# 1NC

## 1

#### Interpretation: “Private entities” is a generic bare plural. The aff may not defend that a subset of nations ban the appropriation of outer space.

Nebel 19. [Jake Nebel is an assistant professor of philosophy at the University of Southern California and executive director of Victory Briefs. He writes a lot of this stuff lol – duh.] “Genericity on the Standardized Tests Resolution.” Vbriefly. August 12, 2019. <https://www.vbriefly.com/2019/08/12/genericity-on-the-standardized-tests-resolution/?fbclid=IwAR0hUkKdDzHWrNeqEVI7m59pwsnmqLl490n4uRLQTe7bWmWDO_avWCNzi14> TG

Both distinctions are important. Generic resolutions can’t be affirmed by specifying particular instances. But, since generics tolerate exceptions, plan-inclusive counterplans (PICs) do not negate generic resolutions.

Bare plurals are typically used to express generic generalizations. But there are two important things to keep in mind. First, generic generalizations are also often expressed via other means (e.g., definite singulars, indefinite singulars, and bare singulars). Second, and more importantly for present purposes, bare plurals can also be used to express existential generalizations. For example, “Birds are singing outside my window” is true just in case there are some birds singing outside my window; it doesn’t require birds in general to be singing outside my window.

So, what about “colleges and universities,” “standardized tests,” and “undergraduate admissions decisions”? Are they generic or existential bare plurals? On other topics I have taken great pains to point out that their bare plurals are generic—because, well, they are. On this topic, though, I think the answer is a bit more nuanced. Let’s see why.

“Colleges and universities” is a generic bare plural. I don’t think this claim should require any argument, when you think about it, but here are a few reasons.

First, ask yourself, honestly, whether the following speech sounds good to you: “Eight colleges and universities—namely, those in the Ivy League—ought not consider standardized tests in undergraduate admissions decisions. Maybe other colleges and universities ought to consider them, but not the Ivies. Therefore, in the United States, colleges and universities ought not consider standardized tests in undergraduate admissions decisions.” That is obviously not a valid argument: the conclusion does not follow. Anyone who sincerely believes that it is valid argument is, to be charitable, deeply confused. But the inference above would be good if “colleges and universities” in the resolution were existential. By way of contrast: “Eight birds are singing outside my window. Maybe lots of birds aren’t singing outside my window, but eight birds are. Therefore, birds are singing outside my window.” Since the bare plural “birds” in the conclusion gets an existential reading, the conclusion follows from the premise that eight birds are singing outside my window: “eight” entails “some.” If the resolution were existential with respect to “colleges and universities,” then the Ivy League argument above would be a valid inference. Since it’s not a valid inference, “colleges and universities” must be a generic bare plural.

Second, “colleges and universities” fails the [upward-entailment test](https://plato.stanford.edu/entries/generics/#IsolGeneInte) for existential uses of bare plurals. Consider the sentence, “Lima beans are on my plate.” This sentence expresses an existential statement that is true just in case there are some lima beans on my plate. One test of this is that it entails the more general sentence, “Beans are on my plate.” Now consider the sentence, “Colleges and universities ought not consider the SAT.” (To isolate “colleges and universities,” I’ve eliminated the other bare plurals in the resolution; it cannot plausibly be generic in the isolated case but existential in the resolution.) This sentence does not entail the more general statement that educational institutions ought not consider the SAT. This shows that “colleges and universities” is generic, because it fails the upward-entailment test for existential bare plurals.

Third, “colleges and universities” fails the adverb of quantification test for existential bare plurals. Consider the sentence, “Dogs are barking outside my window.” This sentence expresses an existential statement that is true just in case there are some dogs barking outside my window. One test of this appeals to the drastic change of meaning caused by inserting any adverb of quantification (e.g., always, sometimes, generally, often, seldom, never, ever). You cannot add any such adverb into the sentence without drastically changing its meaning. To apply this test to the resolution, let’s again isolate the bare plural subject: “Colleges and universities ought not consider the SAT.” Adding generally (“Colleges and universitiesz generally ought not consider the SAT”) or ever (“Colleges and universities ought not ever consider the SAT”) result in comparatively minor changes of meaning. (Note that this test doesn’t require there to be no change of meaning and doesn’t have to work for every adverb of quantification.) This strongly suggests what we already know: that “colleges and universities” is generic rather than existential in the resolution.

#### It applies to “private entities” – adding “generally” to the rez doesn’t substantially change its meaning and the rez doesn’t entail that all entities ought to ban private appropriation

#### Net benefits -

#### [1] Limits – 195 recognized countries plus combinations and specific entities within countries makes negating impossible especially with no unifying disads against different policies, implementation and regulation procedures

#### [2] Precision outweighs – it determines which interps your ballot can endorse by providing the only salient focal point for debates—if their interp is not premised on the text of the resolution, its benefits are irrelevant to the question of topicality since it fails to interpret the topic. Plan affs just lead to cheatier pics anyways since the neg has to default to generics

#### Fairness and education are voters – its how judges evaluate rounds and why schools fund debate

#### DTD – it’s key to norm set and deter future abuse

#### Competing interps – Reasonability invites arbitrary judge intervention and a race to the bottom of questionable argumentation – it also collapses since brightlines operate on an offense-defense paradigm

#### No RVIs – A – Encourages theory baiting – outweighs because if the shell is frivolous, they can beat it quickly B – its illogical for you to win for proving you were fair – outweighs since logic is a litmus test for other arguments

## 2

#### CP Text: The People’s Republic of China should

#### end all private appropriation of outer space except for Asteroid Mining.

#### de-militarize its civilian, military, and commercial space industry.

#### dismantle and remove ASAT weapons.

#### dismantle the People’s Liberation Army.

#### end China-Russian cooperation in Outer Space.

#### The Counterplan solves the Case – solves Advantage 1 and 2 since it’s about Space Militarization which the CP explicitly gets rid of. Concede Space Key to Heg – means the CP access all of the Spill-over Offense to American leadership.

#### China’s Asteroid Mining efforts are light-years ahead of everyone else – now is key for Asteroid Mining. Successful Mining solves Warming through Green Transition.

Cohen 21 Ariel Cohen 10-26-2021 "China’s Space Mining Industry Is Prepping For Launch – But What About The US?" <https://www.forbes.com/sites/arielcohen/2021/10/26/chinas-space-mining-industry-is-prepping-for-launch--but-what-about-the-us/?sh=6b8bea862ae0> (I am a Senior Fellow at the Atlantic Council and the Founding Principal of International Market Analysis, a Washington, D.C.-based global risk advisory boutique.)//Elmer

Exploration of space-based natural resources are on the Chinese policy makers’ mind. The question is, what Joe Biden thinks? In April of this year, China’s Shenzen Origin Space Technology Co. Ltd. launched the NEO-1, the first commercial spacecraft dedicated to the mining of space resources – from asteroids to the lunar surface. Falling costs of space launches and spacecraft technology alongside existing infrastructure provides a unique opportunity to explore extraterrestrial resource extraction. Current technologies are equipped to analyze and categorize asteroids within our solar system with a limited degree of certainty. One of the accompanying payloads to the NEO-1 was the Yuanwang-1, or “little hubble” satellite, which searches the stars for possible asteroid mining targets. The NEO-1 launch marks another milestone in private satellite development, adding a new player to space based companies which include Japan’s Astroscale. Private asteroid identification via the Sentinel Space Telescope was supported by NASA until 2015. As private investment in space grows, the end goal is to be capable of harvesting resources to bring to Earth. “Through the development and launch of the spacecraft, Origin Space is able to carry out low-Earth orbit space junk cleanup and prototype technology verification for space resource acquisition, and at the same time demonstrate future asteroid defense related technologies.” In the end, it will come down to progressively lowering the cost of launched unit of weight and booster rocket reliability – before fundamentally new engines may drive the launch costs even further down. The April launch demonstrates that China is already succeeding while the West is spinning its wheels. The much touted Planetary Resources and Deep Space Industries (DSI) DSI -1% were supposed to be the vanguard of extra-terrestrial resource acquisition with major backers including Google’s GOOG -1.4% Larry Page. But both have since been acquired, the former by block chain company ConsenSys and the latter by Bradford Space, neither of which are prioritizing asteroid mining. This is too bad, given that that supply chain crunches here on Earth – coupled with the global green energy transition – are spiking demand for strategic minerals that are increasingly hard to come by on our environmentally stressed planet. And here China currently holds a monopoly on rare earth element (REE) extraction and processing to the tune of 90%. REE’s 17 minerals essential for modern computing and manufacturing technologies for everything from solar panels to semi-conductors. Resource-hungry China also has major involvement in global critical mineral supply chains, which include cobalt, tungsten, and lithium. As I’ve written before, the Chinese hold of upstream and downstream markets is staggering. Possessing 30% of the global mined ore, 80% of the global processing facilities, and an ever increasing list of high dollar investments around the world, China boasts over $36 billion invested in mining projects in Africa alone. Beijing’s space program clearly indicates that the Chinese would also like to tighten their grip on space-based resources as well. According to research, it is estimated that a small asteroid roughly 200 meters in length that is rich in platinum could be worth up to $300 million. Merrill Lynch predicts the space industry — including extraterrestrial mining industry – to value $2.7 trillion in the next three decades. REEs are fairly common in the solar system, but to what degree remains unknown. The most sought after are M-type asteroids which are mostly metal and hundreds of cubic meters. While these are not the most common, the 27,115 Near Earth asteroids are bound to contain a few. This – and military applications – are no doubt a driving factor of China’s ever increasing space ambitions.

#### Warming causes Extinction

Kareiva 18, Peter, and Valerie Carranza. "Existential risk due to ecosystem collapse: Nature strikes back." Futures 102 (2018): 39-50. (Ph.D. in ecology and applied mathematics from Cornell University, director of the Institute of the Environment and Sustainability at UCLA, Pritzker Distinguished Professor in Environment & Sustainability at UCLA)//Re-cut by Elmer

In summary, six of the nine proposed planetary boundaries (phosphorous, nitrogen, biodiversity, land use, atmospheric aerosol loading, and chemical pollution) are unlikely to be associated with existential risks. They all correspond to a degraded environment, but in our assessment do not represent existential risks. However, the three remaining boundaries (**climate change**, global **freshwater** cycle, **and** ocean **acidification**) do **pose existential risks**. This is **because of** intrinsic **positive feedback loops**, substantial lag times between system change and experiencing the consequences of that change, and the fact these different boundaries interact with one another in ways that yield surprises. In addition, climate, freshwater, and ocean acidification are all **directly connected to** the provision of **food and water**, and **shortages** of food and water can **create conflict** and social unrest. Climate change has a long history of disrupting civilizations and sometimes precipitating the collapse of cultures or mass emigrations (McMichael, 2017). For example, the 12th century drought in the North American Southwest is held responsible for the collapse of the Anasazi pueblo culture. More recently, the infamous potato famine of 1846–1849 and the large migration of Irish to the U.S. can be traced to a combination of factors, one of which was climate. Specifically, 1846 was an unusually warm and moist year in Ireland, providing the climatic conditions favorable to the fungus that caused the potato blight. As is so often the case, poor government had a role as well—as the British government forbade the import of grains from outside Britain (imports that could have helped to redress the ravaged potato yields). Climate change intersects with freshwater resources because it is expected to exacerbate drought and water scarcity, as well as flooding. Climate change can even impair water quality because it is associated with heavy rains that overwhelm sewage treatment facilities, or because it results in higher concentrations of pollutants in groundwater as a result of enhanced evaporation and reduced groundwater recharge. **Ample clean water** is not a luxury—it **is essential for human survival**. Consequently, cities, regions and nations that lack clean freshwater are vulnerable to social disruption and disease. Finally, ocean acidification is linked to climate change because it is driven by CO2 emissions just as global warming is. With close to 20% of the world’s protein coming from oceans (FAO, 2016), the potential for severe impacts due to acidification is obvious. Less obvious, but perhaps more insidious, is the interaction between climate change and the loss of oyster and coral reefs due to acidification. Acidification is known to interfere with oyster reef building and coral reefs. Climate change also increases storm frequency and severity. Coral reefs and oyster reefs provide protection from storm surge because they reduce wave energy (Spalding et al., 2014). If these reefs are lost due to acidification at the same time as storms become more severe and sea level rises, coastal communities will be exposed to unprecedented storm surge—and may be ravaged by recurrent storms. A key feature of the risk associated with climate change is that mean annual temperature and mean annual rainfall are not the variables of interest. Rather it is extreme episodic events that place nations and entire regions of the world at risk. These extreme events are by definition “rare” (once every hundred years), and changes in their likelihood are challenging to detect because of their rarity, but are exactly the manifestations of climate change that we must get better at anticipating (Diffenbaugh et al., 2017). Society will have a hard time responding to shorter intervals between rare extreme events because in the lifespan of an individual human, a person might experience as few as two or three extreme events. How likely is it that you would notice a change in the interval between events that are separated by decades, especially given that the interval is not regular but varies stochastically? A concrete example of this dilemma can be found in the past and expected future changes in storm-related flooding of New York City. The highly disruptive flooding of New York City associated with Hurricane Sandy represented a flood height that occurred once every 500 years in the 18th century, and that occurs now once every 25 years, but is expected to occur once every 5 years by 2050 (Garner et al., 2017). This change in frequency of extreme floods has profound implications for the measures New York City should take to protect its infrastructure and its population, yet because of the stochastic nature of such events, this shift in flood frequency is an elevated risk that will go unnoticed by most people. 4. The combination of positive feedback loops and societal inertia is fertile ground for global environmental catastrophes **Humans** are remarkably ingenious, and **have adapted** to crises **throughout** their **history**. Our doom has been repeatedly predicted, only to be averted by innovation (Ridley, 2011). **However**, the many **stories** **of** human ingenuity **successfully** **addressing** **existential risks** such as global famine or extreme air pollution **represent** environmental c**hallenges that are** largely **linear**, have immediate consequences, **and operate without positive feedbacks**. For example, the fact that food is in short supply does not increase the rate at which humans consume food—thereby increasing the shortage. Similarly, massive air pollution episodes such as the London fog of 1952 that killed 12,000 people did not make future air pollution events more likely. In fact it was just the opposite—the London fog sent such a clear message that Britain quickly enacted pollution control measures (Stradling, 2016). Food shortages, air pollution, water pollution, etc. send immediate signals to society of harm, which then trigger a negative feedback of society seeking to reduce the harm. In contrast, today’s great environmental crisis of climate change may cause some harm but there are generally long time delays between rising CO2 concentrations and damage to humans. The consequence of these delays are an absence of urgency; thus although 70% of Americans believe global warming is happening, only 40% think it will harm them (http://climatecommunication.yale.edu/visualizations-data/ycom-us-2016/). Secondly, unlike past environmental challenges, **the Earth’s climate system is rife with positive feedback loops**. In particular, as CO2 increases and the climate warms, that **very warming can cause more CO2 release** which further increases global warming, and then more CO2, and so on. Table 2 summarizes the best documented positive feedback loops for the Earth’s climate system. These feedbacks can be neatly categorized into carbon cycle, biogeochemical, biogeophysical, cloud, ice-albedo, and water vapor feedbacks. As important as it is to understand these feedbacks individually, it is even more essential to study the interactive nature of these feedbacks. Modeling studies show that when interactions among feedback loops are included, uncertainty increases dramatically and there is a heightened potential for perturbations to be magnified (e.g., Cox, Betts, Jones, Spall, & Totterdell, 2000; Hajima, Tachiiri, Ito, & Kawamiya, 2014; Knutti & Rugenstein, 2015; Rosenfeld, Sherwood, Wood, & Donner, 2014). This produces a wide range of future scenarios. Positive feedbacks in the carbon cycle involves the enhancement of future carbon contributions to the atmosphere due to some initial increase in atmospheric CO2. This happens because as CO2 accumulates, it reduces the efficiency in which oceans and terrestrial ecosystems sequester carbon, which in return feeds back to exacerbate climate change (Friedlingstein et al., 2001). Warming can also increase the rate at which organic matter decays and carbon is released into the atmosphere, thereby causing more warming (Melillo et al., 2017). Increases in food shortages and lack of water is also of major concern when biogeophysical feedback mechanisms perpetuate drought conditions. The underlying mechanism here is that losses in vegetation increases the surface albedo, which suppresses rainfall, and thus enhances future vegetation loss and more suppression of rainfall—thereby initiating or prolonging a drought (Chamey, Stone, & Quirk, 1975). To top it off, overgrazing depletes the soil, leading to augmented vegetation loss (Anderies, Janssen, & Walker, 2002). Climate change often also increases the risk of forest fires, as a result of higher temperatures and persistent drought conditions. The expectation is that **forest fires will become more frequent** and severe with climate warming and drought (Scholze, Knorr, Arnell, & Prentice, 2006), a trend for which we have already seen evidence (Allen et al., 2010). Tragically, the increased severity and risk of Southern California wildfires recently predicted by climate scientists (Jin et al., 2015), was realized in December 2017, with the largest fire in the history of California (the “Thomas fire” that burned 282,000 acres, https://www.vox.com/2017/12/27/16822180/thomas-fire-california-largest-wildfire). This **catastrophic fire** embodies the sorts of positive feedbacks and interacting factors that **could catch humanity off-guard and produce a** true **apocalyptic event.** Record-breaking rains produced an extraordinary flush of new vegetation, that then dried out as record heat waves and dry conditions took hold, coupled with stronger than normal winds, and ignition. Of course the record-fire released CO2 into the atmosphere, thereby contributing to future warming. Out of all types of feedbacks, water vapor and the ice-albedo feedbacks are the most clearly understood mechanisms. Losses in reflective snow and ice cover drive up surface temperatures, leading to even more melting of snow and ice cover—this is known as the ice-albedo feedback (Curry, Schramm, & Ebert, 1995). As snow and ice continue to melt at a more rapid pace, millions of people may be displaced by flooding risks as a consequence of sea level rise near coastal communities (Biermann & Boas, 2010; Myers, 2002; Nicholls et al., 2011). The water vapor feedback operates when warmer atmospheric conditions strengthen the saturation vapor pressure, which creates a warming effect given water vapor’s strong greenhouse gas properties (Manabe & Wetherald, 1967). Global warming tends to increase cloud formation because warmer temperatures lead to more evaporation of water into the atmosphere, and warmer temperature also allows the atmosphere to hold more water. The key question is whether this increase in clouds associated with global warming will result in a positive feedback loop (more warming) or a negative feedback loop (less warming). For decades, scientists have sought to answer this question and understand the net role clouds play in future climate projections (Schneider et al., 2017). Clouds are complex because they both have a cooling (reflecting incoming solar radiation) and warming (absorbing incoming solar radiation) effect (Lashof, DeAngelo, Saleska, & Harte, 1997). The type of cloud, altitude, and optical properties combine to determine how these countervailing effects balance out. Although still under debate, it appears that in most circumstances the cloud feedback is likely positive (Boucher et al., 2013). For example, models and observations show that increasing greenhouse gas concentrations reduces the low-level cloud fraction in the Northeast Pacific at decadal time scales. This then has a positive feedback effect and enhances climate warming since less solar radiation is reflected by the atmosphere (Clement, Burgman, & Norris, 2009). The key lesson from the long list of potentially positive feedbacks and their interactions is that **runaway climate change,** and runaway perturbations have to be taken as a serious possibility. Table 2 is just a snapshot of the type of feedbacks that have been identified (see Supplementary material for a more thorough explanation of positive feedback loops). However, this list is not exhaustive and the possibility of undiscovered positive feedbacks **portends** even greater **existential risks**. The many environmental crises humankind has previously averted (famine, ozone depletion, London fog, water pollution, etc.) were averted because of political will based on solid scientific understanding. We cannot count on complete scientific understanding when it comes to positive feedback loops and climate change.

## 3

#### CP Text: The People’s Republic of China should

#### increase and encourage private and civil space cooperation with the United States over appropriation of outer space.

#### de-militarize its space industry.

#### dismantle and remove ASAT weapons.

#### The United States Federal Government should repeal the Wolf Amendment.

#### The Counterplan competes – it re-directs China’s commercial space industry to productive cooperation with the United States. The 1AC said that China’s government is reliant on private action meaning the Plan collapses all of the space sector meaning meaningful cooperation with the US becomes impossible.

#### Cooperation de-escalates the Space Race, solves Sino-Russian axis, and spills-over to broader US-China relations

Marshall and Hadfield 21 Will Marshall and Chris Hadfield 4-15-2021 "Why the U.S. and China Should Collaborate in Space" <https://time.com/5954941/u-s-china-should-collaborate-in-space/> (CEO of Planet which operates 200 satellites that image the entire Earth landmass on a daily basis, and he formerly worked at NASA on lunar missions and space debris. Colonel Chris Hadfield was Commander of the International Space Station and flew both the U.S. Space Shuttle and Russian Soyuz vehicles. Prior to that he served as a fighter/test pilot with the U.S. Air Force, U.S. Navy, and Royal Canadian Air Force.)//Elmer

While much has been made of the tense March 18 exchange between American and Chinese diplomats in Anchorage, Alaska, one area became an unlikely candidate for cooperation: outer space. During a press conference after the meeting, Jake Sullivan, the U.S. National Security Advisor, pointed out that the Perseverance rover that recently landed on Mars “wasn’t just an American project. It had technology from multiple countries from Europe and other parts of the world.” China’s top diplomat, Yang Jiechi, seized the opportunity to say that, “China would welcome it if there is a will to carry out similar cooperation from the United States with us.” Planned or not, Yang’s comment gave voice to one very smart way two geopolitical rivals sharing the same planet could work together despite their growing tensions. Space exploration has long been used to foster deep cooperation, even between adversaries. During the height of the Cold War, the U.S. and U.S.S.R. jointly undertook the 1975 Apollo-Soyuz mission, which both served as a means of political rapprochement and opened the possibility of cooperation in other areas. Those links endured. After the Soviet Union collapsed, Russia was invited to partner in the construction of the International Space Station (ISS). It was a multi-layered act that went beyond simple generosity; the more work former Soviet scientists had to do designing and building the ISS, the less likely they’d be to sell their expertise to other countries. Today, Sino-American space cooperation is similarly desirable. It could improve ties as it did for the U.S. and Russia, de-escalate an emerging Sino-Russian axis in space, and serve as a bargaining chip to help sustain other areas of cooperation. While China and the U.S. seem to clash on virtually every issue, space, by its nature, is different. Orbit isn’t a high-ground that one can seize. Instead, space works like a commons, where for any one state or company to be able to operate safely, all have to act responsibly. We need peaceful cooperation to enjoy its benefits. One reason not to cooperate in space with a geopolitical rival is technology transfer. There are legitimate concerns that collaboration could lead to technology sharing that unfairly advances China. Indeed, in 2011, the U.S. Congress included a passage, known as the Wolf Amendment, in an appropriations bill, forbidding NASA from cooperating in any way with China for fear of technological theft or espionage. The reasoning was straightforward: The U.S. enjoys significant leadership in some space technologies, including satellites, and much of that technology is proprietary, shared with no other countries. In the area of human spaceflight, however, things are different. The U.S. has extensively shared the entire ISS program for decades with the fourteen partner nations, including Russia. If there ever were secrets there, they are secrets no more. In fact, Russia and the U.S. as partners saved the day between 2011, after the space shuttles were grounded, and 2021, when the U.S. regained the ability to transport astronauts to space. During that decade, Russia’s Soyuz spacecraft served as the only way to get crews to and from the station. At the same time, uncrewed American resupply ships similarly helped keep the ISS viable when the Russian Soyuz fleet was grounded following mishaps. China has developed and proven a very successful human spaceflight program; adding their launch and spacecraft capability to the partnership would strengthen the overall mission. In order for China and the U.S. to work together in space, some things would have to change. First, the Wolf Amendment would have to be repealed—nothing meaningful can happen until that goes. Cooperation might then begin in lower profile areas such as sharing remote sensing data and reducing orbital debris. The United States and Europe have led the way with Landsat and Copernicus satellite programs providing free images of Earth that can be used to understand changes to our environment. The Chinese have yet to create a similar data share program for their Earth imaging systems—but they should. The United States and China could also discuss joint efforts to reduce the belt of space junk that circles the planet and threatens everyone’s satellites. Most importantly, cooperation could extend to joint human spaceflight missions; the US could invite China to conduct a crewed visit to the ISS, or to join in the human exploration of the Moon, targeted to happen in this decade and which both nations are now working on separately; the goal would be a joint Moon base rather than a space race. For decades, space travel has provided an opportunity for humans to see our world differently. Apollo 11 astronaut Michael Collins said, “The thing that really surprised me was that the Earth projected an air of fragility.” Chinese astronauts, since Yang Liwei’s first flight 18 years ago, have surely had a similar experience gazing down at our planet. Cooperating in space can give the United States and China the opportunity to change their thinking together. Bold American leadership can be a leveraged move in reducing tensions, as it was in keeping the Cold War cold—a win for all nations and our shared, blue-green planet.

#### US-China Relations key to prevent escalation – current US course turns status quo cold war hot.

Nye 21 Joseph Nye 3-3-2021 "The factors that could lead to war between the US and China" <https://www.aspistrategist.org.au/the-factors-that-could-lead-to-war-between-the-us-and-china/> (professor at Harvard University and author)//Elmer

When China’s foreign minister, Wang Yi, recently called for a reset of bilateral relations with the United States, a White House spokesperson replied that the US saw the relationship as one of strong competition that required a position of strength. It’s clear that President Joe Biden’s administration is not simply reversing Donald Trump’s policies. Some analysts, citing Thucydides’ attribution of the Peloponnesian War to Sparta’s fear of a rising Athens, believe the US–China relationship is entering a period of conflict pitting an established hegemon against an increasingly powerful challenger. I am not that pessimistic. In my view, economic and ecological interdependence reduces the probability of a real cold war, much less a hot one, because both countries have an incentive to cooperate in a number of areas. At the same time, miscalculation is always possible and some see the danger of ‘sleepwalking’ into catastrophe, as happened with World War I. History is replete with cases of misperception about changing power balances. For example, when US President Richard Nixon visited China in 1972, he wanted to balance what he saw as a growing Soviet threat to a declining America. But what Nixon interpreted as decline was really the return to normal of America’s artificially high share of global output after World War II. Nixon proclaimed multipolarity, but what followed was the end of the Soviet Union and America’s unipolar moment two decades later. Today, some Chinese analysts underestimate America’s resilience and predict Chinese dominance but this, too, could turn out to be a dangerous miscalculation. It is equally dangerous for Americans to over- or underestimate Chinese power, and the US contains groups with economic and political incentives to do both. Measured in dollars, China’s economy is about two-thirds the size of that of the US, but many economists expect China to surpass the US sometime in the 2030s, depending on what one assumes about Chinese and American growth rates. Will American leaders acknowledge this change in a way that permits a constructive relationship, or will they succumb to fear? Will Chinese leaders take more risks, or will Chinese and Americans learn to cooperate in producing global public goods under a changing distribution of power? Recall that Thucydides attributed the war that ripped apart the ancient Greek world to two causes: the rise of a new power and the fear that this created in the established power. The second cause is as important as the first. The US and China must avoid exaggerated fears that could create a new cold or hot war. Even if China surpasses the US to become the world’s largest economy, national income is not the only measure of geopolitical power. China ranks well behind the US in soft power and US military expenditure is nearly four times that of China. While Chinese military capabilities have been increasing in recent years, analysts who look carefully at the military balance conclude that China will not, say, be able to exclude the US from the Western Pacific. On the other hand, the US was once the world’s largest trading economy and its largest bilateral lender. Today, nearly 100 countries count China as their largest trading partner, compared to 57 for the US. China plans to lend more than US$1 trillion for infrastructure projects with its Belt and Road Initiative over the next decade, while the US has cut back aid. China will gain economic power from the sheer size of its market as well as its overseas investments and development assistance. China’s overall power relative to the US is likely to increase. Nonetheless, balances of power are hard to judge. The US will retain some long-term power advantages that contrast with areas of Chinese vulnerability. One is geography. The US is surrounded by oceans and neighbours that are likely to remain friendly. China has borders with 14 countries, and territorial disputes with India, Japan and Vietnam set limits on its hard and soft power. Energy is another area where America has an advantage. A decade ago, the US was dependent on imported energy, but the shale revolution transformed North America from energy importer to exporter. At the same time, China became more dependent on energy imports from the Middle East, which it must transport along sea routes that highlight its problematic relations with India and other countries. The US also has demographic advantages. It is the only major developed country that is projected to hold its global ranking (third) in terms of population. While the rate of US population growth has slowed in recent years, it will not turn negative, as in Russia, Europe, and Japan. China, meanwhile, rightly fears ‘growing old before it grows rich.’ China’s labour force peaked in 2015 and India will soon overtake it as the world’s most populous country. America also remains at the forefront in key technologies (bio, nano and information) that are central to 21st-century economic growth. China is investing heavily in research and development, and competes well in some fields. But 15 of the world’s top 20 research universities are in the US; none is in China. Those who proclaim Pax Sinica and American decline fail to take account of the full range of power resources. American hubris is always a danger but so is exaggerated fear, which can lead to overreaction. Equally dangerous is rising Chinese nationalism, which, combined with a belief in American decline, leads China to take greater risks. Both sides must beware of miscalculation. After all, more often than not, the greatest risk we face is our own capacity for error.

#### US-China War goes Nuclear.

Brands and Beckley 21 Hal Brands and Michael Beckley 12-16-2021 "Washington Is Preparing for the Wrong War With China" https://www.foreignaffairs.com/articles/china/2021-12-16/washington-preparing-wrong-war-china (Henry A. Kissinger Distinguished Professor of Global Affairs at the Johns Hopkins University School of Advanced International Studies, a Senior Fellow at the American Enterprise Institute and Associate Professor of Political Science at Tufts University, a Non-Resident Senior Fellow at the American Enterprise Institute)//Elmer

The United States is getting serious about the threat of war with China. The U.S. Department of Defense has labeled China its primary adversary, civilian leaders have directed the military to develop credible plans to defend Taiwan, and President Joe Biden has strongly implied that the United States would not allow that island democracy to be conquered. Yet Washington may be preparing for the wrong kind of war. Defense planners appear to believe that they can win a short conflict in the Taiwan Strait merely by blunting a Chinese invasion. Chinese leaders, for their part, seem to envision rapid, paralyzing strikes that break Taiwanese resistance and present the United States with a fait accompli. Both sides would prefer a splendid little war in the western Pacific, but that is not the sort of war they would get. A war over Taiwan is likely to be long rather than short, regional rather than local, and much easier to start than to end. It would expand and escalate, as both countries look for paths to victory in a conflict neither side can afford to lose. It would also present severe dilemmas for peacemaking and high risks of going nuclear. If Washington doesn’t start preparing to wage, and then end, a protracted conflict now, it could face catastrophe once the shooting starts. IMPENDING SLUGFEST A U.S.-Chinese war over Taiwan would begin with a bang. China’s military doctrine emphasizes coordinated operations to “paralyze the enemy in one stroke.” In the most worrying scenario, Beijing would launch a surprise missile attack, hammering not only Taiwan’s defenses but also the naval and air forces that the United States has concentrated at a few large bases in the western Pacific. Simultaneous Chinese cyberattacks and antisatellite operations would sow chaos and hinder any effective U.S. or Taiwanese response. And the People’s Liberation Army (PLA) would race through the window of opportunity, staging amphibious and airborne assaults that would overwhelm Taiwanese resistance. By the time the United States was ready to fight, the war would effectively be over. The Pentagon’s planning increasingly revolves around preventing this scenario, by hardening and dispersing the U.S. military presence in Asia, encouraging Taiwan to field asymmetric capabilities that can inflict a severe toll on Chinese attackers, and developing the ability to blunt the PLA’s offensive capabilities and sink an invasion fleet. This planning is predicated on the critical assumption that the early weeks, if not days, of fighting would determine whether a free Taiwan survives. Yet whatever happens at the outset, a conflict almost certainly wouldn’t end quickly. Most great-power wars since the Industrial Revolution have lasted longer than expected, because modern states have the resources to fight on even when they suffer heavy losses. Moreover, in hegemonic wars—clashes for dominance between the world’s strongest states—the stakes are high, and the price of defeat may seem prohibitive. During the nineteenth and twentieth centuries, wars between leading powers—the Napoleonic Wars, the Crimean War, the world wars—were protracted slugfests. A U.S.-Chinese war would likely follow this pattern. If the United States managed to beat back a Chinese assault against Taiwan, Beijing wouldn’t simply give up. Starting a war over Taiwan would be an existential gamble: admitting defeat would jeopardize the regime’s legitimacy and President Xi Jinping’s hold on power. It would also leave China more vulnerable to its enemies and destroy its dreams of regional primacy. Continuing a hard fight against the United States would be a nasty prospect, but quitting while China was behind would seem even worse. Washington would also be inclined to fight on if the war were not going well. Like Beijing, it would view a war over Taiwan as a fight for regional dominance. The fact that such a war would probably begin with a Pearl Harbor–style missile attack on U.S. bases would make it even harder for an outraged American populace and its leaders to accept defeat. Even if the United States failed to prevent Chinese forces from seizing Taiwan, it couldn’t easily bow out of the war. Quitting without first severely damaging Chinese air and naval power in Asia would badly weaken Washington’s reputation, as well as its ability to defend remaining allies in the region. Both sides would have the capacity to keep fighting, moreover. The United States could summon ships, planes, and submarines from other theaters and use its command of the Pacific beyond the first island chain—which runs from Japan in the north through Taiwan and the Philippines to the south—to conduct sustained attacks on Chinese forces. For its part, China could dispatch its surviving air, naval, and missile forces for a second and third assault on Taiwan and press its maritime militia of coast guard and fishing vessels into service. Both the United States and China would emerge from these initial clashes bloodied but not exhausted, increasing the likelihood of a long, ugly war. BIGGER, LONGER, MESSIER When great-power wars drag on, they get bigger, messier, and more intractable. Any conflict between the United States and China is likely to force both countries to mobilize their economies for war. After the initial salvos, both sides would hurry to replace munitions, ships, submarines, and aircraft lost in the early days of fighting. This race would strain both countries’ industrial bases, require the reorientation of their economies, and invite nationalist appeals—or government compulsion—to mobilize the populace to support a long fight. Long wars also escalate as the combatants look for new sources of leverage. Belligerents open new fronts and rope additional allies into the fight. They expand their range of targets and worry less about civilian casualties. Sometimes they explicitly target civilians, whether by bombing cities or torpedoing civilian ships. And they use naval blockades, sanctions, and embargoes to starve the enemy into submission. As China and the United States unloaded on each other with nearly every tool at their disposal, a local war could turn into a whole-of-society brawl that spans multiple regions. Bigger wars demand more grandiose aims. The greater the sacrifices required to win, the better the ultimate peace deal must be to justify those sacrifices. What began as a U.S. campaign to defend Taiwan could easily turn into an effort to render China incapable of new aggression by completely destroying its offensive military power. Conversely, as the United States inflicted more damage on China, Beijing’s war aims could grow from conquering Taiwan to pushing Washington out of the western Pacific altogether. All of this would make forging peace more difficult. The expansion of war aims narrows the diplomatic space for a settlement and produces severe bloodshed that fuels intense hatred and mistrust. Even if U.S. and Chinese leaders grew weary of fighting, they might still struggle to find a mutually acceptable peace. GOING NUCLEAR A war between China and the United States would differ from previous hegemonic wars in one fundamental respect: both sides have nuclear weapons. This would create disincentives to all-out escalation, but it could also, paradoxically, compound the dangers inherent in a long war. For starters, both sides might feel free to shoot off their conventional arsenals under the assumption that their nuclear arsenals would shield them from crippling retaliation. Scholars call this the “stability-instability paradox,” whereby blind faith in nuclear deterrence risks unleashing a massive conventional war. Chinese military writings often suggest that the PLA could wipe out U.S. bases and aircraft carriers in East Asia while China’s nuclear arsenal deterred U.S. attacks on the Chinese mainland. On the flip side, some American strategists have called for pounding Chinese mainland bases at the outset of a conflict in the belief that U.S. nuclear superiority would deter China from responding in kind. Far from preventing a major war, nuclear weapons could catalyze one. Once that war is underway, it could plausibly go nuclear in three distinct ways. Whichever side is losing might use tactical nuclear weapons—low-yield warheads that could destroy specific military targets without obliterating the other side’s homeland—to turn the tide. That was how the Pentagon planned to halt a Soviet invasion of central Europe during the Cold War, and it is what North Korea, Pakistan, and Russia have suggested they would do if they were losing a war today. If China crippled U.S. conventional forces in East Asia, the United States would have to decide whether to save Taiwan by using tactical nuclear weapons against Chinese ports, airfields, or invasion fleets. This is no fantasy: the U.S. military is already developing nuclear-tipped, submarine-launched cruise missiles that could be used for such purposes. China might also use nuclear weapons to snatch victory from the jaws of defeat. The PLA has embarked on an unprecedented expansion of its nuclear arsenal, and PLA officers have written that China could use nuclear weapons if a conventional war threatened the survival of its government or nuclear arsenal—which would almost surely be the case if Beijing was losing a war over Taiwan. Perhaps these unofficial claims are bluffs. Yet it is not difficult to imagine that if China faced the prospect of humiliating defeat, it might fire off a nuclear weapon (perhaps at or near the huge U.S. military base on Guam) to regain a tactical advantage or shock Washington into a cease-fire. As the conflict drags on, either side could also use the ultimate weapon to end a grinding war of attrition. During the Korean War, American leaders repeatedly contemplated dropping nuclear bombs on China to force it to accept a cease-fire. Today, both countries would have the option of using limited nuclear strikes to compel a stubborn opponent to concede. The incentives to do so could be strong, given that whichever side pulls the nuclear trigger first might gain a major advantage. A final route to nuclear war is inadvertent escalation. Each side, knowing that escalation is a risk, may try to limit the other’s nuclear options. The United States could, for instance, try to sink China’s ballistic missile submarines before they hide in the deep waters beyond the first island chain. Yet such an attack could put China in a “use it or lose it” situation with regard to its nuclear forces, especially if the United States also struck China’s land-based missiles and communication systems, which intermingle conventional and nuclear forces. In this scenario, China’s leaders might use their nuclear weapons rather than risk losing that option altogether.

#### US-China Relations solves laundry list of existential threats.

Paulson 15, H. M. "Dealing with China: An insider unmasks the new economic superpower. Hachette Book Group." Inc.: All Books (2015). (Former US Treasury Secretary)//Elmer

One crisp day in early March 2014, I found myself sitting in a sleek conference room high above Boston Harbor taking questions from a group of financial executives. These men and women worked for a range of institutions that managed well over $3 trillion of financial assets, including the personal savings and pension funds of millions of Americans. They were keen to learn as much as they could about the Chinese economy. Was it about to hit the wall? Was I worried about a real estate bubble? How fragile was the country's financial system? Was the government serious about dealing with China's environmental problems? One fellow had a more personal question for me. "Hank," he said. "You're a real patriot. Why are you helping China?" The question pulled me up short. Three years before, when I first 'c began planning to write this book, I don't think I would have been asked anything like that at a meeting of sophisticated financiers. They would J have accepted that helping China to reform its economy, open its markets, protect its environment, and improve the quality of life of its people-all things I have been working on-would bring economic and strategic benefits to the U.S. as well. But that viewpoint has been changing as China has emerged as our biggest, most formidable economic competitor since the end of World War II and has started flexing its newfound military muscle in unsettling ways. As a result, many Americans, from all walks of life, have begun to view China with growing apprehension and resentment. Some would now prefer confrontation to cooperation. I understand these sentiments. Partly they are a function of China's choices and actions, and partly they are born of frustration with the recent economic troubles of the United States. I've spent a fair number of pages explaining how China must carry out meaningful economic reforms if it expects to continue its amazing success story. These arguments make sense for China and its people. But why should an American care? Why should we root for China to succeed? Shouldn't we instead be hoping that this ungainly giant stumbles, if only to slow down its daunting economic and military growth? In coming years China's weight and influence in the world, already substantial, is likely to begin to rival our own. Why take the chance now of helping the Chinese deal with so many of their problems and challenges? Why aid a competitor? The answer is simple: we should do so because it is more than ever in America's own self-interest that we do. To begin with, just about every major global challenge we face-from economic and environmental issues to food and energy security to nuclear proliferation and terrorism-will be easier to solve if the world's two most important economic powers can act in complementary ways. But these challenges will be almost impossible to address if the U.S. and China work at cross-purposes. If we want to benefit from an expanding global economy, we need the most dynamic growth engines, like China's, to thrive. If we want to prevent the worst climate change outcomes and to preserve our fragile global ecosystems, we need China to solve its massive environmental problems at home and adopt better practices abroad. If we want to keep diseases from our shores, we need Chinaand other countries to use the very best methods to prevent and halt epidemics. If we want to stem the spread of dangerous weapons to those who might harm our citizens, we need nations, including China, to work together to end illicit trafficking. If we want all these things to happen, we must be proactive, frank, and at times forceful with the Chinese while seeking ways to cooperate, to develop complementary policies, and to work to more fully integrate them into a rules-based global order. If we attempt to exclude, ignore, or weaken China, we limit our ability to influence choices made by its leaders and risk turning the worst-case scenarios of China skeptics into a self-fulfilling reality.

## 4

#### China’s space program is key to asteroid mitigation---US efforts fail and the same entities referenced in AC Patel and AC Chow are key.

Chen 21 (, S., 2021. How 23 giant Chinese rockets could save world from asteroids. [online] South China Morning Post. Available at: <https://www.scmp.com/news/china/science/article/3139914/how-23-giant-chinese-rockets-could-save-world-doomsday-asteroid> [Accessed 19 January 2022] Stephen Chen investigates major research projects in China, a new power house of scientific and technological innovation. He has worked for the Post since 2006. He is an alumnus of Shantou University, the Hong Kong University of Science and Technology, and the Semester at Sea programme which he attended with a full scholarship from the Seawise Foundation.)-rahulpenu

How 23 giant Chinese rockets could save the world from ‘doomsday’ asteroid China can send mammoth machines into space which travel for years then deflect problematic rocks Same devices have been criticised recently because one plummeted back to Earth in uncontrolled re-entry **China’s** **space** **programme** **could** one day **save** **the** **world**, with massive rockets travelling for years to defend the planet from huge asteroids capable of wiping out entire cities, according to a government-backed study. This saviour role is unexpected given these are the same machines seen as a threat by many, including the United States, just weeks ago; the main 20-tonne section from one such rocket fell back to Earth in May in an uncontrolled re-entry. It fell into the sea or burned up beforehand, although last year fragments from another rocket were said to have hit two villages in the West African country, Ivory Coast. Now a new government-funded study says China can launch 23 Long March 5 (CZ-5) rockets – the largest in its fleet, weighing almost 900 tonnes on take-off – to break up the rocky objects in our solar system. Some asteroids are as small as pebbles but others are hundreds of kilometres across. An asteroid about 500 metres (1,640 feet) wide could kill millions. Although the chance of one colliding with the Earth is currently low, there is one called Bennu which could hit in about a century. Researcher Li Mingtao and his colleagues at the National Space Science Centre in Beijing have been commissioned to find out how China can step in and try to ensure humans do not go the way of the dinosaurs. The asteroid that led to their extinction was around 10km (6 miles) wide. To change the course of a giant asteroid hurtling towards us at terrifying speeds, a lot of kinetic energy would be needed. Nuclear weapons might do the job but such a blast could break the target into several threatening chunks. In their proposal, the space centre team suggested launching 23 CZ-5 rockets from various sites across China, at the same time. The spacecraft would have to travel for almost three years to reach their target. On top of each rocket would be a deflector, a device designed to avoid breaking up the asteroid. Each rocket would “hit” the asteroid, one after another, by way of a gentle nudge. This would only change the course of a Bennu-sized asteroid slightly, but enough to make it pass safely at a distance about 1.4 times the radius of the Earth and **save** some cities **from** **annihilation**, according to Li’s calculations. “[It is] possible to defend against large asteroids with a nuclear-free technique within 10 years,” said Li and colleagues in a June paper published in Icarus , an international journal for solar system studies. The CZ-5 is the **backbone** **of** **China’s** space **programme**, a more-than-handy workhorse used in space station construction and Mars exploration. The problem is its size becomes an issue during free fall back to Earth, travelling at thousands of miles an hour. Western authorities including the US Space Force have said they carefully tracked each CZ-5 after each launch. In May US Defence Secretary Lloyd Austin hoped the rocket of concern at the time would “land in a place where it will not harm anyone. Hopefully in the ocean, or someplace like that.” He also said there was a need to make sure “those kinds of things” were taken into consideration when planning and conducting operations. Some Western media warned readers that the debris might hit big cities. That did not happen but led to an increased focus on China’s responsibility as a space power. In the Icarus paper Li and his colleagues said fuel not used during the rocket launch could give extra thrust during the flight towards an asteroid, and the rocket fuselage also increased the total mass of the deflector. They said existing rockets only had to undergo small modifications such as adding a few small thrusters. A similar mission proposed by researchers with Nasa and California’s Lawrence Livermore National Laboratory in 2018 would require the launch of 75 Delta IV heavy rockets, according to the two organisations and mentioned by Li. Known as HAMMER (Hypervelocity Asteroid Mitigation Mission for Emergency Response), the US plan would deliver more than 400 tonnes of deflectors, nearly twice as many as in the Chinese proposal, but with a flight time nearly a year shorter, to achieve similar results. The US mission would be more expensive than the Chinese one, Li said. The Chinese plan also needs less preparation time. While the American approach would need to discover an asteroid 25 years before its potential collision with Earth, China’s plan could cut the lead time to just a decade. Overall, the Chinese **approach**, involving what is called the Assembled Kinetic Impactor, could **greatly** **improve** deflection **efficiency** **and** **reduce** both **launch** **costs** **and** **lead** **time**, the paper said. A space scientist at Beijing’s Tsinghua University said competition between China and the US would accelerate the development of space technology. “The problem is, when the doomsday threat comes, politics may override science and lots of time may be wasted on debates to decide which country should take the lead,” said the researcher, who did not want to be named because of the sensitivity of the issue. China has been challenging US dominance in space for some time. It already has a rover on Mars, is building a space station, exploring the far side of the moon and studying lunar samples recently retrieved by robots. The US launched its first asteroid defence programme decades ago. It has the only asteroid-warning radar system on Earth and one of its spacecraft is returning home after obtaining samples from Bennu, the asteroid that could hit us in about a century. In 2025 China is expected to launch its own spacecraft to retrieve asteroid samples. China is also building a planetary defence system with what will be the most powerful radar in the world, according to researchers involved in the project. It will be made up of large radio telescopes across the country and be able to track more targets than its US counterpart.

#### Extinction---nuclear winter and global calamity---comprehensive studies

Baum 19 - executive director of the Global Catastrophic Risk Institute, Ph.D in Geography, Seth Baum, “Risk-Risk Tradeoff Analysis of Nuclear Explosives for Asteroid Deflection,” SSRN Scholarly Paper (Rochester, NY: Social Science Research Network, May 31, 2019), <https://papers.ssrn.com/abstract=3397559>.

The most severe asteroid collisions and nuclear wars can cause global environmental effects. The core mechanism is the transport of particulate matter into the stratosphere, where it can spread worldwide and remain aloft for years or decades. Large asteroid collisions create large quantities of dust and large fireballs; the fire heats the dust so that some portion of it rises into the stratosphere. The largest collisions, such as the 10km Chicxulub impactor, can also eject debris from the collision site into space; upon reentry into the atmosphere, the debris heats up enough to spark global fires (Toon, Zahnle, Morrison, Turco, & Covey, 1997). The fires are a major impact in their own right and can send additional smoke into the stratosphere. For nuclear explosions, there is also a fireball and smoke, in this case from the burning of cities or other military targets. While in the stratosphere, the particulate matter blocks sunlight and destroys ozone (Toon et al., 2007). The ozone loss increases the amount of ultraviolet radiation reaching the surface, causing skin cancer and other harms (Mills, Toon, Turco, Kinnison, & Garcia, 2008). The blocked sunlight causes abrupt cooling of Earth’s surface and in turn reduced precipitation due to a weakened hydrological cycle. The cool, dry, and dark conditions reduce plant growth. Recent studies use modern climate and crop models to examine the effects for a hypothetical IndiaPakistan nuclear war scenario with 100 weapons (50 per side) each of 15KT yield. The studies find agriculture declines in the range of approximately 2% to 50% depending on the crop and location.11 Another study compares the crop data to existing poverty and malnourishment and estimates that the crop declines could threaten starvation for two billion people (Helfand, 2013). However, the aforementioned studies do not account for new nuclear explosion fire simulations that find approximately five times less particulate matter reaching the stratosphere, and correspondingly weaker global environmental effects (Reisner et al., 2018). Note also that the 100 weapon scenario used in these studies is not the largest potential scenario. Larger nuclear wars and large asteroid collisions could cause greater harm. The largest asteroid collisions could even reduce sunlight below the minimum needed for vision (Toon et al., 1997). Asteroid risk analyses have proposed that the global environmental disruption from large collisions could cause one billion deaths (NRC, 2010) or the death of 25% of all humans (Chapman, 2004; Chapman & Morrison, 1994; Morrison, 1992), though these figures have not been rigorously justified (Baum, 2018a). The harms from asteroid collisions and nuclear wars can also include important secondary effects. The food shortages from severe global environmental disruption could lead to infectious disease outbreaks as public health conditions deteriorate (Helfand, 2013). Law and order could be lost in at least some locations as people struggle for survival (Maher & Baum, 2013). Today’s complex global political-economic system already shows fragility to shocks such as the 2007- 2008 financial crisis (Centeno, Nag, Patterson, Shaver, & Windawi, 2015); an asteroid collision or nuclear war could be an extremely large shock. The systemic consequences of a nuclear war would be further worsened by the likely loss of major world cities that serve as important hubs in the global economy. Even a single detonation in nuclear terrorism would have ripple effects across the global political-economic system (similar to, but likely larger than, the response prompted by the terrorist attacks of 11 September 2001). It is possible for asteroid collisions to cause nuclear war. An asteroid explosion could be misinterpreted as a nuclear attack, prompting nuclear attack that is believed to be retaliation. For example, the 2013 Chelyabinsk event occurred near an important Russian military installation, prompting concerns about the event’s interpretation (Harris et al., 2015). The ultimate severity of an asteroid collision or violent nuclear conflict use would depend on how human society reacts. Would the reaction be disciplined and constructive: bury the dead, heal the sick, feed the hungry, and rebuild all that has fallen? Or would the reaction be disorderly and destructive: leave the rubble in place, fight for scarce resources, and descend into minimalist tribalism or worse? Prior studies have identified some key issues, including the viability of trade (Cantor, Henry, & Rayner, 1989) and the self-sufficiency of local communities (Maher & Baum, 2013). However, the issue has received little research attention and remains poorly understood. This leaves considerable uncertainty in the total human harm from an asteroid collision or nuclear weapons use. Previously published point estimates of the human consequences of asteroid collisions12 and nuclear wars (Helfand, 2013) do not account for this uncertainty and are likely to be inaccurate. Of particular importance are the consequences for future generations, which could vastly outnumber the present generation. If an asteroid collision or nuclear war would cause human extinction, then there would be no future generations. Alternatively, if survivors fail to recover a large population and advanced technological civilization, then future generations would be permanently diminished. The largest long-term factor is whether future generations would colonize space and benefit from its astronomically large amount of resources (Tonn, 1999). However, it is not presently known which asteroid collisions or nuclear wars (if any) would cause the permanent collapse of human civilization and thus the loss of the large future benefits (Baum et al., 2019). Given the enormous stakes, prudent risk management would aim for very low probabilities of permanent collapse (Tonn, 2009). It should be noted that the severity of violent nuclear conflict could depend on more than just the effects of nuclear explosions, because the overall conflict scenario could include non-nuclear violence. Indeed, it is possible for the nuclear explosions to constitute a relatively small portion of the total severity, as was the case in World War II. 4.4 Risk of Violent Non-Nuclear Conflict Finally, it is necessary to discuss the risk of violent non-nuclear conflict. Only a small portion of violent non-nuclear conflicts are applicable, specifically the portion affected by nuclear weapons. More precisely, this section discusses non-nuclear conflicts involving one or more countries that possess nuclear weapons at some point during the lifetime of a nuclear deflection program. Nuclear deterrence theory predicts that nuclear-armed adversaries will not initiate major wars against each other because both sides could be destroyed in a nuclear war. However, the theory does permit limited, small-scale violent conflicts between nuclear-armed countries. These conflicts likely would not involve nuclear weapons. Indeed, nuclear deterrence may even make small violent conflicts more likely, because the countries know that neither side wants to escalate the conflict into major war. This idea is known as the stability-instability paradox: nuclear deterrence brings stability with respect to major wars but instability with respect to minor conflicts. Empirical support for the stability-instability paradox has been found by some research (Rauchhaus, 2009),while other research has found no significant effect of the possession of nuclear weapons on the probability of conflicts of any scale (Bell & Miller, 2015; Gartzke & Jo, 2009). If countries fully disarm their nuclear arsenals, such that they would never have nuclear weapons again, then there would be no nuclear deterrence to prevent the onset of major wars. A simple risk analysis could assume that the risk of major wars would be comparable to the risk prior to the development of nuclear weapons. The two twentieth century World Wars combined for around 100 million deaths in 50 years,13 suggesting an annualized risk of two million deaths. However, two World Wars do not make for a robust dataset. Indeed, the robustness of these two data points is called into question by historical analysis finding that both world wars might not have occurred in the reasonably plausible event that the 1914 assassination of Archduke Ferdinand had failed (Lebow, 2014). Similarly, another historical analysis finds that the U.S. and Soviet Union would probably not have waged major war against each other even in the absence of nuclear deterrence (Mueller, 1988). Furthermore, these past events are not necessarily applicable to the future conditions of a post-nuclear-disarmament world. To the best of the present author’s knowledge, no studies have analyzed the risk of major wars in a post-nucleardisarmament world.

## 5

#### Text – The People’s Republic of China should implement cooperative active debris removal measures

#### That solves

ESA 17 ( April 14, 2017 “Active Debris Removal” https://www.esa.int/Our\_Activities/Space\_Safety/Space\_Debris/Active\_debris\_removal)

ESA, as a space technology and operations agency, has identified active removal technologies as a strategic goal. Active Debris Removal (ADR) is necessary to stabilise the growth of space debris, but even more important is that any newly launched objects comply with post-mission disposal guidelines – especially orbital decay in less than 25 years. If this were not the case, most of the required ADR effort would go to compensate for the non-compliance of new objects. Studies performed with long-term evolution models like DELTA have shown that a ‘business as usual’ scenario will lead to a progressive, uncontrolled increase of object numbers in LEO, with collisions becoming the primary debris source. The IADC mitigation measures will reduce the growth, but long-term proliferation is still expected, even with full mitigation compliance, and even if all launch activities are halted. This is an indication that the population of large and massive objects has reached a critical concentration in LEO. But even in a future scenario in which no further objects are added to the space environment (no launches, no debris release, no explosions), the results of simulations by ESA and NASA show that the number of debris objects would continue to grow even under these idealised conditions – under which a collision rate of once every 10 years can be assumed. Furthermore, an IADC study with six different models from 2013 show that in an almost perfect scenario with 90% compliance with the mitigation guidelines and with no explosions on orbit, the population suffers a steady increase, and a collision could be expected every 5–9 years. All these studies are a clear indicator that the population of large and massive objects has reached a critical density in LEO, and that mitigation alone is not sufficient. It is necessary to introduce a programme of remediation measures as well: active debris removal, in order to reduce the number of large and massive (mostly physically intact) objects . The current LEO environment contains about 3200 intact objects. An ESA analysis shows that the (lower) level of around 2500 intact objects (the status in the mid-1990s) would have a 50% probability of decreasing the overall debris population. If this is considered to be a desirable goal for remediation, the number of intact objects has to be reduced even while the world’s spaceflight activities continue. Averaged over the eight years 2004–12, about 72 objects were placed into LEO per year. However, since 2012, there has been a steep increase in the number of satellites placed in LEO, with the count now running at 125 objects per year (average over the four years 2013–16), mainly due to the increased use of small satellites. In addition, in 2015, several companies announced their intention to deploy large constellations of more than around 1000 satellites in LEO to provide fast Internet around the world. Limiting launch rates neither feasible nor helpful Therefore, limiting the launch rate or a further reduction of the allowed lifetime in orbit after the end of the mission (which would be two options to reduce the overall number of intact objects in space) do not seem feasible, because they cannot be mandated. For all new objects, strong compliance with post-mission mitigation measures would allow maintaining the number of intact objects at a level similar to the current one, and avoid having to deal with more objects in addition to those already in orbit. Therefore, in order to reduce the number of big objects in LEO, the only option is to actively remove large objects now in orbit and having a long remaining lifetime in space. This would provide several benefits: The most critical objects (those that would generate the most fragments in case of any collision, and that have a higher collision risk) could be removed from the environment first; Decommissioned objects could also be removed; A controlled deorbit could be performed (as large removal targets typically are also most critical in terms of on-­ground risk). Studies at ESA and NASA show that with a removal sequence planned according to a target selection based on mass, area, or cumulative collision risk, the environment can be stabilised when on the order of 5–10 objects are removed from LEO per year (although the effectiveness of each removal decreases as more objects are removed). Active removal is efficient Active removal can be more efficient in terms of the number of collisions prevented versus objects removed when the following principles are applied for the selection of removal targets, which can be used to generate a criticality index and the according list: The selected objects should have a high mass (they have the largest environmental impact in case of collision); Should have high collision probabilities (e.g. they should be in densely populated regions and have a large cross-sectional area); Should be in high altitudes (where the orbital lifetime of the resulting fragments is long). Long­-term environment simulations can be used to analyse orbital regions that are hotspots for collisions. The most densely populated region in LEO is around 800–1000 km altitude at high inclinations. The collision hotspots can be ranked by the number of collisions predicted to occur under a business as usual scenario. Polar Hotspots High-ranking hotspot regions are at around: 1000 km and 82º inclination; 800 km and 98º inclination; 850 km and 71º inclination. The concentration of critical-size objects in these narrow orbital bands could allow multi-target removal missions. Such missions could be specifically designed for one orbit type were a number of objects of the same type are contained While removal targets should be selected from a global perspective, legal constraints dealing with the ownership of space debris objects, and the validation thereof, cannot be neglected. Also, it should be kept in mind that legal responsibility for a coupled remover/target stack (i.e. when a removal spacecraft attaches itself to a inoperative body for deorbiting) is shared. While removal technology should be generic, i.e. applicable to a wide range of removal targets, which may also include non­ESA objects, special emphasis on firm agreements with the owners of the object is required.

## Case

### Advantage 1

#### Vote neg on presumption – private space activities and collaboration with the public sector is inevitable even if they can’t own anything in outer space – that’s the T flow.

#### So many alt causes – all are short-term and not related to space

1AC Hal Brands, 5-1-2021, Henry A. Kissinger Distinguished Professor At The Johns Hopkins School Of Advanced International Studies, China’s Creative Challenge—and the Threat to America, Commentary Magazine, https://www.commentarymagazine.com/articles/hal-brands/chinas-geopolitical-challenge-threat-to-america//Khan

FINALLY, CHINA is testing the patterns of history simply by taking on the United States. America is the most lethal competitor of the modern era, and it now has its sights set squarely on Beijing. Consider the historical record. In an environment populated mostly by hostile autocracies, America became a continental behemoth and the world’s strongest economy within a century. It then achieved something no other modern great power has managed—lasting, if periodically contested, hegemony in its home region. During the 20th century, America or the coalitions it supported decisively defeated a series of illiberal powers—Germany (twice), Japan, the Soviet Union—that challenged its vital interests. Along the way, Washington peacefully wrested global leadership from the United Kingdom. For over a century, the surest path to destruction has been inviting the focused hostility of the United States. America’s formidable record is the product of many factors. Vast resource endowments and uniquely advantageous geography have allowed America to project power globally without facing severe geopolitical threats near home. Similarly, the fact that America is powerful and far away leads countries all around the Eurasian periphery to ally with the United States against nearby predators that threaten their independence. The country’s relatively open economy has created great dynamism and innovation; its democratic institutions have allowed it, more often than not, to use its other advantages effectively. And the slowness with which America sometimes mobilizes to confront threats contributes to the single-mindedness with which it eventually combats them. The type of superpower America is also matters. Because America is a liberal nation, it has taken a liberal approach to global power. Since 1945, it has delivered freedom of the seas, a global reserve currency, and a massive market for foreign goods, in addition to providing security and stability in key regions. Those attributes have made other countries support the American cause, which makes American hegemony even harder to overturn. Neither China nor any other country can compete on these dimensions: Beijing lacks the ability to act as a global security provider and the willingness (as a neo-mercantilist actor) to anchor a truly open global economy. It cannot fully open its market without exposing key industries to competition and wrecking plans to reduce strategic dependence on the West. Even if China’s raw power exceeded America’s, its ability to act as a comparatively benign and popular hegemon would not. Having helped the United States defeat the Soviet Union, Chinese leaders understood the peril of provoking American hostility: This was the crux of Deng Xiaoping’s famous dictum about “hiding” capabilities and “biding” time. Chinese statecraft in the post-Tiananmen era was meant to increase Beijing’s power while delaying an American response. The building of deep commercial and financial ties with the United States not only fueled Chinese growth; it also made it more painful for America to turn toward competition. The cultivation of American elites in academia, business, and politics strengthened supporters of continued engagement. Even as Chinese statecraft become more assertive after 2008, Beijing moved incrementally—in the South China Sea and elsewhere—to avoid giving America an eye-opening “Sputnik moment.” And even as the relationship deteriorated during the Obama years, the Chinese leadership used the lure of cooperation on climate change and talk of a “new type of great-power relations” to discourage a sharper pivot in American policy. Historians will one day marvel at how well this strategy—combined with America’s post-9/11 distraction—worked. It took two decades, from the time serious observers began warning about the Chinese challenge, for the United States to adjust its statecraft decisively. During that time, China gained access to technology, capital, and markets that powered its ascent; there emerged an incredibly complex interdependence that continues to retard multilateral mobilization against Beijing. If the United States loses the competition with China, it will be—in no small part—because Beijing successfully anesthetized Washington to a growing peril. The bad news, from Xi’s vantage point, is that the game is up. Predatory economic behavior that America once tolerated has become more threatening as Beijing worked its way up global value chains. Small nibbles at the status quo eventually added up to larger, more alarming shifts. The Chinese government prematurely let the mask slip after the 2008–09 financial crisis, with more assertive diplomacy that gradually made the thesis of America’s engagement policy—that Beijing would mellow over time—impossible to defend. And by the Trump era, China had simply gotten tired of waiting and disguising its ambitions. COVID then did more than any Committee on the Present Danger could ever have done to reveal both the utterly cynical nature of the CCP regime—which sought to stymie the virus’s spread within China even as it allowed continued travel from Wuhan to the world—and the fact that this behavior could mortally imperil Americans’ well-being. China is no longer the “stealth superpower”—there is now a bipartisan consensus that America must thwart its global designs. From here onward, Beijing must forcefully wrest influence from a dangerous hegemon that is alert to a new authoritarian challenge. STRUCTURAL CONSTRAINTS don’t determine everything: History wouldn’t be very interesting if they did. The United States always had profound advantages over the Soviet Union, but it wouldn’t have won the Cold War had it not worked feverishly to shore up Western Europe in the late 1940s and maintain a military balance that made Soviet aggression seem suicidal. Strategic urgency and commitment were what ultimately allowed America to make the most of its strengths. That’s worth keeping in mind today. The fact that Chinese power and influence have grown so markedly in recent decades and that the resulting challenge has become so stark show the impact that determined, innovative strategy can have. The dilemmas that the United States confronts, in areas from 5G technology to the military balance in the Taiwan Strait, illustrate the costs of strategic lethargy. Indeed, America is fully capable of squandering its advantages if it degrades or destroys its own democracy, declines to make domestic reforms and investments to maintain its competitive edge, fails to rally the overlapping coalitions needed to resist Chinese ambitions, or delays in driving the military innovation required to shore up a sagging balance in the Western Pacific. The list of hard policy problems America must urgently solve to prevail against China is itself long and formidable. And even if Washington does prevail in that rivalry, America may absorb significant setbacks—and the international order may absorb significant damage—in the process. Yet as rough as the road ahead looks from Washington, it ought to look even rougher from Beijing. The Chinese Communist Party runs a profoundly illiberal regime that is trying to overcome centuries of liberal dominance. China is straining against a strategic geography and international system that surely seem more constraining than inviting. Chinese strategists must find a way of breaking America’s position in the Western Pacific while avoiding the potential cataclysm of major war. And Beijing is taking on a superpower that has thrashed all previous comers. Smart strategies have permitted Beijing to do remarkably well, so far, in managing these problems. But many of those strategies face an uncertain future, in part because the international complacency that allowed them to flourish has been replaced—gradually, but increasingly—with international concern. This isn’t to say that China’s ambitions are hopeless illusions. In the coming years, there will be an intense interaction between an America that is adapting its strategies to deal with a pressing threat and a China that will have to adjust its own approaches in light of that response. Even American success in this interaction could bring new dangers: If Chinese leaders perceive that their window to achieve grand geopolitical goals is closing, then the regime could become even more aggressive in seeking to revise the global order while it still can. Much thus hinges on the quality of decisions made in Washington and other capitals around the world. But the fact that so many characteristics of modern great-power politics seem to favor the United States probably gives the reigning superpower better options and more room for error than its autocratic challenger. Nothing is predetermined: Beijing may still succeed in displacing the United States as the primary power in Asia and, eventually, the world. Yet if it does, that outcome will represent a catastrophic failure of American statecraft—or an awesome triumph of Chinese strategy in overcoming the great obstacles that litter Beijing’s path to hegemony.

#### Hegemony is irrelevant and *zero* risk of retrenchment.

Fettweis 20 [Christopher Fettweis, Adjunct scholar in the Cato Institute’s Defense and Foreign Policy Studies Department and a professor at Tulane University’s Department of Political Science; taught at George Washington University, Ohio State University, and the US Naval War College, among other institutions, “Delusions of Danger: Geopolitical Fear and Indispensability in U.S. Foreign Policy,” 06/03/20, *Cato Institute*, https://www.cato.org/publications/publications/delusions-danger-geopolitical-fear-indispensability-us-foreign-policy, kyujin]

The Indispensable Nation

Although geopolitical fear prevents current international empirical realities from receiving a fair evaluation by U.S. society, another belief prescribes a specific approach to foreign policy, one that mandates a far higher level of international activism than would otherwise be warranted. Both are based on thin intellectual foundations, and together they encourage a variety of ill‐​advised policies on the part of the United States. According to what might be considered the indispensability fallacy, many Americans believe that U.S. actions are primarily responsible for any stability that currently exists. “All that stands between civility and genocide, order and mayhem,” explain Lawrence Kaplan and William Kristol, “is American power.“37 That belief is an offshoot, witting or not, of what is known as “hegemonic stability theory,” which proposes that international peace is possible only when one country is strong enough to make and enforce a set of rules.38 Were U.S. leaders to abdicate their responsibilities, that reasoning goes, unchecked conflicts would at the very least bring humanitarian disaster and would quite quickly threaten core U.S. interests.39

Brzezinski is typical in his belief that “outright chaos” and a string of specific horrors could be expected to follow a loss of hegemony, from renewed attempts to build regional empires (by China, Turkey, Russia, and Brazil) to the collapse of the U.S. relationship with Mexico as emboldened nationalists south of the border reassert 150‐​year‐​old territorial claims. Overall, without U.S. dominance, today’s relatively peaceful world would turn “violent and bloodthirsty.“40 The liberal world order that is so beneficial to all would come tumbling down.

Like many believers, proponents of hegemonic stability theory base their view on faith alone.41 There is precious little evidence to suggest that the United States is responsible for the pacific trends that have swept across the system. In fact, the world remained equally peaceful, relatively speaking, while the United States cut its forces throughout the 1990s, as well as while it doubled its military spending in the first decade of the new century.42 Complex statistical methods should not be needed to demonstrate that levels of U.S. military spending have been essentially unrelated to global stability.

Hegemonic stability theory’s flaws go way beyond the absence of simple correlations to support them, however. The theory’s supporters have never been able to explain adequately how precisely 5 percent of the world’s population could force peace on the other 95 percent, unless, of course, the rest of the world was simply not intent on fighting. Most states are quite free to go to war without U.S. involvement but choose not to. The United States can be counted on, especially after Iraq, to steer well clear of most civil wars and ethnic conflicts. It took years, hundreds of thousands of casualties, and the use of chemical weapons to spur even limited interest in the events in Syria, for example; surely internal violence in, say, most of Africa would be unlikely to attract serious attention of the world’s policeman, much less intervention. The continent is, nevertheless, more peaceful today than at any other time in its history, something for which U.S. hegemony cannot take credit.43 Stability exists today in many such places to which U.S. hegemony simply does not extend.

Overall, proponents of the stabilizing power of U.S. hegemony should keep in mind one of the most basic observations from cognitive psychology: rarely are our actions as important to others’ calculations as we perceive them to be.44 The so‐​called egocentric bias, which is essentially ubiquitous in human interaction, suggests that although it may be natural for U.S. policymakers to interpret their role as crucial in the maintenance of world peace, they are almost certainly overestimating their own importance. Washington is probably not as central to the myriad decisions in foreign capitals that help maintain international stability as it thinks it is.

The indispensability fallacy owes its existence to a couple of factors. First, although all people like to bask in the reflected glory of their country’s (or culture’s) unique, nonpareil stature, Americans have long been exceptional in their exceptionalism.45 The short history of the United States, which can easily be read as an almost uninterrupted and certainly unlikely story of success, has led to a (perhaps natural) belief that it is morally, culturally, and politically superior to other, lesser countries. It is no coincidence that the exceptional state would be called on by fate to maintain peace and justice in the world.

Americans have always combined that feeling of divine providence with a sense of mission to spread their ideals around the world and battle evil wherever it lurks. It is that sense of destiny, of being the object of history’s call, that most obviously separates the United States from other countries. Only an American president would claim that by entering World War I, “America had the infinite privilege of fulfilling her destiny and saving the world.“46

Although many states are motivated by humanitarian causes, no other seems to consider promoting its values to be a national duty in quite the same way that Americans do. “I believe that God wants everybody to be free,” said George W. Bush in 2004. “That’s what I believe. And that’s one part of my foreign policy.“47 When Madeleine Albright called the United States the “indispensable nation,” she was reflecting a traditional, deeply held belief of the American people.48 Exceptional nations, like exceptional people, have an obligation to assist the merely average.

Many of the factors that contribute to geopolitical fear — Manichaeism, religiosity, various vested interests, and neoconservatism — also help explain American exceptionalism and the indispensability fallacy. And unipolarity makes hegemonic delusions possible. With the great power of the United States comes a sense of great responsibility: to serve and protect humanity, to drive history in positive directions. More than any other single factor, the people of the United States tend to believe that they are indispensable because they are powerful, and power tends to blind states to their limitations. “Wealth shapes our international behavior and our image,” observed Derek Leebaert. “It brings with it the freedom to make wide‐​ranging choices well beyond common sense.“49 It is quite likely that the world does not need the United States to enforce peace. In fact, if virtually any of the overlapping and mutually reinforcing explanations for the current stability are correct, the trends in international security may well prove difficult to reverse. None of the contributing factors that are commonly suggested (economic development, complex interdependence, nuclear weapons, international institutions, democracy, shifting global norms on war) seem poised to disappear any time soon.50 The world will probably continue its peaceful ways for the near future, at the very least, no matter what the United States chooses to do or not do. As Robert Jervis concluded while pondering the likely effects of U.S. restraint on decisions made in foreign capitals, “It is very unlikely that pulling off the American security blanket would lead to thoughts of war.“51 The United States will remain fundamentally safe no matter what it does — in other words, despite widespread beliefs in its inherent indispensability to the contrary.

#### Nuclear alliances assumes a post-hegemonic order, if they’re right that China is a rising power now than post-transition there would still be a hegemon.

#### No terminal impact to LIO read – don’t make us reinvent the wheel.

### Advantage 2

#### US clustering thumps – Elon’s Starlink satellites are terrible and overwhelm safe Chinese operations.

#### No debris cascades, but even a worst case is confined to low LEO with no impact

Fange 17 [Daniel Von Fange, Web Application Engineer, Founder and Owner of LeanCoder, Full Stack, Polyglot Web Developer, “Kessler Syndrome is Over Hyped”, 05/21/17, *Braino*, http://braino.org/essays/kessler\_syndrome\_is\_over\_hyped/]

Kessler Syndrome is overhyped. A chorus of online commenters great any news of upcoming low earth orbit satellites with worry that humanity will to lose access to space. I now think they are wrong.

What is Kessler Syndrome?

Here’s the popular view on Kessler Syndrome. Every once in a while, a piece of junk in space hits a satellite. This single impact destroys the satellite, and breaks off several thousand additional pieces. These new pieces now fly around space looking for other satellites to hit, and so exponentially multiply themselves over time, like a nuclear reaction, until a sphere of man-made debris surrounds the earth, and humanity no longer has access to space nor the benefits of satellites.

It is a dark picture.

Is Kessler Syndrome likely to happen?

I had to stop everything and spend an afternoon doing back-of-the-napkin math to know how big the threat is. To estimate, we need to know where the stuff in space is, how much mass is there, and how long it would take to deorbit.

The orbital area around earth can be broken down into four regions.

Low LEO - Up to about 400km. Things that orbit here burn up in the earth’s atmosphere quickly - between a few months to two years. The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, Low LEO doesn’t matter for Kessler Syndrome. If Low LEO was ever full of space junk, we’d just wait a year and a half, and the problem would be over.

High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue.

Mid Orbit - GPS satellites and other navigation satellites travel here in lonely, long lives. The volume of space is so huge, and the number of satellites so few, that we don’t need to worry about Kessler here.

GEO - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. Usually the geostationary orbit is used by big weather satellites and big TV broadcasting satellites. (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, all the satellites here are moving the same direction at the same speed - debris doesn’t get free velocity from the speed of the satellites. Also, it’s quite expensive to get a satellite here, and so there aren’t many, only about one satellite per 1000km of the ring. Kessler is not a problem here.

How bad could Kessler Syndrome in High LEO be?

Let’s imagine a worst case scenario.

An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space?

I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000.

So even in the worst case, we don’t lose access to space.

Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits.

In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment.

* Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely.
* Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner.
* Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided.
* The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler.
* Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting)

So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect.

I’m removing Kessler Syndrome from my list of things to worry about.

#### No one’s going to war over a downed satellite

Bowen 18 [Bleddyn Bowen, Lecturer in International Relations at the University of Leicester. The Art of Space Deterrence. February 20, 2018. https://www.europeanleadershipnetwork.org/commentary/the-art-of-space-deterrence/]

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

#### Monitoring is bunk – just because we know warming is happening doesn’t change the lethargic political action surrounding it or terminal impacts themselves.