaviours in the south had reduced the difference in personal dose of UV between the north and south.[199](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit199) Studies from the northern[200](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit200) and southern[201](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit201) hemispheres show that, compared to the general population, people with MS were more likely to have been born in late spring and less likely to have been born in late autumn. This timing would be consistent with a hypothesis that exposure of the mother to more UV radiation during the late first trimester, when the foetal nervous system is developing and maturing, is protective for the development of MS in later life.[201](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit201) Alternatively, it is also possible that exposures early in infancy, rather than in pregnancy, influence risk, or other factors that vary seasonally could be important. Animal studies suggest that UV-B irradiation can prevent the onset of experimental autoimmune encephalomyelitis, used as a model for MS,[202](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit202) and there is supportive evidence from recent studies in humans.[203,204](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit203) The role of UV-induced immune suppression in skin cancer Cutaneous malignant melanoma. Evidence that the immune response is important for the development of CMM is clearly shown by the increase in incidence following organ transplantation that requires ongoing treatment with immunosuppressive medications.[205](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit205) UV radiation, particularly UV-B, can cause suppression of many aspects of cell-mediated immunity but, until recently, how it influenced the initiation of CMM was unknown. In a transgenic mouse model, the recruitment of macrophages to the skin following UV-B irradiation and their subsequent proliferation were shown to be critical in the survival of melanocytes, including those with UV-induced DNA damage.[206–208](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit206) In addition, inflammation induced by UV radiation increased metastasis of melanoma, with neutrophils being the main drivers of the inflammatory process.[209](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit209) Consistent with these reports from animal models, in patients with metastatic melanoma there was a shorter survival time if metastases contained a high proportion of macrophages.[210](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit210) Non-melanoma skin cancer. Tumours induced by UV radiation are highly antigenic. UV-induced immune suppression plays a critical role in the development of NMSC as evidenced by the dramatically increased incidence in immunosuppressed people, for example, following organ transplantation.[211](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit211) This is especially shown for SCCs in organ transplant recipients receiving immunosuppressive drugs that suppress T cell activity, suggesting that effector T cells are of particular importance in the control of SCC.[212](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit212) Furthermore, Tregs induced by UV irradiation infiltrate SCCs and surround BCCs. Pharmacologically blocking steps in the pathway of UV-induced immunosuppression may be effective in preventing the development of skin cancers and actinic keratoses.[212–214](https://pubs.rsc.org/en/content/articlehtml/2015/pp/c4pp90033b#cit212)

#### That causes viruses to human bacterial genome to damage will ensure the next pandemic is existential

Supriya 4/19 [Lakshmi Supriya got her BSc in Industrial Chemistry from IIT Kharagpur (India) and a Ph.D. in Polymer Science and Engineering from Virginia Tech (USA). She has more than a decade of global industry experience working in the USA, Europe, and India. After her Ph.D., she worked as part of the R&D group in diverse industries starting with semiconductor packaging at Intel, Arizona, where she developed a new elastomeric thermal solution, which has now been commercialized and is used in the core i3 and i5 processors. From there she went on to work at two startups, one managing the microfluidics chip manufacturing lab at a biotechnology company and the other developing polymer formulations for oil extraction from oil sands. She also worked at Saint Gobain North America, developing various material solutions for photovoltaics and processing techniques and new applications for fluoropolymers. Most recently, she managed the Indian R&D team of Enthone (now part of MacDermid) developing electroplating technologies for precious metals.) “Humans versus viruses - Can we avoid extinction in near future?” News Medical Life Sciences, 4/19/21, https://www.news-medical.net/news/20210419/Humans-versus-viruses-Can-we-avoid-extinction-in-near-future.aspx] RM

Expert argues that human-caused changes to the environment can lead to the emergence of pathogens, not only from outside but also from our own microbiome, which can pave the way for large-scale destruction of humans and **even our extinction**.

Whenever there is a change in any system, it will cause other changes to reach a balance or equilibrium, generally at a point different from the original balance. Although this principle was originally posited by the French chemist Henry Le Chatelier for chemical reactions, this theory can be applied to almost anything else.

In an essay published on the online server Preprints\*, Eleftherios P. Diamandis of the University of Toronto and the Mount Sinai Hospital, Toronto, argues that changes caused by humans, to the climate, and everything around us will lead to changes that may have a dramatic impact on human life. Because our ecosystems are so complex, we don’t know how our actions will affect us in the long run, so humans generally disregard them.

Changing our environment

Everything around us is changing, from living organisms to the climate, water, and soil. Some estimates say about half the organisms that existed 50 years ago have already become extinct, and about 80% of the species may become extinct in the future.

As the debate on global warming continues, according to data, the last six years have been the warmest on record. Global warming is melting ice, and sea levels have been increasing. The changing climate is causing more and more wildfires, which are leading to other related damage. At the same time, increased flooding is causing large-scale devastation.

One question that arises is how much environmental damage have humans already done? A recent study compared the natural biomass on Earth to the mass produced by humans and found humans produce a mass equal to their weight every week. This human-made mass is mainly for buildings, roads, and plastic products.

In the early 1900s, human-made mass was about 3% of the global biomass. Today both are about equal. Projections say by 2040, the human-made mass will be triple that of Earth’s biomass. But, slowing down human activity that causes such production may be difficult, given it is considered part of our growth as a civilization.

Emerging pathogens

Although we are made up of human cells, we have almost ten times that of bacteria just in our guts and more on our skin. These microbes not only affect locally but also affect the entire body. There is a balance between the good and bad bacteria, and any change in the environment may cause this balance to shift, especially on the skin, the consequences of which are unknown.

Although most bacteria on and inside of us are harmless, gut bacteria can also have viruses. If viruses don’t kill the bacteria immediately, they can incorporate into the bacterial genome and stay latent for a long time until reactivation by environmental factors, when they can become pathogenic. They can also escape from the gut and enter other organs or the bloodstream. Bacteria can then use these viruses to kill other bacteria or help them evolve to more virulent strains.

An example of the evolution of pathogens is the cause of the current pandemic, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Several mutations are now known that make the virus more infectious and resistant to immune responses, and strengthening its to enter cells via surface receptors.

The brain

There is evidence that the SARS-CoV-2 can also affect the brain. The virus may enter the brain via the olfactory tract or through the angiotensin-converting enzyme 2 (ACE2) pathway. Viruses can also affect our senses, such as a loss of smell and taste, and there could be other so far unkown neurological effects. The loss of smell seen in COVID-19 could be a new viral syndrome specific to this disease.

Many books and movies have described pandemics caused by pathogens that wipe out large populations and cause severe diseases. In the essay, the author provides a hypothetical scenario where a gut bacteria suddenly starts producing viral proteins. Some virions spread through the body and get transmitted through the human population. After a few months, the virus started causing blindness, and within a year, large populations lost their vision.

Pandemics can cause other diseases that can threaten humanity’s entire existence. **The COVID-19 pandemic brought this possibility to the forefront**. If we continue disturbing the equilibrium between us and the environment, we don’t know what the consequences may be and **the next pandemic could lead us to extinction.**

#### **Black carbon locks in widespread and dangerous pollution, which kills millions**.

CHO 16 [Renee Cho, Communications Coordinator for Riverkeeper, the Hudson River environmental organization, Columbia Climate School - State of the Planet, "The Damaging Effects of Black Carbon", MARCH 22, 2016, https://news.climate.columbia.edu/2016/03/22/the-damaging-effects-of-black-carbon/] BD

Air pollution, both outdoors and indoors, causes millions of premature deaths each year. The deaths are mainly caused by the inhalation of particulate matter. Black carbon, a component of particulate matter, is especially dangerous to human health because of its tiny size. But black carbon not only has impacts on human health, it also affects visibility, harms ecosystems, reduces agricultural productivity and exacerbates global warming.

The World Health Organization’s new report on disease from preventable environmental risks attributes 3.7 million premature deaths in 2012 to outdoor air pollution, and 4.3 million to household air pollution. The breathing in of particulate matter (composed of black carbon, sulfate, nitrates, ammonia, sodium chloride, mineral dust and water) that measures 10 microns or less in diameter (PM10), poses the greatest health risks because the particles can find their way deep into lungs and the bloodstream, and cause cardiovascular and respiratory disease, and premature death. Formed by the incomplete burning of fossil fuels, biofuels and biomass, black carbon, has a diameter of less than 2½ microns (PM2.5).

A major constituent of soot, black carbon is the most solar energy-absorbing component of particulate matter and can absorb one million times more energy than CO2. The amount of energy stored in the atmosphere is measured as watts per square meter of Earth’s surface; a 2013 study estimated black carbon’s effect to be 1.1 watts per square meter per year, second only to carbon dioxide, which is responsible for 1.56 watts per square meter. In other words, black carbon is the second largest contributor to climate change after CO2. But unlike CO2, which can stay in the atmosphere for hundreds to thousands of years, black carbon, because it is a particle, remains in the atmosphere only for days to weeks before it returns to earth with rain or snow.

Because black carbon absorbs solar energy, it warms the atmosphere. When it falls to earth with precipitation, it darkens the surface of snow and ice, reducing their albedo (the reflecting power of a surface), warming the snow, and hastening melting.

#### Corporate colonialism also locks the Global South out of space, which internal link turns any negative offense because it magnifies interstellar inequality.

Stockwell 20 [Sam Stockwell is a research assistant at RAND Europe working in the area of defence, security and infrastructure. His research interests include terrorism and counter-terrorism, cybersecurity, emerging technologies in conflict environments, and space security. Prior to RAND, Stockwell was a research assistant at The Henry Jackson Society, a security think tank, where he studied the impact of coronavirus on online extremist content. He has also worked with lecturers at the University of East Anglia on Brexit-related projects. Stockwell achieved a Distinction at King's College London in conflict, security and development studies, specialising in far-right terrorism and cyber security. He holds a First Class B.A. (Hons) degree in politics from the University of East Anglia, where he also received The Thomas Paine Prize in Politics for achieving consistently high marks on assignments throughout his course.) “Legal ‘Black Holes’ in Outer Space: The Regulation of Private Space Companies” E-International Relations, July 20, 2020] RM

Corporate Space Debris, Security Tensions and Environmental Contamination

Space debris can be defined as non-purposeful man-made objects that reside in space; made up of inactive parts from former space operations and fragmentations of spacecraft, there are nearly 30,000 pieces of debris in the Earth’s orbit (Pellegrino & Stang, 2016: 25). Despite most debris being centimetres or millimetres in size satellites often travel at the speed of a bullet, meaning that a collision between the two could be catastrophic in terms of environmental, mechanical and financial damage (Black & Butt, 2010: 1).

Since the development of the Kessler Syndrome thesis in 1978 – which predicted that space debris may become so dense as to trigger a chain reaction of major collisions – space debris is considered more of a threat to security operations in the near-term than military space activity (Quintana, 2017: 95). Difficulty over determining whether a collision was accidental or a purposeful act further exacerbates this problem, given that “every object in orbit is a threat to everything else in orbit, regardless of its intended function” (Faith, 2012: 86). Such developments have led to the US administration increasingly adopting a securitisation discourse around orbital debris (Bowen, 2014: 47), which may cause concerns as to whether policymakers may react to future American satellite collisions in a militarised manner.

A number of NewSpace actors are likely to complicate these worries even further through recent satellite proposals. Whilst Boeing is proposing a constellation of up to 3,000 satellites, SpaceX has even grander goals of creating a constellation consisting of 4,425 satellites, eventually expanding to 12,000 satellites in the near-future (Kosiak, 2019: 7). Putting this into context, there are currently just around 1,400 active satellites in orbit around the Earth, highlighting the scale of these projects. The collision between a single US privately-owned Iridium satellite and state-owned Russian Cosmos satellite in 2009 underscored not only the sheer amount of debris caused by these collisions – over 1,500 pieces – but also foreshadowed the possible geopolitical tensions that may arise from them (Wang, 2010: 87-88). Given the number of various commercial satellite constellations possibly going into orbit in the near-future, this raises questions over the possibly devastating security hazards they could pose once in orbit or when they eventually become defunct.

Yet the proliferation of these commercial satellite plans also pose significant environmental issues. Article IX of the OST asserts that: “States shall pursue activities of outer space in a manner that avoids any harmful contamination or adverse environmental changes on Earth” (UN, 1967). However, the use of terms like ‘harmful’ or ‘adverse change’ underscores the lack of specificity over what exactly constitutes environmental damage, or for whom it must refrain from harming. There is also a failure to address the explicit problem of space debris since the discourse is primarily concentrated on chemical effluent pollution, undermining attempts to facilitate the removal of floating wreckage(Gupta, 2016: 26).

The inability of the OST to properly promote environmental considerations in space has been mirrored in the NewSpace community, where there has been a woeful lack of ecological consideration: “The hundreds of articles and books on outer space resource development seldom mention that such actions may adversely affect the environment in ways that will potentially disadvantage their enterprises and the humans that will be required to implement them” (Kramer, 2017: 136). Such images evoke the types of difficulties that private firms have encountered on Earth reconciling capital with the environment in a way that doesn’t damage profit margins (Magdoff & Foster, 2011: 61-66). Yet in doing so, this neglect is only likely to result in the proliferation of extra-terrestrial debris that the UN OST failed to address. Indeed, despite its vastness there is only a narrow region of orbital space that is either useable or beneficial for prolonged human missions (Brearley, 2005: 2), meaning that the increase in space debris from these massive commercial satellite constellations will likely be at the detriment of developing nations who have yet fostered spacefaring capabilities.

Elon Musk’s SpaceX company has already caused complications for Earth-bound astrologists. The brightness of his recent ‘Starlink’ satellite constellation system in comparison to other satellites has been obscuring telescopic images (see Grush, 2020). More concerningly, Starlink may be much more visible during twilight hours which could be problematic in identifying potentially hazardous asteroids in a timely manner (The Verge, 2020). In this sense, whilst private space entrepreneurs are able to increase their profitability from being able to establish constellations, such endeavours are spoiling the scientific work of researchers on Earth that may complicate the monitoring of Earth-based asteroid impacts.

Conclusion: Space as a Global Commodity

Ultimately, this essay has revealed how the UN OST fails to adequately regulate private space enterprises in outer space within an array of activities. Predominately designed from a state-centric perspective, the increasing entanglement of the state apparatus with the private sector is enabling both actors to satisfy their extra-terrestrial interests through legal ambiguities in a way that the treaty never envisaged possible.

Yet, these processes also expose the ways in which the conceptualisation of outer space by both the drafters of the OST and NewSpace actors is intimately connected to Earth-bound social relations and power structures. Whether it be contestations over resources, surveillance or the environment, the concerns raised mirror those taking place on Earth. A product of its time, the OST was broadly concerned with protecting states from damage caused by one another in a tense international terrestrial atmosphere of possible nuclear annihilation, rather than seeking to protect the space environment as an aspiration “in its own right” (Brearley, 2005: 19). Despite framing themselves as the saviours of an anthropogenic extinction, the emphasis of NewSpace entrepreneurs on profit accumulation in space also emulates the types of criticisms private enterprises have faced on Earth, and risk the extension of existing wealth inequalities into the cosmos. The precedent set by NASA in April 2020 that will likely lead to the further involvement of private firms such as SpaceX in space endeavours will therefore serve to restrict public access to the extra-terrestrial domain – and the benefits that may arise from this. Indeed, the notion of outer space as a ‘global commons’ is slowly turning into one of a ‘global commodity’.

### 1AC – Framing

#### Existential threats independently outweigh – all life has infinite value and extinction eliminates the possibility for future generations

GPP 17 (Global Priorities Project, Future of Humanity Institute at the University of Oxford, Ministry for Foreign Affairs of Finland, “Existential Risk: Diplomacy and Governance,” Global Priorities Project, 2017, <https://www.fhi.ox.ac.uk/wp-content/uploads/Existential-Risks-2017-01-23.pdf>,

1.2. THE ETHICS OF EXISTENTIAL RISK In his book Reasons and Persons, Oxford philosopher Derek Parfit advanced an influential argument about the importance of avoiding extinction: I believe that if we destroy mankind, as we now can, this outcome will be much worse than most people think. Compare three outcomes: (1) Peace. (2) A nuclear war that kills 99% of the world’s existing population. (3) A nuclear war that kills 100%. (2) would be worse than (1), and (3) would be worse than (2). Which is the greater of these two differences? Most people believe that the greater difference is between (1) and (2). I believe that the difference between (2) and (3) is very much greater. ... The Earth will remain habitable for at least another billion years. Civilization began only a few thousand years ago. If we do not destroy mankind, these few thousand years may be only a tiny fraction of the whole of civilized human history. The difference between (2) and (3) may thus be the difference between this tiny fraction and all of the rest of this history. If we compare this possible history to a day, what has occurred so far is only a fraction of a second.65 In this argument, it seems that Parfit is assuming that the survivors of a nuclear war that kills 99% of the population would eventually be able to recover civilisation without long-term effect. As we have seen, this may not be a safe assumption – but for the purposes of this thought experiment, the point stands. What makes existential catastrophes especially bad is that they would “destroy the future,” as another Oxford philosopher, Nick Bostrom, puts it.66 This future could potentially be extremely long and full of flourishing, and would therefore have extremely large value. In standard risk analysis, when working out how to respond to risk, we work out the expected value of risk reduction, by weighing the probability that an action will prevent an adverse event against the severity of the event. Because the value of preventing existential catastrophe is so vast, even a tiny probability of prevention has huge expected value.67 Of course, there is persisting reasonable disagreement about ethics and there are a number of ways one might resist this conclusion.68 Therefore, it would be unjustified to be overconfident in Parfit and Bostrom’s argument. In some areas, government policy does give significant weight to future generations. For example, in assessing the risks of nuclear waste storage, governments have considered timeframes of thousands, hundreds of thousands, and even a million years.69 Justifications for this policy usually appeal to principles of intergenerational equity according to which future generations ought to get as much protection as current generations.70 Similarly, widely accepted norms of sustainable development require development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs.71 However, when it comes to existential risk, it would seem that we fail to live up to principles of intergenerational equity. Existential catastrophe would not only give future generations less than the current generations; it would give them nothing. Indeed, reducing existential risk plausibly has a quite low cost for us in comparison with the huge expected value it has for future generations. In spite of this, relatively little is done to reduce existential risk. Unless we give up on norms of intergenerational equity, they give us a strong case for significantly increasing our efforts to reduce existential risks. 1.3. WHY EXISTENTIAL RISKS MAY BE SYSTEMATICALLY UNDERINVESTED IN, AND THE ROLE OF THE INTERNATIONAL COMMUNITY In spite of the importance of existential risk reduction, it probably receives less attention than is warranted. As a result, concerted international cooperation is required if we are to receive adequate protection from existential risks. 1.3.1. Why existential risks are likely to be underinvested in There are several reasons why existential risk reduction is likely to be underinvested in. Firstly, it is a global public good. Economic theory predicts that such goods tend to be underprovided. The benefits of existential risk reduction are widely and indivisibly dispersed around the globe from the countries responsible for taking action. Consequently, a country which reduces existential risk gains only a small portion of the benefits but bears the full brunt of the costs. Countries thus have strong incentives to free ride, receiving the benefits of risk reduction without contributing. As a result, too few do what is in the common interest. Secondly, as already suggested above, existential risk reduction is an intergenerational public good: most of the benefits are enjoyed by future generations who have no say in the political process. For these goods, the problem is temporal free riding: the current generation enjoys the benefits of inaction while future generations bear the costs. Thirdly, many existential risks, such as machine superintelligence, engineered pandemics, and solar geoengineering, pose an unprecedented and uncertain future threat. Consequently, it is hard to develop a satisfactory governance regime for them: there are few existing governance instruments which can be applied to these risks, and it is unclear what shape new instruments should take. In this way, our position with regard to these emerging risks is comparable to the one we faced when nuclear weapons first became available. Cognitive biases also lead people to underestimate existential risks. Since there have not been any catastrophes of this magnitude, these risks are not salient to politicians and the public.72 This is an example of the misapplication of the availability heuristic, a mental shortcut which assumes that something is important only if it can be readily recalled. Another cognitive bias affecting perceptions of existential risk is scope neglect. In a seminal 1992 study, three groups were asked how much they would be willing to pay to save 2,000, 20,000 or 200,000 birds from drowning in uncovered oil ponds. The groups answered $80, $78, and $88, respectively.73 In this case, the size of the benefits had little effect on the scale of the preferred response. People become numbed to the effect of saving lives when the numbers get too large. 74 Scope neglect is a particularly acute problem for existential risk because the numbers at stake are so large. Due to scope neglect, decision-makers are prone to treat existential risks in a similar way to problems which are less severe by many orders of magnitude. A wide range of other cognitive biases are likely to affect the evaluation of existential risks.75

**Pleasure and pain are intrinsically valuable.**

**Moen 16** [Ole Martin Moen, Research Fellow in Philosophy at University of Oslo “An Argument for Hedonism” Journal of Value Inquiry (Springer), 50 (2) 2016: 267–281] SJDI

Let us start by observing, empirically, that **a widely shared judgment about intrinsic value and disvalue is that pleasure is intrinsically valuable and pain is intrinsically disvaluable.** **On virtually any proposed list of intrinsic values and disvalues (we will look at some of them below), pleasure is included among the intrinsic values and pain among the intrinsic disvalues.** This inclusion makes intuitive sense, moreover, for **there is something undeniably good about the way pleasure feels and something undeniably bad about the way pain feels, and neither the goodness of pleasure nor the badness of pain seems to be exhausted by the further effects that these experiences might have.** “Pleasure” and “pain” are here understood inclusively, as encompassing anything hedonically positive and anything hedonically negative.2 **The special value statuses of pleasure and pain are manifested in how we treat these experiences in our everyday reasoning about values.** If you tell me that you are heading for the convenience store, **I might ask: “What for?” This is a reasonable question, for when you go to the convenience store you usually do so**, not merely for the sake of going to the convenience store, but **for the sake of achieving something further that you deem to be valuable.** You might answer, for example: “To buy soda.” This answer makes sense, for soda is a nice thing and you can get it at the convenience store. I might further inquire, however: “What is buying the soda good for?” This further question can also be a reasonable one, for it need not be obvious why you want the soda. You might answer: “Well, I want it for the pleasure of drinking it.” **If I then proceed by asking “But what is the pleasure of drinking the soda good for?” the discussion is likely to reach an awkward end. The reason is that the pleasure is not good for anything further; it is simply that for which going to the convenience store and buying the soda is good.**3 As Aristotle observes**: “We never ask [a man] what his end is in being pleased, because we assume that pleasure is choice worthy in itself.**”4 Presumably, a similar story can be told in the case of pains, for if someone says “This is painful!” we never respond by asking: “And why is that a problem?” We take for granted that if something is painful, we have a sufficient explanation of why it is bad. If we are onto something in our everyday reasoning about values, it seems that **pleasure and pain are both places where we reach the end of the line in matters of value.**

#### Thus, the standard is maximizing expected well-being – prefer:

#### 1] Actor specificity – Governments must aggregate since every policy benefits some and harms others, which also means side constraints freeze action. Actor-specificity comes first since different agents have different ethical standings.

#### 2] **No act-omission distinction—governments are responsible for everything in the public sphere so inaction is implicit authorization of action: they have to yes/no bills, which means everything collapse to aggregation.**