# Ayala AM

## 1NC

### Off 1

#### **Interp: aff’s must not effect celestial bodies**

New World Encyclopedia ND, "Outer space," No Publication, https://www.newworldencyclopedia.org/entry/outer\_space

Outer space (often called space) consists of the relatively empty regions of the universe outside the atmospheres of celestial bodies. Outer space is used to distinguish it from airspace and terrestrial locations. There is no clear boundary between Earth's atmosphere and space, as the density of the atmosphere gradually decreases as the altitude increases.

#### Violation: they don’t; a. babcock talks about celestial bodies b. their plan doesn’t specify where PTD is expanded – just mandates that it is

#### Reject plan text in a vaccum it’s a terrible standard for debate:

#### Allows aff teams to spike out of all T offense – even if the mechanism of the plan is not topical

#### Limits: Allowing celestial bodies creates an unpredictable research burden – the neg not only has to familiarize themselves with the privatization of outer space but also every planet ever – this kills limits on an already large topic

#### Ground: they kill neg ground allowing aff’s that effect planets kills neg ground through allowing aff’s to no link out of satellite and other specific DA’s

#### Predictability: literature base concludes neg – most people define outer space as in between athmospheres– including earth guts predictability for topic lit

#### Explodes limits through having affirmatives just needed to have something to do with the topic – extra topicality is a voting issue --

#### They’re not reasonable---the clear disparity between our interpretation and theirs proves. An offense-defense paradigm is best key to check untopical affirmatives.

#### No rvi’s teams shouldn’t win for just proving their topical.

### Off 2

#### Geoengineering through solar radiation management or SRM is not part of the current climate policy mix, BUT successful public trust litigation causes fast, widespread adoption

Andrew Lockley 20, Honorary Research Assistant, The Bartlett School of Sustainable Construction, University College London; Gideon Futerman, Immanuel College; and D’Maris Coffman, CPM, UCL Bartlett, 2020, “Geoengineering and Public Trust Doctrine,” Climate & Carbon Law Review, 14(2), pp. 85-97 /jpb

The difficulties in swiftly decarbonising the global economy have resulted in a renewed consideration of geoengineering as an alternative and supplement to mitigation and adaptation. In its modern usage, geoengineering is understood to mean the deliberate modification of the climate system. Geoengineering has two key strands:

CDR/GGR: Carbon Dioxide Removal relates to removal of atmospheric CO2 – directly, or indirectly (e.g. by treating seawater). The set of technologies known as Greenhouse Gas Removal (GGR)2 additionally includes removal of secondary Greenhouse Gases (GHGs), such as methane, and halocarbons. Cost is the major impediment to CDR deployment (50 EUR/ton CO2 is suggested by IEAGHG3).

SRM: Solar Radiation Management is a suite of techniques based on the principle of modifying the Earth’s radiation balance through partial reflection of sunlight. Advocates of SRM suggest various schemes: marine cloud brightening (MCB); cirrus cloud thinning (CCT); and stratospheric aerosol injection (SAI). The resulting SRM-modified climate would either be drier, or warmer, than the pre-industrial world. Furthermore, warming is not the only severe risk from CO2 emissions (e.g. ocean acidification is also a major threat). Moreover, there are major risks and controversies which make policymakers reluctant to deploy SRM at present.4

When the term geoengineering is used without clarification in this article, it should be taken to refer to both SRM and CDR. With the exception of afforestation initiatives and suchlike, to date no large-scale geoengineering has been deployed. Nevertheless, experts concur that neither CDR nor SRM are likely to pose insurmountable engineering challenges.5 However, some forms, e.g. space mirrors, are currently prohibitively expensive.6

Despite the absence of historical deployments, geoengineering has a prominent place in current global warming discourses and debates. CDR, in particular, is becoming embedded in major international agreements as the third leg of the mitigation, adaptation, geoengineering tri-partite response to climate change. The recent Paris treaty projects large-scale CDR deployment in the latter half of the 21st century.7 Conversely, SRM is not part of the current policy mix. This may well change, as SRM techniques can be rapidly and inexpensively deployed. SRM is also cost effective,8 with estimates of operational costs as little as $1bn/yr to deliver a 1 W m−2 solar flux change; with the upper bound for deployment costs being, according to McClellan, a little more than $2 billion USD per year9. Another study has the figure for halving the temperature change at between $2 billion and $2.5 billion USD10. These estimates could potentially be reduced significantly by delivery via drone aircraft, and similar automation elsewhere in the supply chain; drone technologies are evolving quickly, although the authors are not aware of calculations regarding this at present. Either way, direct costs of SRM are negligible as a percentage of global GDP.

Future deployment of geoengineering may be made by commercial firms,11 or by states and their proxies. Likewise, two models for the possible future commercial commissioning of geoengineering exist – depending on whether states, or private citizens and firms, are the ultimate customers.12

An important risk of SRM is the threat of ‘termination shock’. This would occur if the deployment were to be interrupted,13 due to the short lifetime of SRM aerosols. Abrupt SRM termination is dangerous, as the rate of increase of global temperature is a major risk factor for the biosphere.14 Accordingly, regulatory processes and procedures for SRM must ensure that any exit from a programme is orderly and thus does not expose the climate to avoidable risk of termination shock. One viable method for achieving this is a smooth transition to CDR. In this case, SRM simply acts as a bridge, constraining temporary temperature rises, whilst CDR deployment is awaited.

SRM is not a homogenous commodity and one kilo of injection is not automatically equivalent to another. Various classes of SRM are fundamentally different: SAI is more long-lasting; MCB is more temporarily and spatially controllable.15. There also exists the less well studied cirrus cloud thinning.16 SAI is much more persistent than is MCB (approximately two years vs. days). SAI deployments are global in effect, tending to be spread rapidly on zonal winds,17 and spread more slowly poleward by the Brewer-Dobson circulation.18 SAI broadly remains within the Northern or Southern hemisphere, according to the locus of injection.19

Hemispheric imbalances in deployment cause significant disruption to the Inter-Tropical Convergence Zone – and therefore major disruption to the climate of the wider equatorial region (such as the Sahel region). MCB and CCT are more locally specific. However, teleconnections in the climate mean that these techniques do not have a cleanly isolated effect.20 Further, SAI and MCB are expected to have differing effects on precipitation. The precise nature of this difference will vary according to the detail of the injection regime.21

Existing authors primarily discuss geoengineering in the context of two potential deployment scenarios: state provision / regulation;22 or the rogue ‘Greenfinger’ philanthropist.23 Criticism of this limited scope, including consideration of alternative funding models, can be found in existing literature.24

A public good is non-excludable and non-rivalrous. Its consumption cannot be prevented, and consumption does not reduce availability. Such goods, e.g. street lighting, are usually provided by the state. Geoengineering is widely regarded as a public good,25 although some differ from this consensus view.26

II. Public Trust Doctrine

A trust is a legal instrument that allows the retention of an asset in a legal vehicle controlled by a party other than that which is the beneficial owner.27 Although they may have more ancient origins, the first appearances of land trusts can be found in biblical accounts.28

Public Trust Doctrine (PTD) concerns a system of common ownership, whereby commons are held in trust for public benefit.

‘The principle that certain natural and cultural resources are preserved for public use, and that the government owns and must protect and maintain these resources for the public's use. For example, under this doctrine, the government holds title to all submerged land under navigable waters. Thus, any use or sale of such land must be in the public interest.’29

PTD has emerged as a feature of modern environmental law,30 with some claiming it to have enormous potential in terms of environmental litigation.31 As such, the concept of public trust doctrine has been invoked in a wide range of recent legal cases, in a number of jurisdictions – even in the absence of plaintiffs.32 Especially notable are a clutch of cases involving child plaintiffs: in Pakistan,33 a range of US states,34 and a number of other countries around the world35, although their scope and applicability may be limited. PTD is found in the case law and legal regimes of many, although not all, countries. PTD in its modern sense is seen to originate as part of English Common Law.36 PTD is recognised as a valid legal doctrine in the case law of 41 US states37 and by the US Supreme Court.38 PTD is found in the case law of India,39 as well as located in the constitution, according to the Supreme Court.40 It is also found in the case law of the Philippines,41 and Canada.42 Moreover, PTD is anchored in Article 237 of the Ugandan constitution.43 It must also be noted that in many cases, PTD has been based on the right to life44 and the right to a safe environment,45 and thus the authors argue that there is potentially scope for its use in other countries that have the right to life and to a safe environment enshrined in their constitution. Notable for this article, PTD is not particularly widespread in small island states, although the right to life is.46,47 The right to life is part of international law in Article 3 of the Universal Declaration of Human Rights48 and the International Covenant on Civil and Political Rights,49 although there are no cases that link PTD to international law through these as far as the authors are aware. It is important to recognise before proceeding the importance of the American conception of PTD, as this strongly influenced many other countries’ conceptions of PTD, such as South Africa and India.50

PTD has been used in several recent cases brought against governments based on their failure to take sufficient climate action51, and Komor v. USA has even used PTD implicitly to argue for action on geoengineering.52 As PTD is becoming more commonly invoked to sue for climate action, it is becoming increasingly relevant to discuss. It is particularly important to speak of the Juliana v. USA53 case in this context. Here, despite the court recognising the necessity for urgent action on climate change, the majority ruled that an Article III court did not have the power to mandate such action, rather it could only come from the political branches.54 If this is upheld in higher courts, it may indicate that PTD is not strong enough to compel the US Federal Government to carry out any climate action. Considering that Komor v. USA is a very similar case to Juliana v. USA, this may mean that PTD as a mechanism to compel action on geoengineering is unlikely to work in the US Federal context. It must be noted that the minority opinion stated the court did have the power to rectify what it considered a constitutional breach, and compared the case to Brown v. Board of Education.55 However, this was based on the idea that climate change presented a threat to the republic, rather than relying on Public Trust Doctrine.56 Elsewhere the Dutch Supreme Court has ruled they do have the power to compel the Dutch government to act on climate change.57 It is clear that the power of judicial rulings to promote climate action differs by jurisdiction. Moreover, the conception of PTD invoked in Juliana v. USA was PTD extended to the atmosphere, rather than with regards to assets that PTD is commonly applied to. However, Juliana v. USA is one of the highest profile cases using PTD in relation to climate change to be ruled on thus far, and it must be noted, the US precedent on PTD carries a lot of weight around the world, for example in an Indian context.58

Despite this, and the seeming impact on the strength of PTD, it is still important to explore it for two reasons. Firstly, PTD is by its nature, exceptionally fluid,59 and thus it is very likely that the interpretation of it will change in the future, and thus it is important from a governance perspective to discuss PTD. Secondly, even if PTD could not be used to compel a government, it could potentially be used by a motivated trustee as justification for geoengineering action, once again raising governance issues. Even if such ideas are speculative, it is important to consider its possible interactions with geoengineering in advance of large-scale deployment becoming a distinct possibility.60

There is merit in exploring the relationship between PTD and geoengineering, despite the debateable strength of PTD – as even a weak principle would affect the governance of geoengineering. As governance is a key area of scholarly activity related to geoengineering,61 PTD is important to discuss. A comprehensive treatment of Atmospheric Trusts is offered by Wood,62 and of Public Trust Doctrine generally in environmental matters by Blumm and Guthrie.63 The approach has, however, not always met with success.64

Although a comprehensive taxonomy of the uses of the Public Trust Doctrine in environmental protection is beyond the scope of this article, it is worth acknowledging that there are several issues that must be addressed before the concept can be fully adapted to global governance structures. PTD’s origins are believed to be Justinian, focusing on placing communal resources in trust, (excluding private control) appointing trustees to preserve and make them available for specific purposes.65 Yet there appears to be some doubt how far this created positive duties of custodianship for the state. The Anglo-American common law tradition – which the Indian system, for example, draws upon66 – has evolved to create a PTD in which the focus is on the responsibility of the state to preserve the public trust for public use.67 PTD thus prohibits conveyancing (which would transfer such assets to private hands), or the division of fiduciary responsibility by devolving the supervision of trustees onto inferior magistrates. Sax proposed a large expansion of the role PTD could play in environmental legislation, which is the origin of much of the modern interest in PTD.

Finally, it is important to address the entities to which PTD applies. Generally, PTD is considered to apply to the nation state68, although in a US context, PTD is a part of state law rather than federal law.69 It should be noted that there are no known cases of PTD applying to supranational entities.

#### Geoengineering causes extinction from nuclear war, ozone loss, food production collapse and accelerated warming

Clive Hamilton 19, Vice-Chancellor’s Chair and professor of public ethics, Centre for Applied Philosophy and Public Ethics, Charles Sturt University, Canberra, 6/5/19, “Could geoengineering cause a climate war?,” <https://www.sciencefocus.com/planet-earth/could-geoengineering-cause-a-climate-war/>

But there are a number of risks, and not just because we’re unsure about how effective these interventions would be. There are fears that one country’s efforts to solve its climate problem could inadvertently mess up the weather elsewhere, creating a new source of political tension. And ultimately, this leads to a worrying question: could we be looking at the dawn of a new kind of war – one fuelled by a battle for dominance over our planet’s climate system?

The problem with geoengineering

Geoengineering is defined as a deliberate, large-scale intervention in the climate system, and schemes come in two varieties. The first type aims to remove carbon dioxide from the atmosphere. This can be done by capturing it from the air using natural or artificial means; making biochar (a type of charcoal) from vegetation waste; or adding lime to the oceans to reduce their acidity and therefore maintain their ability to absorb carbon dioxide from the atmosphere. The greatest hurdle for these schemes lies in finding somewhere to permanently store the huge quantities of carbon. The deep ocean offers one possible solution, but we’re still a long way from a feasible method of doing this.

The second kind of geoengineering scheme is known as solar radiation management or albedo modification. These techniques look to reflect a small amount of sunlight away from the planet to reduce warming. Some of these proposals are relatively benign, but also pretty ineffective. The technology receiving most attention – and the one most likely to be deployed because it’s cheap and feasible – is known as sulphate aerosol spraying.

The idea is to spray sulphur dioxide or sulphuric acid into the stratosphere or upper atmosphere to form tiny particles that reflect an extra 1 to 3 per cent of incoming solar radiation back into space, thereby cooling the planet in the way that large volcanic eruptions are known to do.

In effect, humans would be installing a radiative shield between the Earth and the Sun: one that could be adjusted by those who control it to regulate the temperature of the planet. The models indicate that if we reduced the amount of sunlight reaching the planet, the Earth would cool fairly quickly, although with less effect at the poles, which are warming more rapidly.

A 2010 study published in Nature Geoscience found that, under a solar geoengineering regime, there would be different responses across large regions, making consensus about how much to reduce incoming solar radiation difficult, if not impossible.

Some atmospheric scientists, like Dr Alan Robock at Rutgers University, argue that the complexity of the climate system means that it’s difficult to draw firm conclusions about the consequences of such a radical intervention. They point out that the chemistry of the upper atmosphere – including the ozone layer – is complicated and poorly understood. Reducing the amount of sunlight reaching the Earth in a computer model may give little clue as to what would happen in the actual climate system if a layer of sulphate aerosols were injected into it.

One worry is that, combined with increased water vapour as a result of global warming, adding sulphates to the upper atmosphere could be a lethal cocktail for ozone loss, speeding up chemical reactions that destroy this crucial gas. Other studies indicate that, depending on the kind of aerosol spraying programme, the South Asian and East Asian monsoons could be disrupted. Tropical rainfall depends on differences between temperatures on land and sea, and some models show that by changing the temperature ratio between land and sea, solar geoengineering could suppress monsoon rains, affecting food supplies for millions of people.

However, global warming itself is changing precipitation patterns around the world (broadly speaking, dry regions are becoming drier and wet ones wetter) so a solar shield may improve rainfall in some regions that are drying out. It’s here we get to some of the most difficult issues associated with geoengineering.

Unknown unknowns

If the most sophisticated models cannot provide a firm answer regarding how solar geoengineering would affect the actual global climate, nor can experiments. Only full-scale implementation would provide a clear idea of its impacts.

Even then, we’d need at least 10 years of global climate data before we had enough information to separate out the effects of sulphate aerosol spraying from natural climate variability and, indeed, from the effects of human-induced climate change. To compound the risks, if after 10 years we had accumulated enough data to decide that our intervention was not a good idea, it may be impossible to terminate the solar shield. Why should this be so?

For some time, ecologists have known that the rate at which the globe warms is a greater threat to ecosystems than the amount of warming, because a slower rate of warming gives plants and animals more time to adapt. If the solar shield causes some nasty unintended effects (including conflict between nations), removing it suddenly would cause the suppressed warming ‘rebound’. It’s been estimated that if warming occurs at a rate of 0.3°C per decade (well within the estimated rebound range) then only 30 per cent of ecosystems could adapt and survive.

So we may find that, once deployed, removing the shield becomes too risky; we’d be stuck with it. The danger would be multiplied if we failed to take the opportunity to cut greenhouse gas emissions sharply while the shield was in place. This is perhaps the greatest hazard of going down this path.

Politics, politics

Some technologies are inherently political in the sense that they increase the power of those who control it and reduce the power of those excluded from it. Imagine if the US government decided to install a solar shield that allowed it to regulate the climate. The government would wield great power over all those US industries that depend on the weather, while also being able to influence the climate in other parts of the world, creating immediate strategic tension.

Paradoxically, solar geoengineering can also be seen as a means of preserving social and political structures that are threatened by measures to cut carbon emissions. Instead of taxing fossil fuels, banning coal mining and restricting air transport, those profiting from these activities might welcome a technofix like sulphate aerosol spraying.

Indeed, in the US, conservative think tanks that have been at the forefront of climate science denial have shown an interest in solar geoengineering. It’s cheap and protects any vested interests. Geoengineering promises to turn a drastic failure of the free enterprise system into a triumph of human ingenuity. And they are more inclined to agree with Prof David Keith that an artificial Earth shaped by humans is not intrinsically inferior to a natural one.

At a deeper level, the implicitly autocratic nature of global climate regulation has an appeal to those on the political right just as it frightens those on the democratic left. It’s hard to imagine a government in charge of a solar geoengineering project holding a referendum on whether the Earth’s temperature should be reduced by one degree or two.

The control of the Earth’s weather could become the responsibility of a kind of ‘Climate Regulation Agency’, staffed by a technocratic elite whose task would be to continuously collect a vast array of weather information, feed it into data systems, separate out the effects of the solar shield from other factors, and advise the relevant department as to how many planes loaded with sulphur dioxide should be sent up next week and where they should dump their loads.

Climate wars

Military planners recognise climate change as a ‘threat multiplier’. US defence chiefs, among others, have incorporated a changing climate into their military planning and equipment supply. Climate change is expected to create political instability; indeed, some experts believe that climate change-induced drought, high food prices and migration to cities nudged Syria into civil war.

If that’s true – and we can only guess at how much conflict there might be in a world 3°C warmer – mitigating warming by geoengineering ought to create a more peaceful world. But it’s not so straightforward.

When hit by a devastating flood, drought or storm, a community will tend to see it as an act of God – a natural event that it just has to cope with. But what if we believed that the death and destruction were caused not by nature but by someone manipulating the weather? If another nation were engineering the climate, its politicians’ denials would fall on deaf ears, and not just because humans naturally look for someone to blame. If a nation had embarked on a system-altering form of climate engineering like sulphur dioxide spraying, it would be virtually impossible to work out whether an extreme weather event somewhere in the world was due to natural variability, human-induced climate change or climate manipulation. And climate manipulation would quite likely get the blame.

The government of China, faced with a catastrophic drought in the north of the country, might decide its survival demanded rapid global cooling. But sending up planes to spray sulphur dioxide might deprive India and Pakistan of their monsoon rains, bringing on famine. Three nuclear-armed nations would then be in conflict over weather patterns that affect the survival of millions of their citizens.

### Off 3

#### States ought to;

#### ----create and comply with a global NFU policy on nuclear weapons

#### ----take all nuclear weapons off high alert

#### Global NFU solves escalation.

Global Zero, No Date, [Since its launch in Paris in December 2008, Global Zero has grown to include 300 world leaders and half a million citizens worldwide"No First Use FAQs," https://www.globalzero.org/no-first-use-faqs/]/ISEE

What does No-First-Use (NFU) actually mean? “No First Use” is a commitment to never use nuclear weapons first under any circumstances, whether as a preemptive attack or first strike, or in response to non-nuclear attack of any kind. Where do nuclear-armed countries stand on No First Use? China is the only nuclear-armed country to have an unconditional NFU policy. India maintains a policy of NFU with exceptions for a response to chemical or biological attacks. France, North Korea, Pakistan, Russia, the United Kingdom and the United States maintain policies that permit the first use of nuclear weapons in a conflict. Israel does not acknowledge the existence of its nuclear arsenal so has no publicly known position. Why advocate for global NFU commitments now? The world has never faced so many crises that could escalate to nuclear conflict. In addition to the precarious situation on the Korean peninsula, we’re running acceptably high risks of nuclear weapons use between NATO and Russia, India and Pakistan, and the United States and China. In fact right now the chances that nuclear weapons will be used — intentionally, accidentally, or due to miscalculation — are the highest they’ve been since the worst days of the Cold War. Establishing global NFU commitments would immediately make the world safer by resolving uncertainty about what a nuclear-armed country might do in a crisis, which removes pressure and incentive for any one country to “go nuclear” first in a crisis. What are consequences of nuclear first use? Any use of a nuclear weapon would invite massive retaliation. A recent study by Global Zero estimated U. S. fatalities due to a Russian retaliation to a U.S. nuclear first strike. It found 30% of the total population of the top 145 biggest cities in the United States — 21 million Americans — would die in a Russian nuclear counterattack. To put that in perspective, in the first 24 hours the U.S. death toll would be 50 times greater than all American casualties in World War II. Not to mention the horrific aftermath of nuclear war. A 2014 study shows that so-called “limited” nuclear war in South Asia, in which 100 nuclear weapons are used, would have global consequences. Millions of tons of smoke would be sent into the atmosphere, plunging temperatures and damaging the global food supply. Two billion people would be at risk of death by starvation. How are No First Use commitments a step toward the goal of eliminating all nuclear weapons? Global No First Use would be an important step toward making nuclear weapons irrelevant to national security. These policies would strip nuclear weapons of value in the eyes of military planners, enable future nuclear disarmament negotiations, and accelerate the dismantling of these weapons. It would also serve as a “confidence-building measure” that establishes greater trust among nuclear-armed countries and makes it easier to work together to reduce nuclear risks and ultimately eliminate all nuclear weapons. No First Use in the United States What does current United States policy say about the first use of nuclear weapons? The 2018 U.S. Nuclear Posture Review (NPR) maintains the policy “the United States would only consider the employment of nuclear weapons in extreme circumstances to defend the vital interests of the United States, its allies, and partners.” This loose language holds open the possibility that nuclear weapons would be used in an initial attack (which can be ordered by the president, whose authority to use nuclear weapons is virtually limitless) or in response to a conventional, biological, chemical or cyber attack. Who would believe a U.S. NFU policy? Making a NFU policy credible — establishing it as a commitment that other countries can count on — means going beyond simple declaratory statements. This would require meaningful changes to the kinds of nuclear weapons the United States builds and the way it deploys them. One tangible way to show your NFU policy means something is to take all nuclear weapons off high-alert, meaning they are no longer ready to launch instantly. Another is to eliminate all land-based nuclear missiles (also known as intercontinental ballistic missiles, or ICBMs), which are by definition nuclear first-strike weapons, and prioritize the kinds of systems that would be used only in response to a nuclear attack. More recommendations for what the U.S. nuclear arsenal could look like under a guiding principle of NFU can be found in Global Zero’s Alternative U.S. Nuclear Posture Review. How would adoption of a NFU policy affect national security? Don’t we need to keep all our options on the table to deter our enemies? There exists no plausible circumstance in which the use of a nuclear weapon would be in the national security interests of the United States, American people, or U.S. allies. A nuclear counterattack following a U.S. first strike would be catastrophic, resulting in the deaths of millions of Americans and the total devastation of economic and social infrastructure. Any first use against lesser threats, such as countries or terrorist groups with chemical and biological weapons, would be gratuitous; there are very effective alternative means of countering those threats. There is little evidence to suggest nuclear weapons are effective in deterring non-nuclear attacks, including biological and chemical use. If the United States suffered a non-nuclear attack, it is difficult to imagine any president considering using nuclear weapons — destroying entire cities and killing hundreds of thousands of people, damaging the environment for generations, spreading deadly radiation possibly to uninvolved countries — in retaliation. Is there support for U.S. adoption of NFU? There is growing momentum for NFU in the United States. A 2016 poll showed at least two-thirds of Americans support NFU. Senator Elizabeth Warren (D-MA) and Chairman of the House Armed Services Committee Representative Adam Smith (D-WA9) have introduced the No First Use Act (S.1219/H.R.2603) which states, “It is the policy of the United States to not use nuclear weapons first.” A number of former senior-level military commanders and government officials support U.S. adoption of NFU, including former Vice Chair of the Joint Chiefs of Staff General (ret.) James E. Cartwright, Ambassador Thomas Pickering, and former Secretary of Defense William Perry. How would adoption of No First Use affect U.S. commitments to its allies and partners? Would they be encouraged to develop their own nuclear arsenals? NFU in no way reduces the ability of the United States to deter nuclear attacks on the U.S. or its allies. Allies would be able to rely on the superior capabilities of U.S. non-nuclear forces, which are sufficient to deal with threats to the U.S. and its allies, including biological or chemical weapons threats. A NFU policy would also help allay apprehensions among some allies about the U.S. using nuclear weapons first in a conflict. The first use of nuclear weapons against Russia or China would invite massive retaliation against the U.S. and its allies. First use against lesser threats like North Korea could result in blanketing allies or others uninvolved in the conflict with deadly radioactive fallout. A 2016 Global Zero study that looked at the potential for a NFU policy to encourage proliferation by U.S. allies with extended deterrence agreements found no evidence that a country’s decision to remain non-nuclear was based on its expectation that the United States would conduct a nuclear first strike on its behalf. The reliability of commitments to second-strike and conventional (non-nuclear) defense were found to be more important to extended deterrence. A move to develop nuclear weapons would also go against allied obligations under the Nuclear Non-Proliferation Treaty. Is it true the U.S. President has the sole authority to order the launch of nuclear weapons? What effect does NFU have on that authority? Every American president has sole authority to order the launch of nuclear weapons. No one — not Congress, not the secretary of defense, not the chairman of the Joint Chiefs of Staff — can veto his or her decision. That means under the current system, one person has the power to start a nuclear war at any time, for any reason. A legally-binding NFU policy would change that by making the first use of nuclear weapons illegal, clearly limiting the circumstances under which a president’s nuclear launch order could be executed. What can I do to make No First Use the policy of the United States? Global Zero is working every day to make No First Use a reality all of the nuclear-armed countries of the world, including the United States. If you’d like to support the work of our experts and advocates, please chip in here. Your donation will fund our work to educate policymakers, the public and the press, and help build a broad base of political support for this critical next step on the road to zero. If you’re interested in rolling up your sleeves and getting more involved, check out Beyond the Bomb, a grassroots organization building a people-powered movement to prevent nuclear war. You can sign the No First Use pledge to let your representatives know where you stand and get updates about key moments when your voice will make the biggest impact on your elected officials.

## Case

### Plan

#### Babcock is an idealist – ignore empirical date – lets put on our critical thinking hats the PTD in the squo is applied to other environmental concerns like the atmosphere – PTD has empirically failed as a regulatory regime

#### Babcock concludes that only a modified version of the ptd solves – their blanket application of the aff still leaves regulatory loopholes which proves alt causes

#### Plan literally isn’t feasible – 1AC has read negative cards that states writ large can apply the PTD some simply do not have infrastructure, court systems etc. provs that even if PTD is expanded people CANNOT sue

### Sustainable Space

#### Offensive capabilities are weak, there are lots of defenses---their ev is hype

Dr. Joan Johnson-Freese 16, Ph.D. in Political Science and International Relations from Kent State University, Chair of the Department of National Security Studies at the Naval War College, and Theresa Hitchens, Senior Research Scholar at the Center for International and Security Studies and Former Director of the United Nations Institute for Disarmament Research (UNIDIR), “Stop The Fearmongering Over War In Space: The Sky’s Not Falling, Part 1”, Breaking Defense, 12/27/2016, https://breakingdefense.com/2016/12/stop-the-fearmongering-over-war-in-space-the-skys-not-falling-part-1/

Star Wars it ain’t, but the Pentagon is increasingly anxious over threats to its satellites, as we’ve reported frequently in recent years. But in this op-ed, scholars Joan Johnson-Freese and Theresa Hitchens argue that war in space is dangerously overhyped. — the editors

In the last two years, we’ve seen rising hysteria over a future war in space. Fanning the flames are not only dire assessments from the US military, but also breathless coverage from a cooperative and credulous press. This reporting doesn’t only muddy public debate over whether we really need expensive systems. It could also become a self-fulfilling prophecy. The irony is that nothing makes the currently slim possibility of war in space more likely than fearmongering over the threat of war in space.

Two television programs in the past two years show how egregious this fearmongering can get. In April 2015, the CBS show 60 Minutes ran a segment called “The Battle Above.” In an interview with General John Hyten, the then-chief of U.S. Air Force Space Command, it came across loud and clear that the United States was being forced to prepare for a battle in space — specifically against China — that it really didn’t want.

Gen. John Hyten: It’s a competition that I wish wasn’t occurring, but it is. And if we’re threatened in space, we have the right of self-defense, and we’ll make sure we can execute that right.

David Martin: And use force if necessary.

Gen. John Hyten: That’s why we have a military. You know, I’m not NASA.

It was explained by Hyten and other guests that China is building a considerable amount of hardware and accumulating significant know-how regarding space, all threatening to space assets Americans depend on every day. If viewers weren’t frightened after watching the segment, it wasn’t for lack of trying on the part of CBS.

Using terms like “offensive counterspace” as a 1984 NewSpeak euphemism for “weapons,” it was made clear that the United States had no choice but to spend billions of dollars on offensive counterspace technology to not just thwart the Chinese threat, but control and dominate space. While it didn’t actually distort facts — just omit facts about current U.S. space capabilities — the segment was basically a cost-free commercial for the military-industrial complex.

In retrospect though, “The Battle Above” was pretty good compared to CNN’s recent special, War in Space: The Next Battlefield. The latter might as well have been called Sharknado in Space – because the only far-out weapons technology our potential adversaries don’t have, according to the broadcast, seems to be “sharks with frickin’ laser beams attached to their heads!”

First, CNN needs to hire some fact checkers. Saying “unlike its adversaries, the U.S. has not yet weaponized space” is deeply misleading, like saying “unlike his political opponents, President-Elect Donald Trump has not sprouted wings and flown away”: A few (admittedly alarming) weapons tests aside, no country in the world has yet weaponized space. Contrary to CNN, stock market transactions are not timed nor synchronized through GPS, but a closed system. Cruise missiles can find their targets even without GPS, because they have both GPS and precision inertial measurement units onboard, and IMUs don’t rely on satellite data. Oh, and the British rock group Pink Floyd holds the only claim to the Dark Side of the Moon: There is a “far side” of the Moon — the side always turned away from the Earth — but not a “dark side” — which would be a side always turned away from the Sun.

More nefariously, the segment sensationalized nuggets of truth within a barrage of half-truths, backed by a heavy bass, dramatic soundtrack (and gravelly-voiced reporter Jim Sciutto) and accompanied by sexy and scary visuals.

Make no mistake there are dangers in space, and the United States has the most to lose if space assets are lost. The question is how best to protect them. Here are a few facts CNN omitted.

The Reality

The U.S. has all of the technologies described on the CNN segment and deemed potentially offensive: maneuverable satellites, nano-satellites, lasers, jamming capabilities, robotic arms, ballistic missiles that can be used as anti-satellite weapons, etc. In fact, the United States is more technologically advanced than other countries in both military and commercial space.

That technological superiority scares other countries; just as the U.S. military space community is scared of other countries obtaining those technologies in the future. The U.S. military space budget is more than 10 times greater than that of all the countries in the world combined. That also causes other countries concern.

More unsettling still, the United States has long been leery of treaty-based efforts to constrain a potential arms race in outer space, as supported by nearly every other country in the world for decades. Indeed, under the administration of George W. Bush, the U.S. talking points centered on the mantra “there is no arms race in outer space,” so there is no need for diplomat instruments to constrain one. Now, a decade later, the U.S. military – backed by the Intelligence Community which operates the nation’s spy satellites – seems to be shouting to the rooftops that the United States is in danger of losing the space arms race already begun by its potential adversaries. The underlying assumption — a convenient one for advocates of more military spending — is that now there is nothing that diplomacy can do.

However, it must be remembered that most space-related technologies – with the exception of ballistic missiles and dedicated jammers – have both military and civil/commercial uses; both benign — indeed, helpful — and nefarious uses. For example, giving satellites the ability to maneuver on orbit can allow useful inspections of ailing satellites and possibly even repairs.

Further, the United States is not unable to protect its satellites, as repeated during the CNN broadcast by various interviewees and the host. Many U.S. government-owned satellites, including precious spy satellites, have capabilities to maneuver. Many are hardened against electro-magnetic pulse, sport “shutters” to protect optical “eyes” from solar flares and lasers, and use radio frequency hopping to resist jamming.

Offensive weapons, deployed on the ground to attack satellites, or in space, are not a silver bullet. To the contrary, U.S. deployment of such weapons may actually be detrimental to U.S. and international security in space (as we argued in a recent Atlantic Council publication, Towards a New National Security Space Strategy). Further, there are benefits to efforts started by the Obama Administration to find diplomatic tools to restrain and constrain dangerous military activities in space.

These diplomatic efforts, however, would be undercut by a full-out U.S. pursuit of “space dominance.” This includes dialogue with China, the lack of which Gen. William Shelton, retired commander of Air Force Space Command, lamented in the CNN report.

Given CNN’s “cast,” the spin was not surprising. Starting with Ghost Fleet author Peter Singer set the sensationalist tone, which never altered. The apocalyptic opening, inspired by Ghost Fleet, posited a scenario where all U.S. satellites are taken off-line in nearly one fell swoop. Unless we are talking about an alien invasion, that scenario is nigh on impossible. No potential adversary has such capabilities, nor will they ever likely do so. There is just too much redundancy in the system.

#### Deterrence and interdependence check

Kyle L. Evanoff 19, Research Associate for International Institutions and Global Governance at the Council on Foreign Relations, “Big Bangs, Red Herrings, and the Dilemmas of Space Security”, Council on Foreign Relations, 6/27/2019, https://www.cfr.org/blog/big-bangs-red-herrings-and-dilemmas-space-security

Analysts pointed to Mission Shakti as a vivid example of growing contestation in the outer space domain. Traditional U.S. dominance in space has eroded as a litany of foreign actors (collaborator and competitor alike) have increased their spacefaring prowess, including through the development and use of ASAT weapons and dual-use uncrewed orbiters capable of space rendezvous and proximity operations [PDF]. Pundits fear that such space technologies could alter the calculus of deterrence to inauspicious effect or, worse, become instruments in an adversary’s enactment of a “space Pearl Harbor.” These fears are valid in some senses, overblown and misleading in others. Developments in space pose significant challenges for strategic stability. Obsessive concern with the remote contingency of kinetic warfare in orbit, however, detracts from efforts to address more pressing space security issues and makes catastrophic outcomes more, not less, probable.

Missiles and Lasers and Viruses, Oh My

Recent years have witnessed burgeoning democratization in the outer space domain as plummeting costs—both for manufacturing satellites and placing them in orbit—and proliferating technologies have enabled new spacefaring actors to deploy assets in Earth orbit. The number of active satellites has ballooned to more than two thousand, and their integration into military operations and civil life has deepened in tandem. Recognition of the indispensability of these orbital assets to numerous areas of strategic competition, and defense planners’ emphasis on offensive capabilities as a deterrence measure, has led states to invest large sums in the development of ASAT weapons of various stripes.

In their April Space Threat Assessment 2019 [PDF] report, Todd Harrison, Kaitlyn Johnson, and Thomas G. Roberts of the Center for Strategic and International Studies outline four categories of counterspace operations: kinetic physical attacks, non-kinetic physical attacks, electronic attacks, and cyberattacks. This litany of potential threats, which vary in their severity, reversibility, ease of attribution, and other aspects, makes U.S. policymakers uneasy. After over half a century of spacefaring pre-eminence, the United States has come to depend on the remote-sensing, telecommunications, and positioning, navigation, and timing capabilities that satellites provide. The resounding defeat of the Iraqi military by American and coalition forces during the Gulf War of the early 1990s underscored the substantial battlefield advantages that orbital capabilities confer, and numerous subsequent conflicts have affirmed the U.S. military’s tactical and strategic reliance on space assets. Proliferating counterspace systems heighten the potential for adversaries to disrupt American command, control, and communications networks, as well as surveillance and reconnaissance operations. In attacking these critical space systems, U.S. adversaries could compromise large segments of the national defense enterprise.

Indeed, an insecure orbital environment poses significant challenges for broader strategic stability. Actors in possession of counterspace capabilities can threaten or attack vital elements of ballistic missile launch detection architectures and other systems integral to national and international security, which opens new avenues for intentional, inadvertent, or accidental dispute or conflict escalation. In this sense, novel satellite vulnerabilities add layers of technical and psychological complexity to already labyrinthine deterrence calculations. The effect compounds in light of the deep integration of satellites into information and communications networks: cyber intrusions into space systems are a tantalizing option for state and nonstate actors, and such operations carry their own elaborate deterrence considerations, not least the difficulty of attribution. The net result is a convoluted deterrence landscape, rife with uncertainty and in constant motion thanks to the rapid clip and often competitive character of technological innovation.

Swords of Many Edges

For staunch deterrence advocates, this uncertainty justifies expanding counterspace arsenals. In their view, preventing a space Pearl Harbor in which a U.S. adversary launches a crippling surprise attack against American orbital assets requires evincing the certainty of a devastating counterattack. One way of accomplishing this is through the unambiguous demonstration of effective counterspace capabilities. The clearer the demonstration, the better. In this sense, ASAT missile tests, which are easy to attribute and spectacular in nature, hold great allure as a means of signaling orbital strike capabilities.

Such tests, however, come with significant drawbacks. The most obvious of these is that they generate large amounts of dangerous space debris, which pose serious hazards to spacecraft. Each new fragment requires monitoring and, in cases of potential collisions, risk assessment and avoidance maneuvers. Debris-generating military operations, in this sense, are a self-defeating proposition. ASAT missile tests also come with nebulous reputational costs, as the corpus of international space law, including the 1967 Outer Space Treaty, emphasizes that uses of space should be peaceful in nature. Likewise, UN Debris Mitigation Guidelines [PDF] affirm the importance of minimizing space junk, a dictum inconsistent with kinetic weapons testing. Western media heaped scorn on India for its violation of the important, if incipient, norm against debris generation, even after the country took pains to destroy a low-altitude satellite in order to minimize the lifespan of the bulk of the fragments.

Another important consideration for would-be ASAT testers lies in the potential for space militarization to ignite or exacerbate international arms races. Although military activities have been a persistent feature of the Space Age, those activities have often furthered peaceful as much as warlike pursuits, as has been the case with many remote-sensing operations and the opening of the U.S. Global Positioning System to civilian use. Militarization is a process rather than a state of affairs, and one that takes various forms at that. Deterrence implications notwithstanding, the development and deployment of counterspace capabilities can drive potential adversaries to develop and deploy similar capabilities, contributing to the erosion of norms of peaceful use.

Some military planners and policymakers’ assertions to the contrary, space is at present less a domain of warfighting than a domain of deep interdependence. The value of combat support functions performed from space, as important as they are to battlefield success, pales in comparison to that of other satellite-facilitated services, which are vital to myriad aspects of contemporary global society. Common space security interests include minimizing debris-generation, coordinating on satellite placement and radio-frequency spectrum use, monitoring terrestrial and space weather and the global environment, ensuring the integrity of global navigation satellite systems, tracking licit and illicit ground, air, and maritime movements, scanning for hazardous comets and asteroids, and conducting scientific observations and experiments. Many of these require states to work together to maximize benefits and minimize risks. Perceptions that one or more countries are attempting in systematic fashion to exert dominance and preclude other actors’ access to the domain and its benefits, then, carry significant dangers. They bend state behavior toward aggression and actual warfighting.

Security in the Heavens and on Earth

National governments, including that of the United States, should be careful not to make active contributions to such perceptions. Although low-level grey zone aggression has become commonplace for space-linked systems due to the relative ease and reversibility of many cyber and electronic attacks, space remains free of kinetic combat at present, as a recent Secure World Foundation report [PDF] emphasizes. Rather than responding to limited attacks by expanding counterspace arsenals, which carries the risk of contributing to arms race dynamics, U.S. and allied policymakers should accept some amount of limited aggression as more or less inevitable. They should place more emphasis on diplomacy—not weaponry—as a tool in mitigating these sorts of attacks. The United States should work with other spacefaring powers to reach consensus on non-binding rules of the road for space, using the International Code of Conduct for Outer Space Activities [PDF] that the European Union proposed in 2008 as a rough starting point. While new international law could be a greater boon still, formal UN discussions on the Prevention of an Arms Race in Outer Space have yielded little progress since the mid-1980s. A joint Chinese-Russian proposal for a Treaty on the Prevention of the Placement of Weapons in Outer Space, for instance, has significant shortcomings and has drawn open condemnation from the United States. Such paralysis, in tandem with the Trump administration’s and U.S. Senate Republicans’ disdain of multilateral treaties, makes a formal agreement a farfetched proposition for now.

More important, U.S. policymakers should avoid making decisions on the basis of a possible, though highly improbable, space Pearl Harbor. They should recognize that latent counterspace capabilities—as exemplified in 2008’s Operation Burnt Frost, which saw the United States repurpose a ballistic missile interceptor to destroy a satellite—are more than sufficient to deter adversaries from launching a major surprise attack in almost all scenarios, especially in light of the aforementioned deep interdependence in the space domain. Adding to the deterrence effect are uncertain offensive cyber capabilities. The United States continues to launch incursions into geopolitical competitors’ critical systems, such as the Russian power grid, and has demonstrated a willingness to employ cyberattacks in the wake of offline incidents, as it did after Iran shot down a U.S. drone last week. Unlike in the nuclear arena, where anything short of the prospect of nuclear retaliation holds limited dissuasive power, space deterrence can stem from military capabilities in various domains. For this reason, an attack on a U.S. satellite could elicit any number of responses. The potential for cross-domain retaliation, combined with the high strategic value of space assets, means that any adversary risks extreme escalation in launching a major assault on American space architectures. Again, well-conceived diplomatic efforts are useful in averting such scenarios altogether.

**No risk of accidents – tech solves AND space isn’t crowded.**

**Fernholz ’19** [Tim, "SpaceX’s new satellites will dodge collisions autonomously (and they’d better)," May 24, https://qz.com/1627570/how-autonomous-are-spacexs-starlink-satellites]

“Within a year and a half, maybe two years, if things go well, SpaceX will probably have more satellites in orbit than all other satellites combined,” Elon Musk said last week. This is an exaggeration. There are almost 2,000 operational satellites in space right now. But Thursday night’s launch of 60 satellites for a new internet network called Starlink is the first step towards that goal. Today, Musk’s space company said it expects to launch six more times in 2019, with the goal of operating 720 satellites by the end of the 2020, and eventually more than 4,000. The Federal Communications Commission—the lead regulator for American satellites—approved these satellite, among 13,000 new satellites okayed in the last year. That huge number has many in the space community nervous about the potential for collisions with other satellites or with space debris. Neither the United States nor the world has a reliable system for managing traffic in space, and policymakers are struggling to keep up with the private sector’s growing ability to hurl computers into the cosmos at faster and faster rates. Musk said the satellites his company launches will avoid potential collisions on their own. And Mark Juncosa, the SpaceX executive in charge of developing the Starlink satellites, downplayed concerns when answering press inquiries on the matter last week. “It might be worth mentioning for people that are not in the space industry … space is really big,” he said. It was experts focused on pinning down what’s going on in orbit who questioned whether the autonomous systems would have sufficient data to safely maneuver. Musk’s electric cars at Tesla often face similar questions. However advanced their AI, what’s more important is how well the car can see. The ultimate source for space situational awareness is the US Air Force’s Combined Space Operations Center, or CSpOC, which tracks orbital objects 10 centimeters in diameter or larger with a worldwide radar network. Most satellite companies, especially those with large fleets, automate the communications and “station keeping” maneuvers. But when they receive a warning from CSpOC that there is a risk of collision with another spacecraft or with space debris, their team consults with the Air Force to make a decision about how to move. Planet, which operates more than 150 spacecraft, automates its communications with CSpOC and has software that calculates the probability of potential conjunctions when they receive a warning. But, when the probability of conjunction reaches about 1 in 10,000, their flight operations team steps in to plan a maneuver to keep their satellites out of trouble. SpaceX says there will be no human in the loop when it comes to its satellites. When notified of a potential conjunction with another object in space, their software will decide whether and how to maneuver, and communicate that information back to CSpOC. It’s not clear what their threshold will be for taking action, or how much warning they will give to the US Air Force. CSpOC did not respond to questions about this communications system. Satellite experts are happy to see efforts at automation, because conjunction reports are only going to increase as more satellites fly. But they worry about an automated system responding to imperfect data, and emphasize the need for the widest possible transparency. Though orbital mechanics are extremely predictable, space sensing is imperfect and the margin of error around where exactly a satellite can be is quite large. Many spacecraft operators join the Space Data Association, a trade association for exchanging space traffic data, and others partner with new space surveillance companies like LeoLabs to obtain more data about what’s happening in orbit. “Because we look at many hundreds of satellites every single day, we find that there are issues with the data,” Dr. T.S. Kelso, a former Air Force officer who works for the Space Data Association, told Quartz. His operation generates about 2,000 conjunction reports every four days. “We can go from something that looks very serious one day to all of the sudden there is nothing in the data. … if you are maneuvering because it is a 1 in 10,000 chance, if you had done nothing, you still had a pretty good chance nothing was going to happen.” SpaceX isn’t responsible for the lack of a real space traffic management system, but as a first mover among companies preparing ambitious satellite networks that far outstrip anything that came before, it is likely to set the tone for how operators and regulators interact. The company chose to fly the satellites at a low enough altitude that if they fail, they will safely burn up in the atmosphere within a year, rather than remaining space junk. “The space junk thing, we don’t want to trivialize it or not take it seriously,” Musk said. “[But] it’s not crowded up there. It’s extremely sparse. If your goal was to hit something, it wouldn’t be easy.”

#### Collision is unlikely – all countries receive collision warnings THREE days ahead AND their evidence doesn’t assume new technology.

**Mosher** **’19** [Dave; September 3rd; Journalist with more than a decade of experience reporting and writing stories about space, science, and technology; Business Insider, “Satellite collisions may trigger a space-junk disaster that could end human access to orbit. Here’s How,” <https://www.usafa.edu/app/uploads/Space_and_Defense_2_3.pdf>; GR]

The Kessler syndrome plays center-stage in the movie "Gravity," in which an accidental space collision endangers a crew aboard a large space station. But Gossner said that type of a runaway space-junk catastrophe is unlikely. "Right now I don't think we're close to that," he said. "I'm not saying we couldn't get there, and I'm not saying we don't need to be smart and manage the problem. But I don't see it ever becoming, anytime soon, an unmanageable problem." There is no current system to remove old satellites or sweep up bits of debris in order to prevent a Kessler event. Instead, space debris is monitored from Earth, and new rules require satellites in low-Earth orbit be deorbited after 25 years so they don't wind up adding more space junk. "Our current plan is to manage the problem and not let it get that far," Gossner said. "I don't think that we're even close to needing to actively remove stuff. There's lots of research being done on that, and maybe some day that will happen, but I think that — at this point, and in my humble opinion — an unnecessary expense." A major part of the effort to prevent a Kessler event is the Space Surveillance Network (SSN). The project, led by the US military, uses 30 different systems around the world to identify, track, and share information about objects in space. Many objects are tracked day and night via a networkof radar observatories around the globe. Optical telescopes on the ground also keep an eye out, but they aren't always run by the government. "The commercial sector is actually putting up lots and lots of telescopes," Gossner said. The government pays for their debris-tracking services. Gossner said one major debris-tracking company is called Exoanalytic. It uses about 150 small telescopes set up around the globe to detect, track, and report space debris to the SSN. Telescopes in space track debris, too. Far less is known about them because they're likely top-secret military satellites. Objects detected by the government and companies get added to a catalog of space debris and checked against the orbits of other known bits of space junk. New orbits are calculated with supercomputers to see if there's a chance of any collisions. Diana McKissock, a flight lead with the US Air Force's 18th Space Control Squadron, helps track space debris for the SSN. She said the surveillance network issues warnings to NASA, satellite companies, and other groups with spacecraft, based on two levels of emergency: basic and advanced. The SSN issues a basic emergency report to the public three days ahead of a 1-in-10,000 chance of a collision. It then provides multiple updates per day until the risk of a collision passes. To qualify for such reporting, a rogue object must come within a certain distance of another object. In low-Earth orbit, that distance must be less than 1 kilometer (0.62 mile); farther out in deep space, where the precision of orbits is less reliable, the distance is less than 5 kilometers (3.1 miles). Advanced emergency reports help satellite providers see possible collisions much more than three days ahead. "In 2017, we provided data for 308,984 events, of which only 655 were emergency-reportable," McKissock told Business Insider in an email. Of those, 579 events were in low-Earth orbit (where it's relatively crowded with satellites).

#### Kessler Syndrome false – less debris and existing guidelines solve

Lewis 15 (Hugh, Senior Lecturer in Aerospace Engineering at the University of Southampton, “Space debris, Kessler Syndrome, and the unreasonable expectation of certainty.” Room, <https://room.eu.com/article/Space_debris_Kessler_Syndrome_and_the_unreasonable_expectation_of_certainty>, Accessed 8/10/19, JMoore)

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

#### No miscalc or escalation

James Pavur 19, DPhil Researcher at the Cybersecurity Centre for Doctoral Training at Oxford University, and Ivan Martinovic, Professor of Computer Science in the Department of Computer Science at Oxford University, “The Cyber-ASAT: On the Impact of Cyber Weapons in Outer Space”, 2019 11th International Conference on Cyber Conflict: Silent Battle, https://ccdcoe.org/uploads/2019/06/Art\_12\_The-Cyber-ASAT.pdf

A. Limited Accessibility

Space is difficult. Over 60 years have passed since the first Sputnik launch and only nine countries (ten including the EU) have orbital launch capabilities. Moreover, a launch programme alone does not guarantee the resources and precision required to operate a meaningful ASAT capability. Given this, one possible reason why space wars have not broken out is simply because only the US has ever had the ability to fight one [21, p. 402], [22, pp. 419–420].

Although launch technology may become cheaper and easier, it is unclear to what extent these advances will be distributed among presently non-spacefaring nations. Limited access to orbit necessarily reduces the scenarios which could plausibly escalate to ASAT usage. Only major conflicts between the handful of states with ‘space club’ membership could be considered possible flashpoints. Even then, the fragility of an attacker’s own space assets creates de-escalatory pressures due to the deterrent effect of retaliation. Since the earliest days of the space race, dominant powers have recognized this dynamic and demonstrated an inclination towards de-escalatory space strategies [23].

B. Attributable Norms

There also exists a long-standing normative framework favouring the peaceful use of space. The effectiveness of this regime, centred around the Outer Space Treaty (OST), is highly contentious and many have pointed out its serious legal and political shortcomings [24]–[26]. Nevertheless, this status quo framework has somehow supported over six decades of relative peace in orbit.

Over these six decades, norms have become deeply ingrained into the way states describe and perceive space weaponization. This de facto codification was dramatically demonstrated in 2005 when the US found itself on the short end of a 160-1 UN vote after opposing a non-binding resolution on space weaponization. Although states have occasionally pushed the boundaries of these norms, this has typically occurred through incremental legal re-interpretation rather than outright opposition [27]. Even the most notable incidents, such as the 2007-2008 US and Chinese ASAT demonstrations, were couched in rhetoric from both the norm violators and defenders, depicting space as a peaceful global commons [27, p. 56]. Altogether, this suggests that states perceive real costs to breaking this normative tradition and may even moderate their behaviours accordingly.

One further factor supporting this norms regime is the high degree of attributability surrounding ASAT weapons. For kinetic ASAT technology, plausible deniability and stealth are essentially impossible. The literally explosive act of launching a rocket cannot evade detection and, if used offensively, retaliation. This imposes high diplomatic costs on ASAT usage and testing, particularly during peacetime.

C. Environmental Interdependence

A third stabilizing force relates to the orbital debris consequences of ASATs. China’s 2007 ASAT demonstration was the largest debris-generating event in history, as the targeted satellite dissipated into thousands of dangerous debris particles [28, p. 4]. Since debris particles are indiscriminate and unpredictable, they often threaten the attacker’s own space assets [22, p. 420]. This is compounded by Kessler syndrome, a phenomenon whereby orbital debris ‘breeds’ as large pieces of debris collide and disintegrate. As space debris remains in orbit for hundreds of years, the cascade effect of an ASAT attack can constrain the attacker’s long-term use of space [29, pp. 295– 296]. Any state with kinetic ASAT capabilities will likely also operate satellites of its own, and they are necessarily exposed to this collateral damage threat. Space debris thus acts as a strong strategic deterrent to ASAT usage.

#### Hotlines solve

Chen Lan 15, Writer on the Chinese Space Program, Go Taikounauts, http://www.go-taikonauts.com/images/newsletters\_PDF/GoTaikonauts18.pdf

Though Sino-U.S. cooperation on human spaceflight is still uncertain, a positive move between the two countries has been made, that is the establishment of a space hotline. Western media reported in November that the hotline has been setup between Washington and Beijing to allow easy sharing of technical information about their space operations, hopefully avoiding any misunderstandings or accidents.

#### satellites survive

**Von Fange 17** [Daniel Von Fange is a full stack developer that builds web platforms, with a particular interest in space applications. Kessler Syndrome is Over Hyped. May 21, 2017. braino.org/essays/kessler\_syndrome\_is\_over\_hyped/]

How bad could Kessler Syndrome in High LEO be? Let’s imagine a worst case scenario. An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space? I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000. So even in the worst case, we don’t lose access to space. Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits. In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment. Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely. Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner. Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided. The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler. Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting) So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect. I’m removing Kessler Syndrome from my list of things to worry about.

#### No resource wars

**Bayramov 17** Agha Bayramov, international relations PhD candidate at the University of Groningen. [Review: Dubious nexus between natural resources and conflict. Journal of Eurasian Studies, 9(1), p. 72-81, https://www.rug.nl/research/portal/files/63407252/1\_s2.0\_S187936651730026X\_main.pdf]//BPS

Second, less research has scrutinized political and economic costs of resources wars, namely occupation cost, international cost and investment costs (e.g. Meierding, 2016). The existing works give a misleading impression that resource incomes can cover easily invasion, investment and international costs of wars. Third, the existing works consider approximately most resource states to be more or less equal entities. Although such states may have equal rights from juridical perspective, they share too many diverse features to be considered equal entities in other empirical terms. For example, while Azerbaijan and Saudi Arabia have rich natural resources, they are dissimilar in a number of other important ways. However, both qualitative and quantitative analyses neglect this factor while explaining the resource-conflict nexus. Therefore, it is unwise to lump different case studies together in the same category without considering the particular characteristics of the region or country in question. Moreover, wide part of the existing works adopts a national-level approach by portraying abundancy, scarcity and conflict at the unitary state-level. Nevertheless, natural resources are distributed inconsistently over a nation’s territory. In other words, only particular places, namely cities or urban areas are affected by the abundancy or scarcity of resources. Hence, conflict more likely develops in areas which are excluded from resource wealth and development. However, the present works neglect the distinctive characteristics between resource rich cities and nonresource cities by putting them into country level analysis.

#### Plan solves for econ.

Dvorsky 15 George Dvorsky 6-4-2015 “What Would Happen If All Our Satellites Were Suddenly Destroyed?” <https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681> (Senior staff reporter at Gizmodo specializing in astronomy, space exploration, SETI, archaeology, bioethics, animal intelligence, human enhancement, and risks posed by AI and other advanced tech.)//Elmer

Lastly, there’s the [Kessler Syndrome](http://www.spacesafetymagazine.com/space-debris/kessler-syndrome/) to consider. This scenario was portrayed in the 2013 film Gravity. In the movie, a Russian missile strike on a defunct satellite inadvertently causes a cascading chain reaction that formed an ever-growing cloud of orbiting space debris. Anything in the cloud’s wake — including satellites, space stations, and astronauts — gets annihilated. Disturbingly, the Kessler Syndrome is a very real possibility, and the likelihood of it happening [is steadily increasing as more stuff gets thrown into space](http://io9.com/how-to-clean-up-deadly-space-junk-before-disaster-strik-1443463338). Given these grim prospects, it’s fair to ask what might happen to our civilization if any of these things happened. At the risk of gross understatement, the complete loss of our satellite fleet would instigate a tremendous disruption to our current mode of technological existence — disruptions that would be experienced in the short, medium, and long term, and across multiple [domains](https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681). Compromised Communications Almost immediately we’d notice a dramatic reduction in our ability to communicate, share information, and conduct transactions. “If our communications satellites are lost, then bandwidth is also lost,” [Jonathan McDowell](http://planet4589.org/) tells io9. He’s an astrophysicists and Chandra Observatory scientist who works out of the [Harvard-Smithsonian Center for Astrophysics](http://planet4589.org/jcm/cfa-www.harvard.edu). McDowell says that, with telecommunication satellites wiped out, the burden of telecommunications would fall upon undersea cables and ground-based communication systems. But while many forms of communication would disappear in an [instant](https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681), others would remain. All international calls and data traffic would have to be re-routed, placing tremendous pressure on terrestrial and undersea lines. Oversaturation would stretch the capacity of these systems to the limit, preventing many calls from going through. Hundreds of millions of Internet connections would vanish, or be severely overloaded. A similar number of cell phones would be rendered useless. In remote areas, people dependent on satellite for television, Internet, and radio would practically lose all service. “Indeed, a lot of television would suddenly disappear,” says McDowell. “A sizable portion of TV comes from cable whose companies relay programming from satellites to their hubs.” It’s important to note that we actually have a precedent for a dramatic — albeit brief — disruption in com-sat capability. Back in 1998, [there was a day in which a single satellite failed and all the world’s pagers stopped working](http://articles.latimes.com/1998/may/21/news/mn-52190). Get Out Your Paper Maps We would also lose the Global Positioning System. In the years since its inception, GPS has become ubiquitous, and a surprising number of systems have become reliant on it. “Apart from the fact that everyone has forgotten to navigate without GPS in their cars, many airplanes use GPS as well,” says McDowell. Though backup systems exist, airlines use GPS to chart the most fuel-efficient and expeditious routes. Without GPS and telecomm-sats, aircraft controllers would have tremendous difficulty communicating with and routing airplanes. Airlines would have to fall back to legacy systems and procedures. Given the sheer volume of airline traffic today, accidents would be all but guaranteed. Other affected navigation systems would include those aboard cargo vessels, supply-chain management systems, and transportation hubs driven by GPS. But GPS does more than just provide positioning — it also provides for timing. Ground-based atomic clocks can perform the same function, but GPS is increasingly being used to distribute the universal time standard via satellites. Within hours of a terminated service, any distributing networks requiring tight synchronization would start to suffer from “clock drift,” leading to serious performance issues and outright service outages. Such disruptions could affect everything from the power grid through to the financial sector. In the report, “[A Day Without Space: Economic and National Security Ramifications](http://marshall.org/wp-content/uploads/2013/08/Day-without-Space-Oct-16-2008.pdf),” Ed Morris, the Executive Director of the Office of Space Commerce at the Department of Commerce, writes: If you think it is hard to get work done when your internet connection goes out at the office, imagine losing that plus your cell [phone](https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681), TV, radio, ATM access, [credit cards](https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681), and possibly even your electricity. [...] Wireless services, especially those built to [CDMA standard](http://www.protocols.com/pbook/cellular.htm), would fail to hand off calls from one cell to the next, leading to dropped connections. Computer networks would experience slowdowns as data is pushed through finite pipelines at reduced bit rates. The same would be true for major networks for communication and entertainment, since they are all IP-based today and require ultra-precise timing to ensure digital traffic reaches its destination. The lack of effective synch would hit especially hard in banking, where the timing of transactions needs to be recorded. Credit card payments and bank accounts would likely freeze, as billions of dollars could be sucked away from businesses. A financial crash is not out of the question. The Loss of Military Capability The sudden loss of satellite capability would have a profound effect on the military. The Marshall Institute puts it this way: “Space is a critical enabler to all U.S. warfare domains,” including intelligence, navigation, communications, weather prediction, and warfare. McDowell describes satellite capability as as the “backbone” of the U.S. military. And as 21st century warfare expert [Peter W. Singer](http://www.pwsinger.com/biography.html) from [New America Foundation](https://www.newamerica.org/) tells io9, “He who controls the heavens will control what happens in the battles of Earth.” Singer summarized the military consequences of losing satellites in an email to us: Today there are some 1,100 active satellites which act as the nervous system of not just our economy, but also our military. Everything from communications to GPS to intelligence all depend on it. Potential foes have noticed, which is why Russia and China have recently begun testing a new generation of anti-satellite weapons, which in turn has sparked the U.S. military to recently budget $5 billion for various space warfare systems. What would happen if we lost access to space? Well, the battles would, as one U.S. military officer put it, take us back to the “pre digital age.” Our drones, our missiles, even our ground units wouldn’t be able to operate the way we plan. It would force a rewrite of all our assumptions of 21st century high tech war. We might have a new generation of stealthy battleships...but the loss of space would mean naval battles would in many ways be like the game of Battleship, where the two sides would struggle to even find each other. Moreover, and as McDowell explains to io9, the loss of satellite capability would have a profound effect on arms control capabilities. Space systems can monitor compliance; without them, we’d be running blind. “The overarching consideration is that you wouldn’t really know what’s going on,” says McDowell. “Satellites provide for both global and local views of what’s happening. We would be less connected, less informed — and with considerably degraded situational awareness.” Compromised Weather Prediction and Climate Science One great thing satellites have done for us is improve our ability to forecast weather. Predicting a slight chance of cloudiness is all well and good, but some areas, like India, Pakistan, and Bangladesh, are dependent on such systems to predict potentially hazardous monsoons. And in the U.S., the NOAA has estimated that, during a typical hurricane season, weather satellites save as much as $3 billion in lives and property damage. There’s also the effect on science to consider. Much of what we know about climate change comes from satellites. As McDowell explains, the first couple of weeks without satellites wouldn’t make much of a difference. But over a ten-year span, the lack of satellites would preclude our ability to understand and monitor such things as the ozone layer, carbon dioxide levels, and the distribution of polar ice. Ground-based and balloon-driven systems would help, but much of the data we’re currently tracking would suddenly become much spottier. “We’re quite dependent on satellites for a global view of what’s happening on our planet — and at a time when we really, really need to know what’s happening,” says McDowell. It’s also worth pointing out that, without satellites, we also wouldn’t be able to monitor space weather, such as incoming space storms. Time to Recover With all the satellites gone, both governmental and private interests would work feverishly to restore space-based capabilities. Depending on the nature of the satellite-destroying event, it could take decades or more to get ourselves back to current operational standards. It would take a particularly long time to recover from a Carrington Event, which would zap many ground-based electronic systems as well. The U.S. military is already thinking along these lines, which is why it’s working on the ability to quickly send up emergency assets, such as small satellites parked in Low Earth Orbit (LEO). Cube satellites are increasingly favored, as an easy-to-launch, affordable, and effective solution — albeit a short-term one. The U.S. Operationally Responsive State Office is currently working on the concept of emergency replenishment and the ability to “rapidly deploy capabilities that are good enough to satisfy warfighter needs across the entire spectrum of operations, from peacetime through conflict.” As for getting full-sized, geostationary satellites back into orbit, that would prove to be a greater challenge. It can take years to built a new satellite, which typically requires a big, costly rocket to get it into space. Lastly, if a Kessler Syndrome wipes out the satellites, that would present an entirely different recovery scenario. According to McDowell, it would take a minimum of 11 years for LEO to clear itself of the debris cloud; any objects below 500 km (310 miles) would eventually fall back to Earth. Thus, we would only be able to start re-seeding LEO in a little over a decade following a Kessler event. Unfortunately, the area above 600 km (372 miles) would remain out of touch for a practically indefinite period of time; objects orbiting at that height tend to stay there for a long, long time. We’d probably lose this band for good — unless we manually removed the debris field, using clean-up satellites or other techniques. It’s worth noting that a single Kessler event could hit the LEO zone or the GEO zone (geosynchronous orbit) but realistically not both; LEO debris could never reach GEO, and vice versa — though a spent rocket in GTO (geosynchronous transfer orbit) or SSTO (supersynchronous transfer orbit) passes through or near both zones and could potentially affect either of them. The spent rockets in GTO do not stay too close to the GEO arc for long due to orbital perturbations, so a GEO Kessler event is very unlikely to be triggered by one of them. Suffice to say, we should probably take the prospect of a Kessler Syndrome more seriously, and be aware of what could happen if we’re no longer able to use these spaces.

#### Decline doesn’t cause war

**Clary 15** – Christopher Clary, PhD in Political Science from MIT, M.A. in National Security Affairs, Postdoctoral Fellow, Watson Institute for International Studies, Brown University, 2015 (“Economic Stress and International Cooperation: Evidence from International Rivalries,” April 25th, Available Online via SSRN Subscription)

Do economic downturns generate pressure for diversionary conflict?

Or might downturns encourage austerity and economizing behavior in foreign policy? This paper provides new evidence that economic stress is associated with conciliatory policies between strategic rivals. For states that view each other as military threats, the biggest step possible toward bilateral cooperation is to terminate the rivalry by taking political steps to manage the competition. Drawing on data from 109 distinct rival dyads since 19i9 50, 67 of which terminated, the evidence suggests rivalries were approximately twice as likely to terminate during economic downturns than they were during periods of economic normalcy. This is true controlling for all of the main alternative explanations for peaceful relations between foes (democratic status, nuclear weapons possession, capability imbalance, common enemies, and international systemic changes), as well as many other possible confounding variables. This research questions existing theories claiming that economic downturns are associated with diversionary war, and instead argues that in certain circumstances peace may result from economic troubles. I define a rivalry as the perception by national elites of two states that the other state possesses conflicting interests and presents a military threat of sufficient severity that future military conflict is likely. Rivalry termination is the transition from a state of rivalry to one where conflicts of interest are not viewed as being so severe as to provoke interstate conflict and/or where a mutual recognition of the imbalance in military capabilities makes conflict-causing bargaining failures unlikely. In other words, rivalries terminate when the elites assess that the risks of military conflict between rivals has been reduced dramatically. This definition draws on a growing quantitative literature most closely associated with the research programs of William Thompson, J. Joseph Hewitt, and James P. Klein, Gary Goertz, and Paul F. Diehl.1 My definition conforms to that of William Thompson. In work with Karen Rasler, they define rivalries as situations in which “[b]oth actors view each other as a significant political-military threat and, therefore, an enemy.”2 In other work, Thompson writing with Michael Colaresi, explains further: The presumption is that decisionmakers explicitly identify who they think are their foreign enemies. They orient their military preparations and foreign policies toward meeting their threats. They assure their constituents that they will not let their adversaries take advantage. Usually, these activities are done in public. Hence, we should be able to follow the explicit cues in decisionmaker utterances and writings, as well as in the descriptive political histories written about the foreign policies of specific countries.3 Drawing from available records and histories, Thompson and David Dreyer have generated a universe of strategic rivalries from 1494 to 2010 that serves as the basis for this project’s empirical analysis.4 This project measures rivalry termination as occurring on the last year that Thompson and Dreyer record the existence of a rivalry.

Economic crises lead to conciliatory behavior through five primary channels. (1) Economic crises lead to austerity pressures, which in turn incent leaders to search for ways to cut defense expenditures. (2) Economic crises also encourage strategic reassessment, so that leaders can argue to their peers and their publics that defense spending can be arrested without endangering the state. This can lead to threat deflation, where elites attempt to downplay the seriousness of the threat posed by a former rival. (3) If a state faces multiple threats, economic crises provoke elites to consider threat prioritization, a process that is postponed during periods of economic normalcy. (4) Economic crises increase the political and economic benefit from international economic cooperation. Leaders seek foreign aid, enhanced trade, and increased investment from abroad during periods of economic trouble. This search is made easier if tensions are reduced with historic rivals. (5) Finally, during crises, elites are more prone to select leaders who are perceived as capable of resolving economic difficulties, permitting the emergence of leaders who hold heterodox foreign policy views. Collectively, these mechanisms make it much more likely that a leader will prefer conciliatory policies compared to during periods of economic normalcy. This section reviews this causal logic in greater detail, while also providing historical examples that these mechanisms recur in practice.

#### Growth is unsustainable, causes extinction, and makes war inevitable---err NEG---you’re cognitively biased to underestimate ecological externalities.

Ted Trainer 20, Conjoint Lecturer in the School of Social Sciences, University of New South Wales. PhD from University of Sydney, “1. Unsustainability,” *The Simpler Way: Collected Writings of Ted Trainer*, 2020, https://www.degrowth.info/en/catalogue-entry/the-simpler-way-collected-writings-of-ted-trainer/, kyujin

The way of life we have in rich countries is grossly unsustainable. There is no possibility of all people on Earth ever rising to rich world per capita levels of consumption of energy, minerals, timber, water, food, phosphorous etc. These rates of consumption are generating numer-ous alarming global problems, now threatening our survival and the survival of other species. Most people have no idea of the magnitude of the overshoot – of how far we are beyond sustainable levels of re-source use and environmental impact. If all the estimated 9.8 billion people living on earth in 2050 were to consume resources at the pres-ent per capita rate in rich countries, world annual resource production rates would have to be about eight times as great as they are now.

For instance, the ‘Ecological Footprint’ analysis indicates that the amount of productive land required to provide one person in Australia with food, water, energy and settlement area is about 6.6 ha (Global Footprint Network, 2019). If 9.8 billion people were to live as Australians do, approximately 65 billion ha of productive land would be required. However, the total amount of productive land available is only 12 bil-lion ha. If we assume one third of this should be set aside for nature (see, e.g., Baillie Yang, 2018) the amount available for humans might be about 8 billion ha. In other words, our rich world per capita footprint is about eight times as big as it would ever be possible for all of the world’s people to sustainably share.

Figures for some other items indicate much worse ratios. For instance, the top 10 nations consuming iron ore and bauxite (from which we ob-tain aluminium and steel) have per capita use rates that are respectively around 65 and 90 times the rates for all the other nations (Wiedmann et al., 2015). Mineral ore grades are falling. All people could not rise to present rich world levels of mineral use. The same case can be made with respect to just about all other resources and ecosystem services, such as agricultural land, forests, fisheries, water and biomass.

These simple figures clearly demonstrate the impossibility of all people ever having the material ‘living standards’ we have taken for granted in rich countries like Australia. We are not just a little beyond sustainable levels of resource demand and ecological impact – we are far beyond sustainable levels. Rich world practices, systems and ‘living standards’ are grossly unsustainable, and can never be extended to all the world’s people. Again, few people seem to grasp the magnitude of the over-shoot. We must face up to dramatic reductions in our present per capita levels of production and consumption.

1.1. Now add the absurd commitment to economic growth

The main worry is not the present level of resource use and ecological impact discussed above, it is the level we will rise to given the obsession with constantly increasing the amount of production and consumption. The supreme goal in all countries is to raise incomes, ‘living standards’ and GDP as much as possible, constantly and without any idea of a lim-it. That is, the most important goal is economic growth.

Consider the implications. If we assume a) a 3% p.a. economic growth, b) a population of 9.8 billion, c) all the world’s people rising to the living standards we in the rich world would have in 2050 given 3% p.a. growth – in that scenario, the total volume of world economic output would be 20 times as great as it is now and doubling every 23 years thereafter.

So even though the present levels of production and consumption are grossly unsustainable, the determination to have continual increase in income and economic output will multiply these towards absurd and impossible levels in coming decades.

Why analyse in terms of 9.8 billion rising to rich world levels? Because a) it is not morally acceptable to assume that they remain much poorer than we are, and b) that’s what everyone aspires to, so we had better think about whether it is viable.

1.2 But what about technical advance?

When confronted by global sustainability problems most people just assume that technical advance and ‘green growth’ will solve them, enabling us to go on living with ever-increasing levels of affluence. They do not realise that the magnitude of the problems rules this out.

The core ‘tech-fix’ faith is that resource demand and environmental impacts can be ‘decoupled’ from economic growth, i.e., that produc-tion and consumption can go on increasing while resource demand is sufficiently reduced. This is extremely implausible (see Part Three of this anthology for more detail). How likely is it that the world’s amount of production could be multiplied by 20 while resource use and environmental impacts are reduced by, say, 50% – i.e., a factor 40 reduction? None of the thirty or more reports over the last 20 years show any global reduction at all; they all show that as GDP rises so do the impacts. The recent review essay by Hickel and Kallis (2019) pro-vides a powerful critique of ‘green growth’ (see also Ward et al., 2016).

1.3 Global problems should be seen in terms of ‘limits to growth’

The ‘limits to growth’ perspective (Meadows et al., 1972) is essential if we are to understand the most serious global problems facing us:

* The environmental problem is basically due to the fact that far too much producing and consuming is going on, taking too many resources rom nature and dumping too many wastes back into nature. We are eliminating species mainly because we are taking or ruining so much habitat. The environmental problems cannot be solved in an economy that is geared to providing ever-rising production, con-sumption, ‘living standards’ and GDP (see the next essay, ‘Why this economy must be scrapped’, for more detail).
* Third World poverty and underdevelopment are inevitable if a few living in rich countries insist on taking far more of the world’s re-sources than all could have. The Third World can never develop to rich world levels of consumption, because there are far too few re-sources for that. (For more detail on this issue, see the essay ‘Third World development’ in Part Two.)
* Conflict and war are inevitable if all aspire to rich world rates of consumption, and if rich countries insist on limitless growth on a planet with limited resources. Rich countries now have to support repressive regimes willing to establish policies that enable our cor-porations to ship out cheap resources, use Third World land for export crops, exploit cheap labour etc. This means we must be ready to get rid of regimes and to invade and run countries that threaten to follow policies contrary to our First World interests. Our rich world living standards could not be as high as they are if a great deal of repression and violence was not taking place, and rich countries contribute significantly to this. If we are determined to remain affluent, we should remain heavily armed! (This issue is developed in the essay in part Two called ‘If you want affluence, prepare for war’.)
* Social cohesion is deteriorating and quality of life is being damaged. This is so even in the richest nations, because the supreme goals are raising business turnover, incomes and the GDP, not meet-ing needs, building community and improving the quality of life. (Some details of this decline in quality of life and the benefits of an alternative way to live are discussed in Part Four.)

#### Backups solve

**IBEW 14** – (2014, International Brotherhood of Elctricial Workers, <http://www.ibew.org/IBEW/departments/utility/IBEW-Nuclear-FAQ.pdf> The International Brotherhood of Electrical Workers (IBEW) represents approximately 750,000 active members and retirees who work in a wide variety of fields, including utilities, construction, telecommunications, broadcasting, manufacturing, railroads and government. The IBEW has members in both the United States and Canada and stands out among the American unions in the AFL-CIO because it is among the largest and has members in so many skilled occupations.

Some of the units at the Japanese plants lost both off - site power and diesel generators. This is called a “station blackout.” U.S. nuclear power plants are designed to cope with station blackouts by having multiple back - up power sources at the ready. All U.S. plants are also responsible for demonstrating to the NRC that they can handle such situations in order to legally remain in operation.

#### Pandemics won’t cause human extinction

Sebastian **Farquhar 17**. Director at Oxford's Global Priorities Project, Owen Cotton-Barratt, a Lecturer in Mathematics at St Hugh’s College, Oxford, John Halstead, Stefan Schubert, Haydn Belfield, Andrew Snyder-Beattie, 01-23-17, "Existential Risk Diplomacy and Governance", GLOBAL PRIORITIES PROJECT 2017, https://www.fhi.ox.ac.uk/wp-content/uploads/Existential-Risks-2017-01-23.pdf

1.1.3 Engineered pandemics For most of human history, natural pandemics have posed the greatest risk of mass global fatalities.37 However, there are some reasons to believe that natural pandemics are very unlikely to cause human extinction. Analysis of the International Union for Conservation of Nature (IUCN) red list database has shown that of the 833 recorded plant and animal species extinctions known to have occurred since 1500, less than 4% (31 species) were ascribed to infectious disease.38 None of the mammals and amphibians on this list were globally dispersed, and other factors aside from infectious disease also contributed to their extinction. It therefore seems that our own species, which is very numerous, globally dispersed, and capable of a rational response to problems, is very unlikely to be killed off by a natural pandemic. One underlying explanation for this is that highly lethal pathogens can kill their hosts before they have a chance to spread, so there is a selective pressure for pathogens not to be highly lethal. Therefore, pathogens are likely to co-evolve with their hosts rather than kill all possible hosts.3

#### Limited nuclear war won’t cause extinction, but solves future use

Daniel Deudney 18. Associate Professor of Political Science at Johns Hopkins University. 03/15/2018. “The Great Debate.” The Oxford Handbook of International Security. www.oxfordhandbooks.com, doi:10.1093/oxfordhb/9780198777854.013.22. //reem

Although nuclear war is the oldest of these technogenic threats to civilization and human survival, and although important steps to restraint, particularly at the end of the Cold War, have been achieved, the nuclear world is increasingly changing in major ways, and in almost entirely dangerous directions. The third “bombs away” phase of the great debate on the nuclear-political question is more consequentially divided than in the first two phases. Even more ominously, most of the momentum lies with the forces that are pulling states toward nuclear-use, and with the radical actors bent on inflicting catastrophic damage on the leading states in the international system, particularly the United States. In contrast, the arms control project, although intellectually vibrant, is largely in retreat on the world political stage. The arms control settlement of the Cold War is unraveling, and the world public is more divided and distracted than ever. With the recent election of President Donald Trump, the United States, which has played such a dominant role in nuclear politics since its scientists invented these fiendish engines, now has an impulsive and uninformed leader, boding ill for nuclear restraint and effective crisis management. Given current trends, it is prudent to assume that sooner or later, and probably sooner, nuclear weapons will again be the used in war. But this bad news may contain a “silver lining” of good news. Unlike a general nuclear war that might have occurred during the Cold War, such a nuclear event now would probably not mark the end of civilization (or of humanity), due to the great reductions in nuclear forces achieved at the end of the Cold War. Furthermore, politics on “the day after” could have immense potential for positive change. The survivors would not be likely to envy the dead, but would surely have a greatly renewed resolution for “never again.” Such an event, completely unpredictable in its particulars, would unambiguously put the nuclear-political question back at the top of the world political agenda. It would unmistakeably remind leading states of their vulnerability It might also trigger more robust efforts to achieve the global regulation of nuclear capability. Like the bombings of Hiroshima and Nagasaki that did so much to catalyze the elevated concern for nuclear security in the early Cold War, and like the experience “at the brink” in the Cuban Missile Crisis of 1962, the now bubbling nuclear caldron holds the possibility of inaugurating a major period of institutional innovation and adjustment toward a fully “bombs away” future.