## OFF

### NC – T

#### Interpretation: the affirmative must only defend that an appropriation of outer space by private entities is unjust.

#### "To be" is a linking verb of description, not an action verb

**GU no date** [Gallaudet University. "ACTION VERBS AND LINKING VERBS," https://www.gallaudet.edu/tutorial-and-instructional-programs/english-center/grammar-and-vocabulary/verbs/action-verbs-and-linking-verbs/] HWIC

A linking verb is a verb that links (connects) the subject of the sentence to **information about that subject**. Linking verbs **do not describe action**. When using linking verbs, the sentence structure will be : SUBJECT--->LINKING VERB---> INFORMATION ABOUT THE SUBJECT (noun)(verb)(adjective, noun, or complement)

Some verbs are ALWAYS linking verbs because they never describe an action. Other verbs can be linking verbs in some sentences and action verbs in other sentences.

The following three verbs are ALWAYS linking verbs:

to be (is, am, are, was, were, has been, have been, had been, is being, are being, was being, will have been, etc.) to become (become, becomes, became, has become, have become, had become, will become, will have become, etc.) to seem (seemed, seeming, seems, has seemed, have seemed, had seemed, is seeming, are seeming, was seeming, were seeming, will seem) Here are some examples of linking verbs that are ALWAYS linking verbs in sentences: “The ball is red.” 'Is' is a linking verb that connects the subject, ball, to information about that subject (that it is red). “The children are smart.” 'Are' is a linking verb that connects the subject, children, to information about that subject (that they are smart). “The child will be tall five years from now.” 'Will be' is the linking verb connecting 'child' to the fact that he will be 'tall five years from now.'“The cat seems fine.”'Seems' links the subject, cat, with information about the cat (that it is fine). “The dog became thin after his surgery.” 'Became' links the subject, the dog, with information about him (that he became thin).

#### Violation – the aff fiats a legal action

#### 1] Precision – if we win definitions the aff is not topical. The resolution is the only predictable stasis point for dividing ground—any deviation justifies the aff arbitrarily jettisoning words in the resolution at their whim which decks negative ground and preparation because the aff is no longer bounded by the resolution.

#### 2] Limits and ground – endless number of potential mechanisms of action means affs can make private appropriation better, but only defending the resolution as a value statement gives the neg generic privatization good ground.

#### Topicality is a voting issue that should be evaluated through competing interpretations – it tells the negative what they do and do not have to prepare for—there’s no way for the negative to know what constitutes a “reasonable interpretation” when we do prep – reasonability is arbitrary and causes a race to the bottom, proliferating abuse

#### No RVIs—it’s your burden to be topical.

## OFF

### NC – CP

#### CP Text: Space faring states ought to create significant subsidies for private entities to create terrestrially accessible blockchain verification computing centers and cryptocurrency mining centers on the Moon and Deep Space. Space faring states should prohibit all other appropriations of outer space by private entities.

#### Climate-motivated terrestrial mining regulations kill crypto now – those don’t get applied to space because of unique environments – that saves crypto with sufficient private investment

Greene 21 Greene, Tristan. Tristan covers human-centric artificial intelligence advances, quantum computing, STEM, Spiderman, physics, and space stuff. As far as I can tell his highest level of education was that he was in the Navy for a while. "What happens to Bitcoin when billionaires build cryptocurrency miners on the Moon?" TNW | Hardfork, 8 June 2021, thenextweb.com/news/bitcoin-billionaires-build-cryptocurrency-miners-on-moon-bitcoin.

Space exploration and exploitation have traditionally been nationalist endeavors. But the rise of the 12-digit billionaire has suddenly made outer space look like open territory. The players Jeff Bezos is stepping down from his position as the CEO of Amazon after 25 years ahead of his imminent launch into space aboard one of his own Blue Origin spaceships. This will be the future of fintech 6 trends that will dominate fintech in 2022 While it’s easy to imagine the long-time leader retiring to live out a childhood fantasy, there’s nothing in Bezos’ history as an incredibly ambitious person and businessman to indicate his he’ll just blast off into the sunset to live a life of quiet leisure. Simply put, Bezos’ interest in the space sector likely won’t end with offering consumer thrill rides. While it’s impossible to know where the soon-to-be-former CEO might take his ambition, it’s likely Amazon and/or Blue Origin is already looking for ways to exploit the space sector for profit. But, obviously, Bezos isn’t the only private citizen with a spaceship company. Elon Musk’s SpaceX has spent the last decade becoming the belle of NASA’s ball and he’s already all-in on the idea of sending humans to Mars. And we can’t forget Richard Branson. He may only be worth a paltry $5 billion (lol), but his Virgin Galactic company’s been banking on making some money in space tourism for a long time. Let’s also not forget that Virgin’s dabbled in everything from railroad technology to record labels. And the list goes on. Anyone with a few billion dollars has business options and opportunities that extend beyond our planet’s surface. Space for profit In the past, we’ve discussed the idea of mining space asteroids for profit. Some experts believe there are unimaginable fortunes floating around in space in the form of resource-rich asteroids. In fact, you can even get a degree in asteroid mining. And even Goldman Sachs has considered getting in on the action. But, at the end of the day, we still have to figure out where these resources are, build machines capable of extracting them, and get them safely to somewhere they can be useful. Right now, there’s not much value in investing in asteroid mining futures because the technology either doesn’t exist or isn’t ready yet. However, there’s more than one kind of mining you can do in space. Enter cryptocurrency and the future Elon Musk recently got involved in a friendly space race, but this time it has nothing to do with competition over rockets or government contracts. He’s racing against BitMEX, a cryptocurrency exchange and derivative platform, to see who can get a cryptocurrency on the Moon first. If you’re curious about how that works, here’s a snippet from BitMEX’s official announcement: BitMEX will mint a one-of-a-kind physical bitcoin, similar to the Casascius coins of 2013, which will be delivered to the Moon by Astrobotic. The coin will hold one bitcoin at an address to be publicly released, underneath a tamper-evident hologram covering. The coin will proudly display the BitMEX name, the mission name, the date it was minted and the bitcoin price at the time of minting. According to BitMEX, this isn’t just a ceremonial or token delivery. The coin itself is a hardware wallet containing an actual Bitcoin, so its value will change with the value of the BTC here on Earth. In other words, BitMEX is sending a literal treasure to the Moon for anyone brave (or rich) enough to retrieve it. Per the company’s blog post: A moon surface background with text superimposed, quote below Credit: BitMEX Come and Get It. When the physical coin lands, it will remain on the Moon until anyone deems it worthy of retrieval. Decades from now, what will it be worth? It’s a great question. Some experts have predicted a single bitcoin will one day be worth $100K, $1M, or even more. But an even better question is this: What’s the end game for cryptocurrency in space? Billionaires want to be trillionaires Back in 1999 Wired ran a feature about the imminent rise of the world’s first trillionaire. At the time, everyone assumed the richest man in the world, Microsoft CEO Bill Gates, would be the first trillionaire by a long shot. Here’s a quote from that article: The value of Bill’s Microsoft stake has grown from $233.9 million at the time of Microsoft’s 1986 IPO to $72.2 billion as of June 15, 1999 (disregarding stock sales). At this rate – 58.2 percent a year – he will become a trillionaire in March 2005, at age 49, and his Microsoft holdings will be valued at $1 quadrillion in March 2020, when he is 64. Of course, we still haven’t seen a trillionaire in modern history. As of the time of this writing, the richest person in the world is France’s Bernard Arnault, whose $193.6 billion empire edges out Jeff Bezos’ $189 billion. At some point, if Bezos wants to pull away with it or Elon Musk wants to close the widening gap between his $151.4 billion and a first place finish, the world’s richest people are going to have to do more than squeeze terrestrial markets for every last drop of profit. That’s why many experts view Elon Musk’s heavy involvement in cryptocurrency as the potential difference maker. On any given day the Tesla, SpaceX, and Neuralink founder’s total worth can skyrocket or plummet by tens of billions of dollars based on how his cryptocurrency holdings are performing. When you consider that market movements can be directly tied to Musk’s social media statements, the power proposition for billionaires holding cryptocurrency is unbridled. Simply put: Elon Musk has more control over the so-called “volatile” world of cryptocurrency than most. Putting a cryptocurrency in space, much like firing a Tesla off into the galaxy, is a PR move meant to generate interest in the burgeoning cryptomarket. But that’s not the only purpose they serve. These acts remind us that people like Musk and Bezos can do anything they want. If they want to put a coin on the Moon, they have the means to do it. And, for example, if Musk or Bezos suddenly wanted to solve the biggest problems with cryptocurrency mining – power consumption, carbon footprint, developing powerful-enough hardware – they’re in a unique position to do so. In space, no one can hear you mine Arguably, one of the biggest things stopping an apex whale like Elon Musk from spending a fair portion of his billions on cryptomining centers is the fact that such an operation would almost certainly draw universal condemnation for its potential effect on the global climate crisis. But the Moon’s atmosphere isn’t necessarily as fragile as the Earth’s. Hypothetically speaking, there’s nothing to stop a billionaire from building a facility on the Moon to mine cryptocurrency. They would, of course, need to be able to build their own batteries, have experience with artificial intelligence and supercomputers, and already have their own satellite network set up in space – all boxes Elon Musk can tick today. And, in the near-future, as we perfect deep space transmission technology, what’s to stop a billionaire from putting a supercomputer on a satellite and sending it somewhere in deep space to mine cryptocurrency 24/7 at near absolute-zero temperatures? All of this is conjecture, but the writing is on the wall. Cryptocurrency enthusiasts fear what the experts are consistently warning: regulation is coming. Eventually, it’s possible cryptocurrency mining could become regulated with harsh policies designed to keep mining operations from further damaging the environment. This could seriously hinder the market. If humanity walks away from terrestrial mining to save the planet, we’ll be leaving unfathomable amounts of money on table. Billionaires don’t become billionaires by doing that. The only logical path forward, barring some unknown new green mining technology, may be moving the cryptocurrency industry to space.

#### Cryptocurrency reach a wide rollout---that builds resilience to survive inevitable existential filters.

Alex McShane 21, Writer and Head of Video for Bitcoin Magazine, BA from the University of Iowa, Degree from the University College Dublin, Degree from Kirkwood Community College, “Bitcoin and Existential Risk”, Bitcoin Magazine, 9/5/2021, https://bitcoinmagazine.com/culture/bitcoin-and-existential-risk-alex-mcshane

TL;DR - An existential risk is the possibility of an event or series of events that could drastically curtail humanity’s potential. A hypothetical global catastrophe could be anthropogenic or non-anthropogenic and internal or external in nature. The adoption of Bitcoin will better position us to address these risks as a society.

EXTERNAL NON-ANTHROPOGENIC

A catastrophic collision with an astronomical object, such as an asteroid impact would be an external non-anthropogenic risk. This has already occurred here several times. During the Permian Triassic period (ending 250 million years ago) an astronomical impact killed 90 percent of the species on Earth. It took tens of millions of years for life on Earth to repopulate and Earth’s intelligence potential to recover.

One interesting external non-anthropogenic risk is Earth’s reflected light, which could be measured by an external intelligence who then come to extinguish us. (The topic of our own signal bringing about this death by misadventure is discussed further below.)

What does this have to do with Bitcoin?

Generally, hard money facilitates greater innovation and technological process. At this point one might argue that if we do not migrate to some degree from Earth as a species, and are subsequently wiped out by an astronomical object impact or a super-volcanic event, the risk becomes anthropogenic in nature. We are a centralized species on a grand scale, and at this point one could say we have through consensus chosen to remain vulnerable to a single vector of attack by staying here.

Bitcoin is not only the hardest money known to man, it is the most responsible from this standpoint. Bitcoin as it currently operates is currency that can provide a monetary framework on which humans can achieve greater capital growth, collaboration, resource allocation, and therefore technological progress. Because the terminal supply of Bitcoin is capped, we can store value in it indefinitely as a society.

66 Million years ago the Cretaceous-Paleogene Extinction Event extinguished the life and intelligence potential of the non-avian dinosaurs. This series of events was external, and broadly non-anthropogenic in the sense that no form of life on Earth at the time contributed to its own demise, but more specifically, at the time of those astronomical impacts the first humans hadn’t split from chimpanzee lineages. This split is thought to have occurred between between 4 and 8 million years ago.

An important distinction between astronomical impacts or super-volcanic events of the past and such events if they were to happen today is that one could argue that our intelligence potential is now mature enough to tackle certain of the external existential risks. Today, the risk posed by an asteroid impact or something similar would still be external in its origin, but at what point does the burden of responsibility to migrate off of the planet fall upon our population? We can surely solve for some external existential risks, and in any case, no one is going to do it for us. You could say that failing to collectively pursue a solution when technically we could have would recategorize a civilization-extinguishing asteroid impact as an external but anthropogenic risk.

At what point do innovation dampening authoritarian states and their mandated broken money cause society to stall at a local optimum? Surely the government has already caused this. It’s only a matter of time before another object strikes the Earth with devastating consequence. I would argue it is irresponsible to continue life here with government money. Government money is an existential risk. Bitcoin is not only a solution, it is a societal responsibility.

INTERNAL ANTHROPOGENIC

Nuclear war is one example of an internal anthropogenic risk. That is, should nuclear war arise, it would be both self destructive, and relatively self contained on a cosmic scale. It follows that biological warfare is an internal anthropogenic risk, the reality of which we as a species can surely understand now. If I were to hazard a guess I would say virtual emergencies and cyber pandemics are next. These self constructed catastrophes are the government’s misguided attempts at proof of work. This is a topic for another time. Do not surrender your ability to think and speak freely.

The second law of thermodynamics can summed thus, processes that involve the transfer or conversion of heat energy are irreversible. The law indicates we have not observed a spontaneous transfer of energy from cold to hot. Another way to think of this is that there is no such thing as cold, only lesser degrees of hot. Nothing cannot transfer. So broadly, within a closed system, the second law of thermodynamics would indicate that all differences tend to level out.

So what has this got to do with Bitcoin?

Well firstly, all hardware is subject to entropy. The distributed nature of the blockchain increases the probability that it will survive centralized entropy. At Bitcoin’s inception, imagine a failure because Satoshi’s computer randomly crashed. Distributed networks are inherently hedged against this particular centralized form of existential risk.

The second law of thermodynamics also suggests that on a grander scale, relatively isolated (centralized) systems will degenerate more and more into disordered states. Proof of work, and network growth are two ways Bitcoin fights against falling into disrepair.

Bitcoin uses proof of work to stave off entropy. The system cannot stay dormant. It must continue to use proof of work to advance the state of the chain, and to fight entropy to secure the monetary value all of the users have stored in the network. The U.S. dollar, as many have pointed out, relies on proof of war, or distributed political energies to maintain dominance. Its methodology can be described as haphazard at best.

INTERNAL NON-ANTHROPOGENIC

One internal non-anthropogenic risk is that of a super-volcanic eruption, provided it wasn’t humans who brought about the eruption. Just like with external non-anthropogenic risks, Bitcoin alone cannot prevent them, but it can help humans prepare for them such that we may survive these relatively small intelligence filters the universe throws our way.

Bitcoin allows for fundamental capital accumulation and human innovation, and promotes collaboration to such a degree that we will find an increased collective problem solving power as humans the further Bitcoin adoption spreads. It is worth mentioning that Bitcoin also maintains and appreciates wealth to such a degree that often those of us to chose to live our lives on a Bitcoin standard will experience relatively greater freedoms, and vastly greater amounts of free time than our peers who chose to continue their lives on a fiat standard, and are perpetually working to outpace their chronic debt. Many Bitcoiners will likely forego that newfound free time to work and continue to provide value to others in whatever area interests them, because Bitcoin incentivizes the collaborative accumulation of capital but also the responsible reallocation of it.

EXTERNAL ANTHROPOGENIC

An external anthropogenic risk has the least probability of occurring. This is a problem of reach. Imagine human intelligence being sent into the cosmos and signaling or generally causing an external intelligence or astronomical object to come back to extinguish us. This is a most improbable extinction by misadventure.

The probability that we send messages of consequence into the cosmos that in turn cause some other far-flung intelligence, with knowledge enough to reach us, to come and bring about our own destruction is next to zero, but it isn’t zero.

I would posit that the probability increases every day that Bitcoin survives, with each person that chooses to hold Bitcoin over fiat, because on a fiat standard we are again, stuck at a local optimum at best, and each day the global monetary system devolves further into chaos. The fiat world may continue to be habitable chaos, but our technological progress and our greatest capacity for innovation cannot be achieved on a fiat standard.

A Bitcoin standard is not only our current best bet, it is the only monetary vehicle that will take us from here, or enable us to build technology that can effectively communicate with places in the universe where other intelligence has emerged. The other reason this fatal miscommunication is unlikely to occur is that once through a Bitcoin standard we have manage to build a society that can effectively reach and communicate at greater depths of the cosmos we will at that time have already become a multi-planetary, if not transitory, if not multi-solar system species. The topic of Bitcoin in space and planetary interoperability will be discussed in a later essay.

The most distant human made object from the earth is the Voyager 1, which is over 13 billion miles away. (For perspective, Apha Centuri, the nearest star system to Earth, is 25 trillion miles away.) Human radio signals have announced our presence and our intelligence to the cosmos since around 1900. The first human radio signals have all ready traveled 114 light years, that is 681,920,540,000,000 miles. Although the reach of our radio signals is very great, the probability of us being heard and subsequently extinguished is negligible. External anthropogenic risks are the least of our concerns at the moment.

As Bitcoin adoption grows, it serves to promote advances in artificial intelligence and nanotechnology. External anthropogenic risks will become more relevant to human intelligence at a much later time. External non-anthropogenic risks are similarly out of our hands for the time being. That is, at the moment there is nothing we can do to prevent the Sun from becoming a red giant star and subsuming the Earth.

But we do already have the monetary technology upon which to engineer solutions to some of these problems. We have the potential as humans to prevent internal global catastrophes, both those set on by us and not. Survival and longevity is arguably our greatest task as a species. Adopting Bitcoin, and protecting this network is proceeding with diligence and a long eye toward the future in all of our political and scientific affairs. The existential risks of living are great, though it is human nature for our ambitions to out pace our current abilities. The only evidence of life is change. To change is to exit fiat currency, it is to use Bitcoin instead.

## OFF

### NC – CP/DA

#### CP Text: Space faring states, except the United States, should prohibit the appropriation of outer space by private entities.

#### CP solves the case – no space war if only one country militarizes.

#### Bipartisan anti-china momentum ensures COMPETES passes now and maintains tech leadership, but its narrow

Sayers & Kanapathy 2/15 [ Eric Sayers, a senior vice president at Beacon Global Strategies, and Ivan, a vice president at Beacon Global Strategies, both guest contributors for Foreign Policy magazine “America is Showering China with New Restrctions” https://foreignpolicy.com/2022/02/15/us-china-economic-financial-decoupling-controls-restrictions-sanctions/]

In recent years, Washington’s China policies have expanded rapidly into technology sectors such as telecommunications, semiconductors, data security, and financial services. Growing bipartisan concern about Beijing’s actions and intentions have fueled these developments, with little difference between the Trump and Biden administrations or between the White House and Congress.

The result has been a flurry of new restrictions—including on exports, imports, direct investment, and financial securities—that are fundamentally reshaping the U.S.-China economic relationship. Cross-border business travel between the United States and China, essentially halted for the past two years due to the COVID-19 pandemic, is unlikely to fully rebound because of increased caution and suspicion on both sides of the Pacific.

At the same time as this more defensive approach to economic and technology competition with China has taken root, Congress has also gone on the offensive by moving to appropriate new funding to areas deemed critical to maintaining U.S. competitive advantages in technology, manufacturing, and defense. The current depth and breadth of these approaches were hard to imagine just a few years ago. The corporate sector, besides facing increased government action with respect to doing business with China, must also contend with shifting public opinion and increased investor scrutiny—for example, on human rights issues along companies’ supply lines in China. Looking ahead, 2022 promises a continuation of these trends, which will have far-reaching impacts across multiple business sectors.

In just the last three years, Washington has enacted a raft of policy changes and regulation related to economic competition with China. In early 2018, the Trump administration applied and expanded tariffs on Chinese goods in response to Beijing’s unfair practices, including industrial subsidies, forced technology transfer, and state-sponsored intellectual property theft. Leveraging new laws passed in 2018, Washington expanded the use of export controls in defense technology, imposed stricter vetting of foreign investments in strategic U.S. industries, and restricted the procurement of equipment and services from five Chinese information technology companies, the most prominent of which was Huawei.

The pace and scope of Washington’s policymaking have accelerated in ways not previously considered possible.

In addition, U.S. border agencies shifted their sights from primarily countering terrorists to screening for nontraditional intelligence collectors—for example, journalists, researchers, and businesspeople, who are frequently used by Beijing to gather information—as well as counterfeit goods and goods produced with forced labor. Using presidential emergency powers, the Trump administration also created regimes to remove untrusted contractors from U.S. IT infrastructure projects and block Americans from investing in companies that work with the Chinese military.

To Beijing’s consternation, the Biden administration has signaled its general agreement with all these approaches—and even expanded the investment ban to include Chinese surveillance technology companies. While close U.S. allies in Europe and Asia have been reluctant to impose a similarly broad sweep of policies, the Biden administration has achieved significant rhetorical alignment on defining the challenges posed by Beijing. Under pressure from the Trump administration, several U.S. allies turned away from Huawei, blocked inbound Chinese technology investments, and held up the shipment of critical semiconductor manufacturing equipment to China. However, Europe has yet to follow the United States in imposing real costs on China for its ongoing human rights violations, even though this is a declared point of convergence between the United States and the European Union.

For its part, Congress has passed a slew of China-related bills. Among other actions, legislators have reformed inbound investment screening, forced the delisting of Chinese stocks that do not comply with U.S. accounting practices, expanded requirements for the U.S. Defense Department to list Chinese companies assisting the People’s Liberation Army, strengthened sanctions authorities in response to atrocities in Xinjiang and repression in Hong Kong, presumed that all goods produced in Xinjiang are made with forced labor (and thus banned as imports), and prohibited the federal purchase of Chinese telecommunications equipment.

While Washington mainly focused on defensive measures in recent years, Congress began in 2020 to balance its approach with a more offensive agenda. Efforts to invest in semiconductor manufacturing, accelerate the adoption of 5G telecommunications capabilities, and reorganize the National Science Foundation to focus on increasing U.S competitiveness were all added to the Senate’s U.S. Innovation and Competition Act. The House of Representatives, in turn, recently passed a similar bill—the America COMPETES Act of 2022—so the prospects for final passage of a bipartisan competitiveness bill sometime this spring look strong.

This flurry of activity raises the question of what comes next. Looming issues such as rising inflation, possible new variants of COVID-19, and Russian aggression toward Ukraine could take Washington’s attention away from China policy, at least temporarily. At the same time, there is a strong bipartisan consensus—between the White House and Congress—on China. In particular, there are five policy areas where further action appears imminent this year.

#### Space policy causes immense partisan backlash that wrecks the delicate balance

Dreier 16 [Casey Dreier, Chief Advocate & Senior Space Policy Adviser for The Planetary Society, April 13, 2016. “Does Presidential Intervention Undermine Consensus for NASA?” https://www.planetary.org/blogs/casey-dreier/2016/0413-does-a-strong-president-help-or-hurt-consensus-on-NASA.html]

To see how this happens, I recommend reading the book “[Beyond Ideology](http://smile.amazon.com/Beyond-Ideology-Politics-Principles-Partisanship/dp/0226470768/ref=smi_www_rco2_go_smi_g2243582042?_encoding=UTF8&*Version*=1&*entries*=0&ie=UTF8)” by Frances Lee. The author’s larger premise is that issues having no intrinsic relation to stated party ideology have become increasingly polarized in recent years. This is a function of the two party nature of our political system. If your party coalition wins, the other one loses. It’s [It is] zero-sum. Your party can win in one of two ways: you can make a better pitch to voters by demonstrating the superiority of your agenda; or you can undermine and stymie the agenda of the opposition party, making them unpopular with voters, and pick up the seats that they lose. Since you’re the only other political party, you gain in either scenario. I’m not sure if you’ve noticed, but the “undermine and stymie” approach has been popular for quite some time now in the U.S. Congress. Given this situation, the President and their policies naturally become the symbolic target of the opposition party. Anything promoted by the President effectively induces opposition by association. Lee demonstrates the magnitude of this induced polarization on various types of issues. For highly polarized issues like the role of government in the economy, or social issues, the impact is minimal—the opposition has already been clearly defined and generally falls into clearly defined ideologies of the Republican and Democratic parties. But for issues that do not fit readily into a predefined political ideology—like space—the induced polarization by the President can be significant. In fact, Lee showed that space, science, and technology issues incur the greatest increase in partisanship based on their inclusion in the Presidential agenda. One need only look to at the responses by political operatives of the opposing party to the strong human spaceflight proposals by [Barack Obama in 2010](http://www.shelby.senate.gov/public/index.cfm/mobile/newsreleases?ID=25F3AD2E-802A-23AD-4960-F512B9E205D2), [George W. Bush in 2004](http://www.nbcnews.com/id/3950099/ns/technology_and_science-space/t/bush-sets-new-course-moon-beyond/#.Vw3UMRMrKHo), and [George H.W. Bush in 1989](http://www.nytimes.com/1989/07/21/us/president-calls-for-mars-mission-and-a-moon-base.html) to see this reflected in recent history. This isn’t to say that Presidents can’t have a significant impact on the space program. Clearly they can. But the broad consensus needed for stability after their departure from office may be undermined by the very priority they gave it during their tenure. It what amounts to a mixed blessing for NASA, the U.S. space program does have an unusually strong bipartisan group of politicians who support the program due to NASA centers in a variety of states throughout the union. Berger notes this throughout his article, and it does, in a way, act as force that is resistant to change for good and bad. This mitigates somewhat the pure polarization seen on other science and technology issues. But for a Journey to Mars—a major effort that would, at best, require stability and significant funding over many Presidential administrations—that may not be enough. Perhaps the solution is for the next President to maintain a light touch on space. Maybe they should speak softly through the budget process, and avoid the Kennedyesque speeches and declarations to Congress that induce the types of partisanship we so dearly need to avoid.

#### The bill is uniquely key to solve Chinese and Russian tech supremacy

Seattle 2/16 [Seattle Times, leading newspaper serving the greater Seattle area. “Congress must unite behind China competitiveness bill” https://www.hawaiitribune-herald.com/2022/02/16/opinion/congress-must-unite-behind-china-competitiveness-bill/]

Under the shadow of growing tensions with Beijing, the U.S. House of Representatives has approved a bill that would help the United States remain economically competitive with China. It will now need to be reconciled with similar legislation that passed the Senate last year.

Congress must not allow partisan squabbles to scuttle this vital proposal.

Republicans, who supported the U.S. Senate’s United States Innovation and Competition Act, have so far turned their back on the House version, known as the America COMPETES Act, saying the bill includes unacceptable provisions related to labor, foreign policy and climate change.

While differences exist — and their merits are worth debating — both bills promise to fund the critical need to address supply-chain vulnerabilities and increase computer chip production in the U.S. They also include a major investment in ensuring America’s place as the leader in scientific research and innovation.

These similarities should be the focus, said U.S. Sen. Maria Cantwell, D-Wash., who heads the Senate Committee on Commerce, Science and Transportation. Both bills call for a $52 billion investment in the semiconductor industry, about $160 billion for research and development agencies such as the National Science Foundation and the Department of Energy, as well as funding to reduce STEM workforce gaps.

“This would be the largest five-year commitment to public R&D in our nation’s history,” Cantwell said. “We need it for the job growth. We need it to stay competitive.”

The legislation would also create some manufacturing jobs in the U.S., but the benefit to American workers may be strongest in improved protection from global market volatility, said Jeffrey Kucik, an associate professor at the University of Arizona.

“It’s about insulating the domestic market from unpredictable global forces,” he said. “Whether that’s the pandemic, or the Great Recession, or shocks associated with the escalation of the U.S.-China trade war.”

For their part, Chinese officials have repeatedly labeled these legislative efforts as the product of a “Cold War mentality.”

It was ironic, then, to see President Xi Jinping of China and Russian President Vladimir Putin warmly meet on the sidelines of the Winter Olympics in Beijing. Even more so was their joint statement, which sent a message of cooperation between the two countries not seen since Josef Stalin and Mao Zedong.

Their statement, which includes support for each other’s foreign policies, underlines the precarious situation surrounding existential threats to Ukraine and Taiwan. It also underlines the need for Congress to act.

#### Authoritarian tech lead is an S-Risk of irreversible, constant suffering. That outweighs extinction

Minardi 20 [Di Minardi, "The grim fate that could be ‘worse than extinction’", 10/15/20, https://www.bbc.com/future/article/20201014-totalitarian-world-in-chains-artificial-intelligence]

What would totalitarian governments of the past have looked like if they were never defeated? The Nazis operated with 20th Century technology and it still took a world war to stop them. How much more powerful – and permanent – could the Nazis have been if they had beat the US to the atomic bomb? Controlling the most advanced technology of the time could have solidified Nazi power and changed the course of history.

When we think of existential risks, events like nuclear war or asteroid impacts often come to mind. Yet there’s one future threat that is less well known – and while it doesn’t involve the extinction of our species, it could be just as bad.

It’s called the “world in chains” scenario, where, like the preceding thought experiment, a global totalitarian government uses a novel technology to lock a majority of the world into perpetual suffering. If it sounds grim, you’d be right. But is it likely? Researchers and philosophers are beginning to ponder how it might come about – and, more importantly, what we can do to avoid it.

Existential risks (x-risks) are disastrous because they lock humanity into a single fate, like the permanent collapse of civilisation or the extinction of our species. These catastrophes can have natural causes, like an asteroid impact or a supervolcano, or be human-made from sources like nuclear war or climate change. Allowing one to happen would be “an abject end to the human story" and would let down the hundreds of generations that came before us, says Haydn Belfield, academic project manager at the Centre for the Study of Existential Risk at the University of Cambridge.

Toby Ord, a senior research fellow at the Future of Humanity Institute (FHI) at Oxford University, believes that the odds of an existential catastrophe happening this century from natural causes are less than one in 2,000, because humans have survived for 2,000 centuries without one. However, when he adds the probability of human-made disasters, Ord believes the chances increase to a startling one in six. He refers to this century as “the precipice” because the risk of losing our future has never been so high.

Researchers at the Center on Long-Term Risk, a non-profit research institute in London, have expanded upon x-risks with the even-more-chilling prospect of suffering risks. These “s-risks” are defined as “suffering on an astronomical scale, vastly exceeding all suffering that has existed on Earth so far.” In these scenarios, life continues for billions of people, but the quality is so low and the outlook so bleak that dying out would be preferable. In short: a future with negative value is worse than one with no value at all.

This is where the “world in chains” scenario comes in. If a malevolent group or government suddenly gained world-dominating power through technology, and there was nothing to stand in its way, it could lead to an extended period of abject suffering and subjugation. A 2017 report on existential risks from the Global Priorities Project, in conjunction with FHI and the Ministry for Foreign Affairs of Finland, warned that “a long future under a particularly brutal global totalitarian state could arguably be worse than complete extinction”.

Singleton hypothesis

Though global totalitarianism is still a niche topic of study, researchers in the field of existential risk are increasingly turning their attention to its most likely cause: artificial intelligence.

In his “singleton hypothesis”, Nick Bostrom, director at Oxford’s FHI, has explained how a global government could form with AI or other powerful technologies – and why it might be impossible to overthrow. He writes that a world with “a single decision-making agency at the highest level” could occur if that agency “obtains a decisive lead through a technological breakthrough in artificial intelligence or molecular nanotechnology”. Once in charge, it would control advances in technology that prevent internal challenges, like surveillance or autonomous weapons, and, with this monopoly, remain perpetually stable.

If the singleton is totalitarian, life would be bleak. Even in the countries with the strictest regimes, news leaks in and out from other countries and people can escape. A global totalitarian rule would eliminate even these small seeds of hope. To be worse than extinction, “that would mean we feel absolutely no freedom, no privacy, no hope of escaping, no agency to control our lives at all", says Tucker Davey, a writer at the Future of Life Institute in Massachusetts, which focuses on existential risk research.

“In totalitarian regimes of the past, [there was] so much paranoia and psychological suffering because you just have no idea if you're going to get killed for saying the wrong thing,” he continues. “And now imagine that there's not even a question, every single thing you say is being reported and being analysed.”

“We may not yet have the technologies to do this,” Ord said in a recent interview, “but it looks like the kinds of technologies we’re developing make that easier and easier. And it seems plausible that this may become possible at some time in the next 100 years.”

AI and authoritarianism

Though life under a global totalitarian government is still an unlikely and far-future scenario, AI is already enabling authoritarianism in some countries and strengthening infrastructure that could be seized by an opportunistic despot in others.

“We've seen sort of a reckoning with the shift from very utopian visions of what technology might bring to much more sobering realities that are, in some respects, already quite dystopian,” says Elsa Kania, an adjunct senior fellow at the Center for New American Security, a bipartisan non-profit that develops national security and defence policies.

## \*\*OFF

### NC – DA

#### NASA is preserving resources by leveraging private partnerships

Miriam Kramer 21, author of Space, “NASA's plans for the future hinge on the success of private companies,” Axios, 12-7-2021, https://www.axios.com/nasa-private-spaceflight-plans-5a5710e6-5223-4da3-8c5d-5a712e1d862e.html

The private space players who will drive NASA's plans for the coming decade are declaring themselves and defining the stakes. Why it matters: NASA plans to focus on getting people to Mars and the Moon, and its deep space exploration ambitions hinge on the agency being able to successfully hand over major operations in low-Earth orbit to private companies. The space agency hopes companies will build private space stations that its astronauts can use and to continue to buy space on private rockets for launching its satellites and other payloads to orbit and beyond. NASA's "big experiment" right now is to test where these commercial partnerships work, the Planetary Society's Casey Dreier told Axios. What's happening: Last week, NASA announced it would award multimillion-dollar contracts to three teams of commercial space companies to start designing and building privately operated space stations.

#### Plan forces spending trade-offs that crush effective Earth sciences --- risks catastrophic climate change

Haymet 7 (Tony, Director of the Scripps Institution of Oceanography – University of California, San Diego, Mark Abbott, Dean of the College of Oceanic and Atmospheric Science – Oregon State University, and Jim Luyten, Acting Director – Woods Hole Oceanographic Institution, “The Planet NASA Needs to Explore”, Washington Post, 5-10, [http://www.washingtonpost.com/wp-dyn/content/article/2007/05/09/AR2007050902451.html](http://www.lexis.com/research/retrieve))

Decades ago, a shift in NASA priorities sidelined progress in human space exploration. As momentum gathers to reinvigorate human space missions to the moon and Mars, we risk hurting ourselves, and Earth, in the long run. Our planet -- not the moon or Mars -- is under significant threat from the consequences of rapid climate change. Yet the changing NASA priorities will threaten exploration here at home.

NASA not only launches shuttles and builds space stations, it also builds and operates our nation's satellites that observe and monitor the Earth. These satellites collect crucial global data on winds, ice and oceans. They help us forecast hurricanes, track the loss of Arctic sea ice and the rise of sea levels, and understand and prepare for climate changes.

NASA's budget for science missions has declined 30 percent in the past six years, and that trend is expected to continue. As more dollars are reallocated to prepare for missions back to the moon and Mars, sophisticated new satellites to observe the Earth will be delayed, harming Earth sciences.

The National Academy of Sciences has noted that the Landsat satellite system, which takes important measurements of global vegetation, is in its fourth decade of operation and could fail without a clear plan for continuation. The same is true for the QuikSCAT satellite, which provides critical wind data used in forecasting hurricanes and El Niño effects.

In January, a partnership of university and NASA scientists demonstrated that climate change and higher ocean temperatures were reducing the growth of microscopic plants and animals at the heart of the marine food web.

Their analysis was based on nearly a decade of NASA satellite measurements of ocean color, which unfortunately are at risk of being interrupted for several years.

Sea levels are rising, and the Arctic Ocean may be ice-free in summer. The buildup of carbon dioxide in the oceans threatens to make them more acidic, which may in turn hinder the ability of some types of marine life, including corals, to build their shells and skeletons. We must learn as much as we can to assess these threats and develop solutions.

Satellites provide coverage of vast, remote regions of our planet that would otherwise remain unseen, especially the oceans, which play an important role in climate change. Without accurate data on such fundamentals as sea surface height, temperatures and biomass, as well as glacier heights and snowpack thickness, we will not be able to understand the likelihood of dangers such as more severe hurricanes along the Gulf Coast or more frequent forest fires in the Pacific Northwest.

Climate change is the most critical problem the Earth has ever faced.

Government agencies and the private sector, as well as individual citizens, need to better grasp the risks and potential paths of global climate change. Mitigating these risks and preparing for the effects of warming will require scientific understanding of how our complex planet operates, how it is changing, and how that change will affect the environment and human society.

John F. Kennedy's brilliant call to put a man on the moon by the end of the 1960s set an arbitrary deadline, but the deadline we face today is set by nature. NASA must continue to play a vital role in helping find ways to protect our planet for (and perhaps from) its intelligent life. Exploration of space is a noble quest. But we can't afford to be so starry-eyed that we overlook our own planet.

#### Warming is inevitable but adjusting government policy can address the worst effects – specifically, for sea level rise. US responses are modeled globally.

**Economist 17**, "How government policy exacerbates hurricanes like Harvey," Economist, https://www.economist.com/news/leaders/21727898-if-global-warming-were-not-enough-threat-poor-planning-and-unwise-subsidies-make-floods

THE extent of the devastation will become clear only when the floodwater recedes, leaving ruined cars, filthy mud-choked houses and the bloated corpses of the drowned. But as we went to press, with the rain pounding South Texas for the sixth day, Hurricane Harvey had already set records as America’s most severe deluge (see Briefing). In Houston it drenched Harris County in over 4.5trn litres of water in just 100 hours—enough rainfall to cover an eight-year-old child. The fate of America’s fourth-largest city holds the world’s attention, but it is hardly alone. In India, Bangladesh and Nepal, at least 1,200 people have died and millions have been left homeless by this year’s monsoon floods. Last month torrential rains caused a mudslide in Sierra Leone that killed over 1,000—though the exact toll will never be known. Around the world, governments are grappling with the threat from floods. This will ultimately be about dealing with climate change. Just as important, is correcting short-sighted government policy and the perverse incentives that make flooding worse. Judgment day The overwhelming good news is that storms and flooding have caused far fewer deaths in recent decades, thanks to better warning systems and the construction of levees, ditches and shelters. The cyclone that struck Bangladesh in 1970 killed 300,000-500,000 people; the most recent severe one, in 2007, killed 4,234. The bad news is that storms and floods still account for almost three-quarters of weather-related disasters, and they are becoming more common. According to the Munich Re, a reinsurer, their number around the world has increased from about 200 in 1980 to over 600 last year. Harvey was the third “500-year” storm to strike Houston since 1979. At the same time, floods and storms are also becoming more costly. By one estimate, three times as many people were living in houses threatened by hurricanes in 2010 as in 1970, and the number is expected to grow as still more people move to coastal cities. The UN reckons that, in the 20 years to 2015, storms and floods caused $1.7trn of destruction; the World Health Organisation estimates that, in real terms, the global cost of hurricane damage is rising by 6% a year. Flood losses in Europe are predicted to increase fivefold by 2050. One cause is global warming. The frequency and severity of hurricanes vary naturally—America has seen unusually few in the past decade. Yet the underlying global trend is what you would expect from climate change. Warmer seas evaporate faster and warmer air can hold more water vapour, which releases energy when it condenses inside a weather system, feeding the violence of storms and the intensity of deluges. Rising sea levels, predicted to be especially marked in the Gulf of Mexico, exacerbate storm surges, adding to the flooding. Harvey was unusually devastating because it suddenly gained strength before it made landfall on Friday; it then stayed put, dumping its rain on Houston before returning to the Gulf. Again, that is consistent with models of a warmer world. Poor planning bears even more blame. Houston, which has almost no restrictions on land-use, is an extreme example of what can go wrong. Although a light touch has enabled developers to cater to the city’s rapid growth—1.8m extra inhabitants since 2000—it has also led to concrete being laid over vast areas of coastal prairie that used to absorb the rain. According to the Texas Tribune and ProPublica, a charity that finances investigative journalism, since 2010 Harris County has allowed more than 8,600 buildings to be put up inside 100-year floodplains, where floods have a 1% chance of occurring in any year. Developers are supposed to build ponds to hold run-off water that would have soaked into undeveloped land, but the rules are poorly enforced. Because the maps are not kept up to date, properties supposedly outside the 100-year floodplain are being flooded repeatedly. Government failure adds to the harm. Developing countries are underinsured against natural disasters. Swiss Re, a reinsurer, says that of the $50bn or so of losses to floods, cyclones and other disasters in Asia in 2014, only 8% were covered. The Bank of International Settlements calculates that the worst natural catastrophes typically permanently lower the afflicted country’s GDP by almost 2%. America has the opposite problem—the federal government subsidises the insurance premiums of vulnerable houses. The National Flood Insurance Programme (NFIP) has been forced to borrow because it fails to charge enough to cover its risk of losses. Underpricing encourages the building of new houses and discourages existing owners from renovating or moving out. According to the Federal Emergency Management Agency, houses that repeatedly flood account for 1% of NFIP’s properties but 25-30% of its claims. Five states, Texas among them, have more than 10,000 such households and, nationwide, their number has been going up by around 5,000 each year. Insurance is meant to provide a signal about risk; in this case, it stifles it. Mend the roof while the sun shines What to do? Flooding strengthens the case for minimising climate change, which threatens to make wet places wetter and storms stormier. Even those who doubt the science would do well to see action as an insurance policy that pays out if the case is proven. However, that will not happen fast, even if all countries, including America, sign up to international agreements. More immediately, therefore, politicians can learn from Houston. Cities need to protect flood defences and catchment areas, such as the wetlands around Kolkata and the lakes in and around Pokhara in Nepal, whose value is becoming clear. Flood maps need to be up to date. Civil engineers, often starved of funds and strangled by bureaucracy, should be building and reinforcing levees and reservoirs now, before it is too late. The NFIP should start to charge market premiums and developing countries should sell catastrophe bonds. All this is a test of government, of foresight and the ability to withstand the lobbying of homeowners and developers. But politicians and officials who fail the test need to realise that, sooner or later, they will wake up to a Hurricane Harvey of their own.

#### The impact’s global war

Eric **Holthaus 15**, editor at rollingstone magazine citing James Hansen, former NASA climatologist, "The Point of No Return: Climate Change Nightmares Are Here," Rolling Stone, accessed 10-23-2016, http://www.rollingstone.com/politics/news/the-point-of-no-return-climate-change-nightmares-are-already-here-20150805

On July 20th, James Hansen, the former NASA climatologist who brought climate change to the public's attention in the summer of 1988, issued a bombshell: He and a team of climate scientists had identified a newly important feedback mechanism off the coast of Antarctica that suggests mean sea levels could rise 10 times faster than previously predicted: 10 feet by 2065. The authors included this chilling warning: If emissions aren't cut, "We conclude that multi-meter sea-level rise would become practically unavoidable. Social disruption and economic consequences of such large sea-level rise could be devastating. It is not difficult to imagine that conflicts arising from forced migrations and economic collapse might make the planet ungovernable, threatening the fabric of civilization."

## Framing

### 2NR – PICs Good [:40]

PICs good-

1] Ground- aff should defend the entirety of the plan- anything beyond that is neg ground- absence of one part of the plan should be devastating to solvency or it proves the plan is bad

2] Neg flex- aff gets first and last word, literature bias, and 1nc is reactive- neg flex is key on a topic where there are dozens of plans since it ensures a generic that applies across countries. Best test of rational opportunity cost- by choosing to do the entire plan, they forfeited only doing parts- every strategic benefit should incur a strategic cost

3] Logical policymaker- if we win the counterplan is a preferable advocacy, warrants a negative ballot- best form of cost benefit analysis which enables sophisticated refinement of the lit which best mirrors actual policy debates- only non-arbitrary view of competition- their interp is an illogical constraint on neg options

Defense-

1] It’s predictable- the counterplan is a defense of appropriation, it’s their job to prove that’s bad

2] Net benefits check abuse since they can generate offense- small net benefits lose to perm do the counterplan- inability to generate a solvency deficit means write a better aff

3] Solvency advocates check- proves it’s in the lit

4] Reject the arg at worst- remedies all abuse

5] Every CP is a PIC- all use the federal gov, funding mechs, access similar advantage areas- the brightline for “too much” is arbitrary

## Advantage

### NC – AT: Militarizing Space

#### Private companies don’t “infringe” on space law, they just aren’t subject to national regulations. States still have to follow weaponization bans, which solve the advantage.

#### No Space Race

Lopez 12 [LAURA DELGADO LO´ PEZ, Institute for Global Environmental Strategies, Arlington, Virginia. Astropolitics. "Predicting an Arms Race in Space: Problematic Assumptions for Space Arms Control." https://www.tandfonline.com/doi/full/10.1080/14777622.2012.647391]

The previous discussion demonstrates that although a globalized space arms race could follow U.S. deployment of space weapons, it is also plausible and more likely that it may not happen at all. As Mueller states: ‘‘In the end, most of the inevitability arguments are weak.’’62 The assumptions discussed here break the argument into a series of debatable maxims that other scholars have also considered. Hays, for instance, counters the inevitability argument by pointing out that previous ASAT tests did not have this purported destabilizing effect, to which we can add that even after the Chinese ASAT test, neither Russia nor the United States, who would be both capable and more politically likely to launch space weapons, moved forward in that direction.63 Although some may draw attention to the recent wake-up calls in order to underline a sense of urgency, one should also recall that when it seemed truly inevitable before, it did not happen either. In his detailed account of military space developments from 1945 to 1984, Paul Stares described how superpowers’ assessment of the value of space weapons shifted, with a ‘‘hiatus in testing’’ reflecting the attractiveness of satellites as military targets.64 In this changed landscape, Stares also assumed the inevitability argument, claiming that ‘‘the chances of space remaining a ‘sanctuary’ [absence of weapons] into the 21st century appear today to be remote.’’65 Perhaps the conditions are more conducive now, but the important point to be reiterated is that the outcome is not inevitable, and that any such prediction must be undertaken with caution.

One of the most prominent theorists to propose an alternate picture and pair it with an aggressive pro-space weapons stance is Everett Dolman. In his Astropolitik theory, Dolman summarizes the steps that the United States must take to assume control of space, particularly through withdrawal from the current space regime.66 This move, he argues, would benefit not only the United States, but also the rest of the world, since having a democracy controlling space is a catalyst for peace.67 Elsewhere, he writes: ‘‘Only a liberal world hegemon would be able to practice the restraint necessary to maintain its preponderant balance of hegemonic power without resorting to an attempt at empire.’’68 Accordingly, he believes that this strategy would be ‘‘perceived correctly as an attempt at continuing U.S. hegemony,’’69 but that other countries, correctly assessing U.S. leadership in space, would not seek to deploy their own systems. Having the ability to prevent the stationing of foreign weapons systems in space, he writes, ‘‘makes the possibility of large-scale space war and a military space race less likely, not more.’’70 In fact, he says, ‘‘to suggest that the inevitable result is a space arms competition is the worst kind of mirror-imaging.’’71 Dolman argues that the weaponization of space by the United States would ‘‘decrease the likelihood of an arms race by shifting spending away from conventional weapons systems,’’ which would reduce U.S. capabilities in territorial occupation and would thus be perceived as less threatening to other countries.72

### NC – AT: Non-Appropriation

#### AC Tronchetti is about country non-appropriation – which is separate from the plan and a massive alt cause.

#### The aff doesn’t change the problems in AC Yuan because it endorses the same failed CIL policies.

### NC – AT: Space Ilaw

#### Space ilaw fails –

#### Ineffective laws.

Michael Williams 2021 [Filling the Void: Why Existing International Law is Not Suited to Mitigating Space Debris] [DS] [http://www.mjilonline.org/filling-the-void-why-existing-international-law-is-not-suited-to-mitigating-space-debris/]

Space and the sea have long been paralleled, each seen as a type of res communis. There has been a push to try to understand the former through a similar lens as the latter. Space, however, provides new and complex issues that do not lend themselves well to being approached through existing frameworks. One such issue forthcoming is addressing the fear of the Kessler syndrome[1]. The Kessler syndrome, also known as ablation cascade or collision cascading, is a theoretical scenario in which a high density of space debris pollution increases the density of space debris as objects collide. As objects collide, more objects are produced generating a positive feedback loop and the likelihood of collisions increases exponentially. The fear is that as the density of space debris in low earth orbits (LEO) is increased, our ability to access space is diminished. Rockets traversing in a LEO can be rendered inoperable, or even destroyed, by pieces of debris no larger than golf balls. This fear has risen drastically as states, such as China beginning in 2007, have begun testing anti-satellite missiles which turn one item of space debris into several thousands.[2] The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies applies international law to space, but current international law – absent a new treaty – is insufficient to address the Kessler syndrome.[3] As it currently stands, soft law, customary international law, and existing treaties do not sufficiently address the issue of space debris. The strongest argument for a soft law approach to space debris mitigation is the Space Debris Mitigation Guidelines, drafted by the Committee on the Peaceful Uses of Outer Space and endorsed by the United Nations General Assembly in 2007.[4] As part of these guidelines, member states are encouraged to utilize rockets that limit debris produced during normal operations and that any manmade object placed in LEO should only reside there so long as they remain operational and should be removed from orbit in a controlled fashion following termination of operation. As these requirements are all soft law, none of them are mandatory and member states are encouraged to comply on their own initiative. This approach fails to solve the issue for the same host of reasons that soft law has proven largely insufficient to address large scale tragedies of the common issues. Spacefaring member states have no incentive to comply, no penalty for noncompliance, and, perhaps more uniquely, the technology is still undeveloped that allows for full compliance. The recently signed Artemis Accords, however, holds that NASA and member states shall act in a manner that is consistent with the Space Debris Mitigation Guidelines, but it remains unclear to what extent member states will regulate the rapidly growing number of space fairing corporations.[5] Customary international law faces several hurdles when addressing this issue and ultimately stumbles, proving insufficient. When drafting the United Nations Convention on the Law of the Sea (UNCLOS), there were thousands of years of seafaring to look to for what the existing customary law was at that time.[6] This is not the case with spacefaring, and parallels that can be established – if any – do not provide a strong enough foundation to build on. The Debris Mitigation Guidelines could either be a codification of customary international law in 2007 or could have become customary international law through practice and opinio juris since endorsement. It is unlikely that it codified customary international law as there is such a short window of time and so few states participated in this process of space debris mitigation before 2007. Equally unlikely is that it has become customary international law since 2007. Customary international law requires the practice of states engaged in the action – a small number here – but there has been hardly any compliance with the guidelines beyond verbal promises and guarantees. There has been zero opinio juris on the subject, unsurprising given the lack of state practice. Even if we viewed the Debris Mitigation Guidelines as binding member states through customary international law, this would again fail to address the debris left in space by corporations. The Space Liability Convention, in conjunction with Article 31 of the Vienna Convention on the Law of Treaties, could be seen as addressing the issue of manmade space debris, but this stretches the bounds of treaty interpretation to its uttermost limits.[7] There has only been one claim under the Space Liability Convention so it can hardly be argued there is sufficient subsequent practice.[8] The definitions contained within the Space Liability Convention have, to some academics and scholars, been viewed as covering space debris. This interpretation is only possible due to the wide array of tracking of space debris and its origins.[9] Absent being able to understand where space debris originated it would be impossible to assign liability to the launching state or party. Even with tracking, fault-based liability hardly addresses space debris that is the result of a true accident. The Outer Space Treaty and the Registration Convention, the two other major treaties in the international space law regime create a patchwork framework that is nearly too vague to be usable.[10] To truly address this issue, and others, in this new frontier, a treaty of the magnitude of UNCLOS is needed. A treaty of this scale is necessary, compared to a mere framework convention, to protect the rights of all mankind, including nations who have not yet ventured into space. To truly address the issue, such a treaty would need to hold member states strictly liable for the acts committed by private entities within their borders. As with natural resources in the high seas, we cannot let the first nations to reach space pollute it beyond usability before other nations are able to partake as well. Space, and access to it, must be a resource for all mankind.

#### Bad voting procedures.

Hugo Peter 4/23/2021 [THE IMPORTANCE OF THE UN COPUOS IN THE SPACE DEBRIS MITIGATION: WHAT EVOLUTION FOR THE UN COPUOS?] [DS] [https://conference.sdo.esoc.esa.int/proceedings/sdc8/paper/194/SDC8-paper194.pdf]

REFLECTION ON THE VOTING PROCEDURE IN THE UN COPUOS 2.1 REFLECTION ON THE CONSENSUS The voting procedure of the UN COPUOS is the consensus and it seems quite complicated to change it. The history of the UN COPUOS explains the adoption of the vote by consensus against the unanimity vote on the one hand – which was championed by the USSR (the Union of Soviet Socialist Republics) and the majority vote on the other hand – which was supported by the USA. A compromise was finally reached through the adoption of the consensus voting procedure [21]. However, as Eilene Galloway mentions: “That meant that every member of the Committee had a veto right” [22]. As a result, it allows each State to sink any project they disagree with. Although similar to the unanimity procedure, the consensus procedure should not be confused with the former. While unanimity is the expression of the agreement of each voting member to a proposal - which means that if one does not agree, the proposition will not be validated. When the vote happens, if no States opposes it, then the proposal is passed. As a consequence, in the case of consensus, States do not express their full agreement. Some may not agree but not to the extent of opposition which would signify the failure to adopt the text [23]. From a formal perspective if these two procedures are quite similar, their legal consequences are widely different. Instruments adopted by unanimity will have a stronger impact and States will be morally more bound by such instruments whereas consensus instruments, while easier to adopt, will have a lighter impact on the behaviour of States. Consensus was chosen so as to avoid permanent blockage as the Committee was built during the Cold War and the opposition between the two blocs was so strong that each one would have blocked any initiative coming from the opposite camp. Considering the current context and composition of the UN COPUOS and the fact that the Committee does not rely on the opposition between two blocs any longer but instead operates on multilateral rivalry, it may be time to think about an evolution of the voting procedure. Unanimity appears to be a utopic voting procedure, considering the many oppositions between States. Consequently, it would not allow the UN COPUOS to be more effective or reliable. The main goal of such a change would be to allow member States to adopt stronger instruments that could better address the current challenges, primarily space debris. The UN COPUOS could move towards the adoption of a qualified majority procedure. While the simple majority would not be strong enough and would create the risk that only half the members respect the adoption of legal instruments, a qualified majority, at the 2/3 or 3/5 for example, could be a reasonable solution. It would both allow to enforce instruments with a stronger base that reveals the clear agreement of a large majority and at the same time enable those who disagree to clearly express their opposition without blocking the adoption of the instrument. 2.2 REFLECTION ON THE ‘ONE VOTE PER STATE’ PRINCIPLE Concerning the vote, another debatable point is discussed by Bin Cheng: ’the one vote per State’ principle, which is directly inspired by the UN Charter and its article 18 paragraph 1 [24]. In his analysis of domestic law, Professor Cheng states that this rule is not the most democratic one. From the State’s point of view, it appears democratic as each State is equal no matter what its size or capabilities are. From the population’s and citizens’ perspective however – which is the analysis of Bin Cheng, it is not the case any longer. Indeed, in this case, it means that while each State has the same importance, their citizens are not in any case taken into consideration. Even though this reflection is worth discussing, it seems complicated to individualize the vote according to the number of citizens or, for example, according to the capabilities of each State. In a global context, such as the UN’s, to favour population size instead of State equality seems inequal as it would mean that large countries will always have a preponderant vote and will weigh more on the world forum. The principle of ‘one vote per State’ establishes legal equality in law which is already disturbed by factual inequalities linked to the importance and weight of the economies, the diplomacy, and the technology that some States enjoy. Hence, it seems counterproductive to bring changes that could lead to more disequilibrium. In the case of the UN COPUOS and space matters, such an idea of considering the population or any other means could make the UN COPUOS disappear. The ‘one vote per State’ rule in the Committee guarantees equality between States, no matter whether they have space capabilities or not, and no matter how developed these capabilities are. 2.3 FINAL REFLECTION Finally, while the voting procedure should be reviewed and maybe updated to the current situation (end of the Cold War, more member States, development of space capabilities all over the world), the ‘one vote per State’ rule should remain unchanged to guarantee equality between States within the UN COPUOS and between spacefaring and non-spacefaring nations. Keeping hold of this rule will allow States and the UN COPUOS to carry on with negotiations without taking the risk of losing the interest of smaller States. It will also guarantee the same weight to every State on the global work carried out by the Committee and its SubCommittees. And lastly, it will allow States with capacities in development as well as the ones which do not have any yet, to focus on developing them. Conversely, the consensus rule could be the object of a serious reflection within the Committee and particularly within its Legal Sub-Committee so as to examine how it could evolve and what the consequences of such a medication could be. Moreover, the UN COPUOS creates a precedent which could lead other organs of the UN to adopt the consensus rule, even though article 18 of the United Nations Charter only mentions majority or qualified majority. The passage from consensus to qualified majority could help the UN COPUOS to grow and gather more States from all over the world, just like the UNGA and its 193 member States. Such a modification could allow the UN COPUOS to reconnect with its great past. While hard law was established as a predominant model for space law, the blockages within the Committee and its SubCommittees render them useless and unable to adopt new hard law instrument. The tendency nowadays in the UN COPUOS and space law in general turns towards soft law even though it is non-binding. The traditional opposition between hard and soft laws needs to change, generally speaking but more specifically in the case of the UN COPUOS if it wants to be relevant in the next decades.

### NC – Loon

#### Loon says that CIL solves aff impacts – this card proves the irrelevance of private infringement on CIL.

### NC – Space War

#### No space war – it’s hype and systems are redundant

Johnson-Freese and Hitchens 16 [Dr. Joan Johnson-Freese is a member of the Breaking Defense Board of Contributors, a Professor of National Security Affairs at the Naval War College and author of Space Warfare in the 21st Century: Arming the Heavens. Views expressed are those of the author alone. Theresa Hitchens is a Senior Research Scholar at the Center for International and Security Studies at Maryland (CISSM), and the former Director of the United Nations Institute for Disarmament Research (UNIDIR) in Geneva, Switzerland. Stop The Fearmongering Over War In Space: The Sky’s Not Falling, Part 1. December 27, 2016. https://breakingdefense.com/2016/12/stop-the-fearmongering-over-war-in-space-the-skys-not-falling-part-1/]

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

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

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

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

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

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

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

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

The Reality

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

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

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

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

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

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

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

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

### NC – Mining Turn

#### Asteroid mining is privatized and feasible – it solves resource conflict and environmental catastrophe

Kevin MacWhorter 16, J.D. Candidate, William & Mary Law School, "Sustainable Mining: Incentivizing Asteroid Mining in the Name of Environmentalism", William & Mary Environmental Law and Policy Review, Vol 40, Issue 2, Article 11, <https://scholarship.law.wm.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1653&context=wmelpr>

A. Rare Element Mining on Earth In the next sixty years, scientists predict that certain elements crucial to modern industry such as platinum, zinc, copper, phosphorous, lead, gold, and indium could be exhausted on Earth. 12 Many of these have no synthetic alternative, unlike chemical elements such as oil or diamonds.13 Liquid-crystal display (LCD) televisions, cellphones, and laptops are among the various consumer technologies that use precious metals.14Further, green technologies including wind turbines, solar panels, and catalytic converters require these rare elements. 15 As demand rises for both types of technologies, and as reserves of rare metals fall, prices skyrocket.16 Demand for nonrenewable resources creates conflict, and consumerism in rich countries results in harsh labor treatment for poorer countries.17 In general, the mining industry is extremely destructive to Earth’s environment.18 In fact, depending on the method employed, mining can destroy entire ecosystems by polluting water sources and contributing to deforestation.19 It is by its nature an unsustainable practice, because it involves the extraction of a finite and non-renewable resource.20 Moreover, by extracting tiny amounts of metals from relatively large quantities of ore, the mining industry contributes the largest portion of solid wastes in the world.21 The Environmental Protection Agency (EPA) describes the industry as the source of more toxic and hazardous waste than any other industrial sector [in the United States], costing billions of dollars to address the public health and environmental threats to communities. 22 Poor regulations and oxymoronic corporate definitions of sustainability, however, make it unclear as to just how much waste the industry actually produces.23 Platinum provides an excellent case study of the issue, because it is an extremely rare and expensive metal—an ore expected to exist in vast quantities in asteroids.24 Further, production of platinum has increased sharply in the past sixty years in order to keep up with growing demand for use in new technologies.25 In fact, despite their high costs, platinum group metals are so useful that [one] of [four] industrial goods on Earth require them in production. 26 Scholars do not expect demand to slow any time soon.27 Among other technologies, industries use platinum in products such as catalytic converters, jewelry production, various catalysts for chemical processing, and hydrogen fuel cells.28 While there is no consensus on how far the Earth’s reserves of platinum will take humanity, many scientists agree that platinum ore reserves will deplete in a relatively short amount of time.29 With the rate of mining at an all-time high,30 it is increasingly clear that historical patterns of mineral resources and development cannot simply be assumed to continue unaltered into the future. 31 The platinum mining industry, however, has a strong incentive to increase its rate of extraction as profits grow with the rate of demand. Without any alternative, this destructive practice will continue into the future.32 So-called platinum-group metal (PGM) ores are mined through underground or open cut techniques.33 Due to these practices, all but a very small fraction of the mined platinum ore is disposed of as solid waste.34 The environmental consequences of platinum production are thus quite significant, but like the mining industry in general, the amount of waste is typically under-reported.35 While this is due to high production levels at the moment, those levels will only increase given the estimated future demand of platinum.36 In spite of the negative consequences, mining continues unabated because it is economically important to many areas.37 The future environmental costs provide a major challenge in creating a sustainable system. Relegating at least some mining companies to near-Earth asteroids would reduce the negative effects of future mining levels on Earth. The economic benefits of mining need not be sacrificed for the sake of the environment.38 B. Privatization of the Space Industry For most of the Space Age, the role of private companies has been as that of government contractors.39 During the past fifteen years, however, space flight has become increasingly the realm of private industry.40 Space tourism is on the rise,41 and private companies have been launching their own satellites into orbit for decades.42 In May 2012, SpaceX docked with the International Space Station the first private company to do so. 43 While the National Aeronautics and Space Administrations (NASA) federal outlay has increased since 1958, NASAs budget as a percentage of US spending has decreased dramatically.44The private space industry has seen dramatic growth as a result.45 Since NASA retired its shuttle fleet in 2011, the agency has turned to private actors to design and build spacecraft.46 That year, NASA awarded four private space companies SpaceX, Blue Origin LLC, Boeing Co., and Sierra Nevada Corp. contracts worth a combined total of $269.3 million to transport cargo and crew to and from the International Space Station.47 More companies, such as Orbital Sciences, have followed suit.48 Space mining in particular has been a focus of private investment.49 The promise of abundant rare Earth resources creates the possibility of vast wealth for intrepid investors.50 For example, Google founders Larry Page and Eric Schmidt have invested heavily in private space flight.51 Google is offering the Lunar X Prize: $30 million in prizes to any team who is able to safely land a robot on the surface of the Moon, have that robot travel 500 meters [1,640 feet] over the lunar surface, and send video, images, and data back to the Earth before 2016. 52 The purpose behind the contest should be apparent: investors think private space flight and mining could be extremely lucrative.53 Rare metals, such as platinum, could become far more accessible.54 In 2012, Page, Schmidt, director James Cameron, and other distinguished entrepreneurs announced they were investing considerable financial resources in Planetary Resources, a company developing the technology to mine an asteroid.55The companys goalis to land a mining vessel on a near-Earth asteroid, mine its valuable minerals, and bring the natural resources of space within humanitys economic sphere. 56 To that end, many companies are focused on the idea of asteroid mining.57 Privatization, however, has brought many legal and economic considerations to the forefront. One of the most significant obstacles for the private space industry has been the price tag of traveling into space. Complicating matters, the current law governing claims of property in space is ambiguous.58 Companies therefore cannot be sure whether their property claims will be enforced after they extract minerals in space and bring them back to Earth.59 When investing large sums of money such a consideration is absolutely critical.60 Although there has been investment in the area, sending an actual mission to an asteroid will require less ambiguous property provisions in international space law. C. Asteroid Mining 101 As the Planetary Resources website exclaims, [T]he more we learn about asteroids, the more enticing they become! 61 Certain types of asteroids including X-type and S-type asteroids contain both precious and base metals in quantities sufficient to make any entrepreneur salivate.62 Metals on which many current technologies rely such as iron, gold, and platinum can be found in most asteroids. 63 Current estimates count around two million asteroids in the solar system that are a kilometer or more in diameter.64 Astrophysicists estimate that each could contain 30 million tons of nickel, 1.5 million tons of cobalt, and 7,500 tons of platinum, among other minerals.65 To put that in economic terms, the value of each asteroid could be somewhere in the trillions [of dollars] or higher. 66 Indeed, because of their zero gravity fields and availability of metals, asteroids have been considered as candidates for resource extraction since the beginning of the space age.67 The technology needed to extract resources from asteroids, however, is a very recent phenomenon.68 With the European Space Agency successfully landing the Philae Lander on Comet 67P, it is much more plausible to land a mining operation on an asteroid.69 Although companies likely are not able to send mining ventures to asteroids immediately, as the preceding section suggested, asteroid mining is a possibility in the near future.70 First of all, two companies are developing the technology needed to mine asteroids.71Planetary Resources is creating cheaper prospecting spacecraft small enough to hitch a ride into space with larger, primary payloads. 72 Another company, Deep Space Industries (DSI), is developing a four-stage system for mining in space: Prospecting, Processing, Harvesting, and Manufacturing.73 It has already invented one spacecraft to be used for the Prospecting stage: a tiny probe, called FireFly, designed to scout asteroids and study their size, shape, spin and composition . . . . 74 For the Processing phase, DSI is creating technology required to transform regolith to raw materials for manufacture.75 The company is currently developing another spacecraft, called a Harvestor, for the third stage to collect and transport resources.76Finally, the company is creating technology to manufacture finished products in space.77 The United States space policy is also embracing the idea of asteroid mining. In April 2010, President Obama promised to send astronauts to explore an asteroid by 2025.78 In 2014, NASA requested, much to the surprise of asteroid scientists, a budget that includes $105 million to begin work on a mission that would send a robotic spacecraft to capture an asteroid as early as 2019 and haul it back so that astronauts could rendezvous with it by 2022. 79 Further, NASA has awarded contracts to Planetary Resources and Deep Space Industries to prepare for and ultimately execute missions to land on and mine asteroids for valuable resources. 80 NASA is also designing a spacecraft, the primary goal of which is to land on an asteroid and take samples.81 It is scheduled for launch in September 2016.82 As all this recent development suggests, the technology to mine asteroids is not far off. In fact, the requisite technology exists it just needs to be adapted for use in an extraterrestrial environment.83 As Chris Lewicki, president of Planetary Resources, said: [T]he single biggest challenge that Planetary Resources will have to overcome is convincing people that asteroid mining will happen sooner than they think. 84 Asteroid mining will gain in popularity as resources deplete, forcing humans to dig deeper and deeper in the Earths crust for minerals. 85 A recent article summarized some of Lewickis reasoning succinctly: [T]he energy required to extract minerals from an asteroid is considerably less than to extract from the Earth, or even the moon . . . , because in space there is no atmosphere to oxidise or salt to corrode, no weather, no gravity or friction to oppose transportation, dissipate energy and waste heat and unlimited heat from the sun and coldness in space for refrigeration, creating the perfect vacuum . . . .86

#### Outweighs the aff.

Phil Torres 16. Affiliate scholar at the Institute for Ethics and Emerging Technologies. “Biodiversity loss: An existential risk comparable to climate change.” *Bulletin of the Atomic Scientists* 4/11/2016. http://thebulletin.org/biodiversity-loss-existential-risk-comparable-climate-change9329

Such considerations warrant decoupling biodiversity loss from climate change, because the former has been consistently subsumed by the latter as a mere effect. Biodiversity loss is a distinct environmental crisis with its own unique syndrome of causes, consequences, and solutions—such as restoring habitats, creating protected areas (“biodiversity parks”), and practicing sustainable agriculture. The sixth extinction. The repercussions of biodiversity loss are potentially as severe as those anticipated from climate change, or even a nuclear conflict. For example, according to a 2015 study published in Science Advances, the best available evidence reveals “an exceptionally rapid loss of biodiversity over the last few centuries, indicating that a sixth mass extinction is already under way.” This conclusion holds, even on the most optimistic assumptions about the background rate of species losses and the current rate of vertebrate extinctions. The group classified as “vertebrates” includes mammals, birds, reptiles, fish, and all other creatures with a backbone. The article argues that, using its conservative figures, the average loss of vertebrate species was 100 times higher in the past century relative to the background rate of extinction. (Other scientists have suggested that the current extinction rate could be as much as 10,000 times higher than normal.) As the authors write, “The evidence is incontrovertible that recent extinction rates are unprecedented in human history and highly unusual in Earth’s history.” Perhaps the term “Big Six” should enter the popular lexicon—to add the current extinction to the previous “Big Five,” the last of which wiped out the dinosaurs 66 million years ago. But the concept of biodiversity encompasses more than just the total number of species on the planet. It also refers to the size of different populations of species. With respect to this phenomenon, multiple studies have confirmed that wild populations around the world are dwindling and disappearing at an alarming rate. For example, the 2010 Global Biodiversity Outlook report found that the population of wild vertebrates living in the tropics dropped by 59 percent between 1970 and 2006. The report also found that the population of farmland birds in Europe has dropped by 50 percent since 1980; bird populations in the grasslands of North America declined by almost 40 percent between 1968 and 2003; and the population of birds in North American arid lands has fallen by almost 30 percent since the 1960s. Similarly, 42 percent of all amphibian species (a type of vertebrate that is sometimes called an “ecological indicator”) are undergoing population declines, and 23 percent of all plant species “are estimated to be threatened with extinction.” Other studies have found that some 20 percent of all reptile species, 48 percent of the world’s primates, and 50 percent of freshwater turtles are threatened. Underwater, about 10 percent of all coral reefs are now dead, and another 60 percent are in danger of dying. Consistent with these data, the 2014 Living Planet Report shows that the global population of wild vertebrates dropped by 52 percent in only four decades—from 1970 to 2010. While biologists often avoid projecting historical trends into the future because of the complexity of ecological systems, it’s tempting to extrapolate this figure to, say, the year 2050, which is four decades from 2010. As it happens, a 2006 study published in Science does precisely this: It projects past trends of marine biodiversity loss into the 21st century, concluding that, unless significant changes are made to patterns of human activity, there will be virtually no more wild-caught seafood by 2048. Catastrophic consequences for civilization. The consequences of this rapid pruning of the evolutionary tree of life extend beyond the obvious. There could be surprising effects of biodiversity loss that scientists are unable to fully anticipate in advance. For example, prior research has shown that localized ecosystems can undergo abrupt and irreversible shifts when they reach a tipping point. According to a 2012 paper published in Nature, there are reasons for thinking that we may be approaching a tipping point of this sort in the global ecosystem, beyond which the consequences could be catastrophic for civilization. As the authors write, a planetary-scale transition could precipitate “substantial losses of ecosystem services required to sustain the human population.” An ecosystem service is any ecological process that benefits humanity, such as food production and crop pollination. If the global ecosystem were to cross a tipping point and substantial ecosystem services were lost, the results could be “widespread social unrest, economic instability, and loss of human life.” According to Missouri Botanical Garden ecologist Adam Smith, one of the paper’s co-authors, this could occur in a matter of decades—far more quickly than most of the expected consequences of climate change, yet equally destructive. Biodiversity loss is a “threat multiplier” that, by pushing societies to the brink of collapse, will exacerbate existing conflicts and introduce entirely new struggles between state and non-state actors. Indeed, it could even fuel the rise of terrorism. (After all, climate change has been linked to the emergence of ISIS in Syria, and multiple high-ranking US officials, such as former US Defense Secretary Chuck Hagel and CIA director John Brennan, have affirmed that climate change and terrorism are connected.) The reality is that we are entering the sixth mass extinction in the 3.8-billion-year history of life on Earth, and the impact of this event could be felt by civilization “in as little as three human lifetimes,” as the aforementioned 2012 Nature paper notes. Furthermore, the widespread decline of biological populations could plausibly initiate a dramatic transformation of the global ecosystem on an even faster timescale: perhaps a single human lifetime. The unavoidable conclusion is that biodiversity loss constitutes an existential threat in its own right. As such, it ought to be considered alongside climate change and nuclear weapons as one of the most significant contemporary risks to human prosperity and survival.

#### Resource wars go nuclear.

Klare 13 – Michael T., professor emeritus of peace and world-security studies at Hampshire College and senior visiting fellow at the Arms Control Association in Washington, DC, " How Resource Scarcity and Climate Change Could Produce a Global Explosion", *The Nation*, 4/22/2013, <https://www.thenation.com/article/how-resource-scarcity-and-climate-change-could-produce-global-explosion/> JHW

Resource Shortages and Resource Wars Start with one simple given: the prospect of future scarcities of vital natural resources, including energy, water, land, food and critical minerals. This in itself would guarantee social unrest, geopolitical friction and war. It is important to note that absolute scarcity doesn’t have to be on the horizon in any given resource category for this scenario to kick in. A lack of adequate supplies to meet the needs of a growing, ever more urbanized and industrialized global population is enough. Given the wave of extinctions that scientists are recording, some resources—particular species of fish, animals and trees, for example—will become less abundant in the decades to come, and may even disappear altogether. But key materials for modern civilization like oil, uranium and copper will simply prove harder and more costly to acquire, leading to supply bottlenecks and periodic shortages. Oil—the single most important commodity in the international economy—provides an apt example. Although global oil supplies may actually grow in the coming decades, many experts doubt that they can be expanded sufficiently to meet the needs of a rising global middle class that is, for instance, expected to buy millions of new cars in the near future. In its 2011 World Energy Outlook, the International Energy Agency claimed that an anticipated global oil demand of 104 million barrels per day in 2035 will be satisfied. This, the report suggested, would be thanks in large part to additional supplies of “unconventional oil” (Canadian tar sands, shale oil and so on), as well as 55 million barrels of new oil from fields “yet to be found” and “yet to be developed.” However, many analysts scoff at this optimistic assessment, arguing that rising production costs (for energy that will be ever more difficult and costly to extract), environmental opposition, warfare, corruption and other impediments will make it extremely difficult to achieve increases of this magnitude. In other words, even if production manages for a time to top the 2010 level of 87 million barrels per day, the goal of 104 million barrels will never be reached and the world’s major consumers will face virtual, if not absolute, scarcity. Water provides another potent example. On an annual basis, the supply of drinking water provided by natural precipitation remains more or less constant: about 40,000 cubic kilometers. But much of this precipitation lands on Greenland, Antarctica, Siberia and inner Amazonia where there are very few people, so the supply available to major concentrations of humanity is often surprisingly limited. In many regions with high population levels, water supplies are already relatively sparse. This is especially true of North Africa, Central Asia and the Middle East, where the demand for water continues to grow as a result of rising populations, urbanization and the emergence of new water-intensive industries. The result, even when the supply remains constant, is an environment of increasing scarcity. Wherever you look, the picture is roughly the same: supplies of critical resources may be rising or falling, but rarely do they appear to be outpacing demand, producing a sense of widespread and systemic scarcity. However generated, a perception of scarcity—or imminent scarcity—regularly leads to anxiety, resentment, hostility and contentiousness. This pattern is very well understood, and has been evident throughout human history. In his book Constant Battles, for example, Steven LeBlanc, director of collections for Harvard’s Peabody Museum of Archaeology and Ethnology, notes that many ancient civilizations experienced higher levels of warfare when faced with resource shortages brought about by population growth, crop failures or persistent drought. Jared Diamond, author of the bestseller Collapse, has detected a similar pattern in Mayan civilization and the Anasazi culture of New Mexico’s Chaco Canyon. More recently, concern over adequate food for the home population was a significant factor in Japan’s invasion of Manchuria in 1931 and Germany’s invasions of Poland in 1939 and the Soviet Union in 1941, according to Lizzie Collingham, author of The Taste of War. Although the global supply of most basic commodities has grown enormously since the end of World War II, analysts see the persistence of resource-related conflict in areas where materials remain scarce or there is anxiety about the future reliability of supplies. Many experts believe, for example, that the fighting in Darfur and other war-ravaged areas of North Africa has been driven, at least in part, by competition among desert tribes for access to scarce water supplies, exacerbated in some cases by rising population levels. “In Darfur,” says a 2009 report from the UN Environment Programme on the role of natural resources in the conflict, “recurrent drought, increasing demographic pressures, and political marginalization are among the forces that have pushed the region into a spiral of lawlessness and violence that has led to 300,000 deaths and the displacement of more than two million people since 2003.” Anxiety over future supplies is often also a factor in conflicts that break out over access to oil or control of contested undersea reserves of oil and natural gas. In 1979, for instance, when the Islamic revolution in Iran overthrew the Shah and the Soviets invaded Afghanistan, Washington began to fear that someday it might be denied access to Persian Gulf oil. At that point, President Jimmy Carter promptly announced what came to be called the Carter Doctrine. In his 1980 State of the Union Address, Carter affirmed that any move to impede the flow of oil from the Gulf would be viewed as a threat to America’s “vital interests” and would be repelled by “any means necessary, including military force.” In 1990, this principle was invoked by President George H.W. Bush to justify intervention in the first Persian Gulf War, just as his son would use it, in part, to justify the 2003 invasion of Iraq. Today, it remains the basis for US plans to employ force to stop the Iranians from closing the Strait of Hormuz, the strategic waterway connecting the Persian Gulf to the Indian Ocean through which about 35 percent of the world’s seaborne oil commerce passes. Recently, a set of resource conflicts have been rising toward the boiling point between China and its neighbors in Southeast Asia when it comes to control of offshore oil and gas reserves in the South China Sea. Although the resulting naval clashes have yet to result in a loss of life, a strong possibility of military escalation exists. A similar situation has also arisen in the East China Sea, where China and Japan are jousting for control over similarly valuable undersea reserves. Meanwhile, in the South Atlantic Ocean, Argentina and Britain are once again squabbling over the Falkland Islands (called Las Malvinas by the Argentinians) because oil has been discovered in surrounding waters. By all accounts, resource-driven potential conflicts like these will only multiply in the years ahead as demand rises, supplies dwindle and more of what remains will be found in disputed areas. In a 2012 study titled Resources Futures, the respected British think-tank Chatham House expressed particular concern about possible resource wars over water, especially in areas like the Nile and Jordan River basins where several groups or countries must share the same river for the majority of their water supplies and few possess the wherewithal to develop alternatives. “Against this backdrop of tight supplies and competition, issues related to water rights, prices, and pollution are becoming contentious,” the report noted. “In areas with limited capacity to govern shared resources, balance competing demands, and mobilize new investments, tensions over water may erupt into more open confrontations.” Heading for a Resource-Shock World Tensions like these would be destined to grow by themselves because in so many areas supplies of key resources will not be able to keep up with demand. As it happens, though, they are not “by themselves.” On this planet, a second major force has entered the equation in a significant way. With the growing reality of climate change, everything becomes a lot more terrifying. Normally, when we consider the impact of climate change, we think primarily about the environment—the melting Arctic ice cap or Greenland ice shield, rising global sea levels, intensifying storms, expanding desert and endangered or disappearing species like the polar bear. But a growing number of experts are coming to realize that the most potent effects of climate change will be experienced by humans directly through the impairment or wholesale destruction of habitats upon which we rely for food production, industrial activities or simply to live. Essentially, climate change will wreak its havoc on us by constraining our access to the basics of life: vital resources that include food, water, land and energy. This will be devastating to human life, even as it significantly increases the danger of resource conflicts of all sorts erupting. We already know enough about the future effects of climate change to predict the following with reasonable confidence: \* Rising sea levels will in the next half-century erase many coastal areas, destroying large cities, critical infrastructure (including roads, railroads, ports, airports, pipelines, refineries and power plants) and prime agricultural land. \* Diminished rainfall and prolonged droughts will turn once-verdant croplands into dust bowls, reducing food output and turning millions into “climate refugees.” \* More severe storms and intense heat waves will kill crops, trigger forest fires, cause floods and destroy critical infrastructure. No one can predict how much food, land, water and energy will be lost as a result of this onslaught (and other climate-change effects that are harder to predict or even possibly imagine), but the cumulative effect will undoubtedly be staggering. In Resources Futures, Chatham House offers a particularly dire warning when it comes to the threat of diminished precipitation to rain-fed agriculture. “By 2020,” the report says, “yields from rain-fed agriculture could be reduced by up to 50%” in some areas. The highest rates of loss are expected to be in Africa, where reliance on rain-fed farming is greatest, but agriculture in China, India, Pakistan and Central Asia is also likely to be severely affected. Heat waves, droughts and other effects of climate change will also reduce the flow of many vital rivers, diminishing water supplies for irrigation, hydro-electricity power facilities and nuclear reactors (which need massive amounts of water for cooling purposes). The melting of glaciers, especially in the Andes in Latin America and the Himalayas in South Asia, will also rob communities and cities of crucial water supplies. An expected increase in the frequency of hurricanes and typhoons will pose a growing threat to offshore oil rigs, coastal refineries, transmission lines and other components of the global energy system. The melting of the Arctic ice cap will open that region to oil and gas exploration, but an increase in iceberg activity will make all efforts to exploit that region’s energy supplies perilous and exceedingly costly. Longer growing seasons in the north, especially Siberia and Canada’s northern provinces, might compensate to some degree for the desiccation of croplands in more southerly latitudes. However, moving the global agricultural system (and the world’s farmers) northward from abandoned farmlands in the United States, Mexico, Brazil, India, China, Argentina and Australia would be a daunting prospect. It is safe to assume that climate change, especially when combined with growing supply shortages, will result in a significant reduction in the planet’s vital resources, augmenting the kinds of pressures that have historically led to conflict, even under better circumstances. In this way, according to the Chatham House report, climate change is best understood as a “threat multiplier…a key factor exacerbating existing resource vulnerability” in states already prone to such disorders. Like other experts on the subject, Chatham House’s analysts claim, for example, that climate change will reduce crop output in many areas, sending global food prices soaring and triggering unrest among those already pushed to the limit under existing conditions. “Increased frequency and severity of extreme weather events, such as droughts, heat waves and floods, will also result in much larger and frequent local harvest shocks around the world….These shocks will affect global food prices whenever key centers of agricultural production area are hit—further amplifying global food price volatility.” This, in turn, will increase the likelihood of civil unrest. When, for instance, a brutal heat wave decimated Russia’s wheat crop during the summer of 2010, the global price of wheat (and so of that staple of life, bread) began an inexorable upward climb, reaching particularly high levels in North Africa and the Middle East. With local governments unwilling or unable to help desperate populations, anger over impossible-to-afford food merged with resentment toward autocratic regimes to trigger the massive popular outburst we know as the Arab Spring. Many such explosions are likely in the future, Chatham House suggests, if current trends continue as climate change and resource scarcity meld into a single reality in our world. A single provocative question from that group should haunt us all: “Are we on the cusp of a new world order dominated by struggles over access to affordable resources?” For the US intelligence community, which appears to have been influenced by the report, the response was blunt. In March, for the first time, Director of National Intelligence James R. Clapper listed “competition and scarcity involving natural resources” as a national security threat on a par with global terrorism, cyberwar and nuclear proliferation. “Many countries important to the United States are vulnerable to natural resource shocks that degrade economic development, frustrate attempts to democratize, raise the risk of regime-threatening instability, and aggravate regional tensions,” he wrote in his prepared statement for the Senate Select Committee on Intelligence. “Extreme weather events (floods, droughts, heat waves) will increasingly disrupt food and energy markets, exacerbating state weakness, forcing human migrations, and triggering riots, civil disobedience, and vandalism.” There was a new phrase embedded in his comments: “resource shocks.” It catches something of the world we’re barreling toward, and the language is striking for an intelligence community that, like the government it serves, has largely played down or ignored the dangers of climate change. For the first time, senior government analysts may be coming to appreciate what energy experts, resource analysts and scientists have long been warning about: the unbridled consumption of the world’s natural resources, combined with the advent of extreme climate change, could produce a global explosion of human chaos and conflict. We are now heading directly into a resource-shock world.

#### Solves warming.

Taylor 19 Chris Taylor is a veteran journalist. Previously senior news writer for Time.com a year later. In 2000, he was named San Francisco bureau chief for Time magazine. He has served as senior editor for Business 2.0, West Coast editor for Fortune Small Business and West Coast web editor for Fast Company. Chris is a graduate of Merton College, Oxford and the Columbia University Graduate School of Journalism. "How asteroid mining will save the Earth — and mint trillionaires." Mashable, 2019, mashable.com/feature/asteroid-mining-space-economy. [Quality Control]

The mission is essential, Joyce declares, to save Earth from its major problems. First of all, the fictional billionaire wheels in a fictional Nobel economist to demonstrate the actual truth that the entire global economy is sitting on a mountain of debt. It has to keep growing or it will implode, so we might as well take the majority of the industrial growth off-world where it can’t do any more harm to the biosphere.

Secondly, there’s the climate change fix. Suarez sees asteroid mining as the only way we’re going to build solar power satellites. Which, as you probably know, is a form of uninterrupted solar power collection that is theoretically more effective, inch for inch, than any solar panels on Earth at high noon, but operating 24/7. (In space, basically, it’s always double high noon).

The power collected is beamed back to large receptors on Earth with large, low-power microwaves, which researchers think will be harmless enough to let humans and animals pass through the beam. A space solar power array like the one China is said to be working on could reliably supply 2,000 gigawatts — or over 1,000 times more power than the largest solar farm currently in existence.

“We're looking at a 20-year window to completely replace human civilization's power infrastructure,” Suarez told me, citing the report of the Intergovernmental Panel on Climate Change on the coming catastrophe. Solar satellite technology “has existed since the 1970s. What we were missing is millions of tons of construction materials in orbit. Asteroid mining can place it there.”

The Earth-centric early 21st century can’t really wrap its brain around this, but the idea is not to bring all that building material and precious metals down into our gravity well. Far better to create a whole new commodities exchange in space. You mine the useful stuff of asteroids both near to Earth and far, thousands of them taking less energy to reach than the moon. That’s something else we’re still grasping, how relatively easy it is to ship stuff in zero-G environments.

#### Warming causes extinction

Peter Kareiva 18, Ph.D. in ecology and applied mathematics from Cornell University, director of the Institute of the Environment and Sustainability at UCLA, Pritzker Distinguished Professor in Environment & Sustainability at UCLA, et al., September 2018, “Existential risk due to ecosystem collapse: Nature strikes back,” Futures, Vol. 102, p. 39-50

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

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

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

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

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

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

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

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

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

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

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

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

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

### NC – AT: Mining Debris

**NASA thumps mining debris**

Sarah **Scoles 15**, “Dust from asteroid mining spells danger for satellites,” New Scientist, 5-27-2015, https://www.newscientist.com/article/mg22630235-100-dust-from-asteroid-mining-spells-danger-for-satellites/

NASA chose the second option for its Asteroid Redirect Mission, which aims to pluck a boulder from an asteroid’s surface and relocate it to a stable orbit around the moon. But an asteroid’s gravity is so weak that it’s not hard for surface particles to escape into space. **Now a new model warns that debris shed by such transplanted rocks could intrude where many defence and communication satellites live** – in geosynchronous orbit. According to Casey Handmer of the California Institute of Technology in Pasadena and Javier Roa of the Technical University of Madrid in Spain, 5 per cent of the escaped debris will end up in regions traversed by satellites. Over 10 years, it would cross geosynchronous orbit 63 times on average. **A satellite in the wrong spot at the wrong time will suffer a damaging high-speed collision with that dust.** The study also looks at the “catastrophic disruption” of an asteroid 5 metres across or bigger. Its total break-up into a pile of rubble would increase the risk to satellites by more than 30 per cent (arxiv.org/abs/1505.03800). That may not have immediate consequences. But as Earth orbits get more crowded with spent rocket stages and satellites, we will have to worry about cascades of collisions like the one depicted in the movie Gravity. Handmer and Roa want to point out the problem now so that we can find a solution before any satellites get dinged. **“It is possible to quantify and manage the risk**,” says Handmer. “**A few basic precautions will prevent harm due to stray asteroid material.”**

### NC – AT: Debris Cascades

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

Daniel Von Fange 17, Web Application Engineer, Founder and Owner of LeanCoder, Full Stack, Polyglot Web Developer, “Kessler Syndrome is Over Hyped”, 5/21/2017, 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.

#### It takes centuries and adaptation solves

Ted Muelhaupt 19, Associate Principal Director of the Systems Analysis and Simulation Subdivision (SASS) and Manager of the Center for Orbital and Reentry Debris Studies at The Aerospace Corporation, M.S., B.S. Aerospace and Aeronautical Engineering & Mechanics, University of Minnesota - Twin Cities, Senior Member of the American Institute of Aeronautics and Astronautics, “How Quickly Would It Take For the Kessler Syndrome To Destroy All The Satellites In LEO? And Could You See This Happening From Earth?”, Quora, 2/28/2019, https://www.quora.com/How-quickly-would-it-take-for-the-Kessler-Syndrome-to-destroy-all-the-satellites-in-LEO-And-could-you-see-this-happening-from-Earth

The dynamics of the Kessler Syndrome are real, and most people studying it agree on the concept: if there is sufficient density of objects and mass, a chain reaction of debris breaking up objects and creating more debris can occur. But the timescale of this process takes decades and centuries. There are many assumptions that go into these models. Though there is still argument about this, many people in the field think that the process is already underway in low earth orbit. But others, including myself, think we can stop it if we take action. This is a slow motion disaster that we can prevent.

But in spite of hype to the contrary, we will never “lose access to space”. Certain missions may become impractical or too expensive, and we may decide that some orbits are too risky for humans. Even that depends on the tolerance for the risk. But robots don’t have mothers, and if we feel it is worthwhile we will take the risk and fly the satellites where we need to.

To the specifics of the question, it will take many decades. It will not destroy all satellites in LEO. You won’t be able to see it from the ground unless you were extraordinarily lucky, and you happened to see a flash from a collision in the instant you were looking, with just the right lighting.

#### Squo tracking, shielding, and removal plans solve

Dr. Brian Koberlein 16, Professor of Physics at the Rochester Institute of Technology and PhD in Astrophysics from the University of Connecticut, “Cascade Effect”, 5-4, https://archive.briankoberlein.com/2016/05/04/cascade-effect/index.html

In the movie Gravity the driving force of the plot is a catastrophic cascade of space debris. An exploding satellite sends high speed debris into the path of other satellites, and the resulting collisions create more space debris until everything from a space shuttle to the International Space Station faces an eminent threat of destruction. Not unexpectedly, the movie portrayal of such a situation is not particularly accurate, but the risk of a debris cascade is very real.

It’s known as the Kessler syndrome, after Donald Kessler, who first imagined the scenario in the 1970s. The problem comes down to the fact that small objects in Earth orbit can stay in orbit for a very long time. If an astronaut drops a bolt, it can stay in orbit for decades or centuries. Because the relative speed of two objects in orbit can be quite large, it doesn’t take a big object to pose a real threat to your spacecraft. On the highway a small pebble can chip your car windshield. In space it can be done by a chip of paint traveling at thousands of kilometers per hour. In the history of the space shuttle missions, there were more than 1,600 debris strikes. Because of such strikes, more than 90 space shuttle windows had to be replaced over the lifetime of shuttle missions.

While that might sound alarming, it’s actually quite manageable. Upgrades and maintenance were quite common on the shuttle missions, and we tend to err on the side of caution when it comes to replacing parts. Modern spacecraft also have ways to mitigate the risk of small impacts, such as Whipple shields made of thin layers of material spaced apart so that objects disintegrate when hitting the shield rather than the spacecraft itself. We also have a tracking system that currently tracks more than 300,000 objects bigger than 1 cm, so we can make sure that most spacecraft avoid these objects.

But the risk of big collisions isn’t negligible. In 2009 the Iridium 33 and Kosmos-2251 satellites collided at high speed, destroying both spacecraft and creating more dangerous debris. It wouldn’t take many collisions like this for the debris numbers to rise dramatically, and more debris means a greater risk of collisions. In Gravity the cascade happens very quickly, triggered by a single event. The reality is not quite so grave. Instead of happening overnight, Kessler syndrome would occur gradually, raising collision risks to the point where certain orbits become logistically impractical. It could occur so gradually that we might not notice it early on, and there are some that argue it’s already underway.

The good news is that we’re aware of the threat. And, as the old saying goes, knowing is half the battle. Already we take steps to limit the amount of debris created. New spacecraft include end of life plans to remove them from orbit, either by sending them into Earths atmosphere to burn up, or sending them to a “graveyard orbit” that poses little risk to other spacecraft. There are also plans on the drawing board to clear orbits of debris, particularly in low-Earth orbit where the risk is greatest. The cascade effect is a real risk, but it’s also one we can likely manage with a bit of ingenuity.

### NC – AT: Sats Econ !

#### Alternatives solve---it’d just make life slightly harder

Bob Hannent 17, BSc (Hons) Media Technology, Southampton Solent University, Technologist and Video Architect, “Can We Make It Without Satellites?”, Quora, 6/29/2017, https://www.quora.com/Can-we-make-it-without-satellites

Can we make it without satellites?

Yes, although it would make life slightly harder.

Weather forecasting relies on satellites these days.

Remote high speed communications from

Ships at sea often use satellites for weather reports, communications and entertainment

Remote oil rigs or processing stations in remote areas use them for communication and entertainment

Islands without fiber optic links such as many Pacific islands

Navigation of ships and aircraft using GPS/GNSS

All pilots and ships are supposed to be able to navigate without GPS

Without satellite communications many communities and groups would be isolated. They would probably be dependent on very slow HF communications or relatively slow and expensive VHF relays.

Navigation on land can be done with ground station beacon navigation perhaps using cell towers and TV/radio transmitters. Navigation at sea near to shore can use the same beacons and longer range ones can give more coverage. Deep sea? You could use some kind of long range positioning or even astronavigation with some compute power and clear skies.

#### Space is only a small part of the economy

Brian Higginbotham 18, 10-11-2018, Senior Economist @ the US Chamber of Commerce, “The Space Economy: An Industry Takes Off” <https://www.uschamber.com/series/above-the-fold/the-space-economy-industry-takes>

The space industry has developed into a multi-billion dollar industry and has attracted considerable media attention in recent years, in part because of interest and investment from high profile billionaires like Paul Allen, Jeff Bezos, and Elon Musk, among others. These entrepreneurs have poured billions of dollars into their respective commercial space ventures and many other private sector investors have likewise turned their attention to the promising opportunities the industry presents. It is easy to see the motivation when we examine the growth in revenues even as the commercial side was just getting rolling. Global revenues have increased from $175 billion in 2005 to almost [$385 billion in 2017](https://www.spacefoundation.org/news/space-foundation-report-reveals-global-space-economy-3835-billion-2017) – a growth rate of just under 7% per year. Moreover, despite the great recession, revenues grew unimpeded, with only one down year in 2009. In order for the emerging space industry to realize its full market potential, an efficient and reliable regulatory regime is essential. U.S. interagency decisions across a range of fields, from space debris management to spectrum interference in low Earth orbit, will have consequential effects on the industry for years to come. For that reason, the U.S. Chamber recently announced the expansion of its [Procurement and Space Industry Council](https://www.uschamber.com/procurement-and-space-industry-council) to facilitate dialogue and engagement among industry and key oversight agencies. A number of [private sector forecasters](https://spacenews.com/a-trillion-dollar-space-industry-will-require-new-markets/) predict the space economy will continue to grow dramatically. Goldman Sachs analysts predicted the sector would grow to about $1 trillion by 2040, consistent with a forecast by [Morgan Stanley](https://www.morganstanley.com/ideas/investing-in-space). On the high end, analysts at Bank of America Merrill Lynch predict the sector will surpass $3 trillion over the same period. In our estimation, this sector will increase from approximately $385 billion today to at least $1.5 trillion by 2040. That would amount to roughly 5% of U.S. GDP at that time, though the revenues would not all accrue to the U.S. This estimate is based on a growth rate of 6% per year, which is consistent with the pace of growth over the past 10 years. Can this rate of growth be sustained over such a long horizon?

### NC – AT: Econ

#### Alt cause – Maavak is about current economic decline, and

#### Recessions don’t uniquely cause wars

Liao 19 [Jianan Liao, Shenzhen Nanshan Foreign Language School, China. Business Cycle and War: A Literature Review and Evaluation. Advances in Economics, Business and Management Research, volume 68. Copyright 2019]

First, war can occur at any stage of expansion, crisis, recession, recovery, so it is unrealistic to assume that wars occur at any particular stage of the business cycle. On the one hand, although the domestic economic problems in the crisis/recession/depression period break out and become prominent in a short time, in fact, such challenge exists at all stages of the business cycle. When countries cannot manage to solve these problems through conventional approaches, including fiscal and monetary policies, they may resort to military expansion to achieve their goals, a theory known as Lateral Pressure. [13] Under such circumstances, even countries in the period of economic expansion are facing downward pressure on the economy and may try to solve the problem through expansion. On the other hand, although the resources required for foreign wars are huge for countries in economic depression, the decision to wage wars depends largely on the consideration of the gain and loss of wars. Even during depression, governments can raise funding for war by issuing bonds. Argentina, for example, was mired in economic stagflation before the war on the Malvinas islands (also known as the Falkland islands in the UK). In fact, many governments would dramatically increase their expenditure to stimulate the economy during the recession, and economically war is the same as these policies, so the claim that a depressed economy cannot support a war is unfounded. In addition, during the crisis period of the business cycle, which is the early stage of the economic downturn, despite the economic crisis and potential depression, the country still retains the ability to start wars based on its economic and military power. Based on the above understanding, war has the conditions and reasons for its outbreak in all stages of the business cycle.

Second, the economic origin for the outbreak of war is downward pressure on the economy rather than optimism or competition for monopoly capital, which may exist during economic recession or economic prosperity. This is due to a fact that during economic prosperity, people are also worried about a potential economic recession. Blainey pointed out that wars often occur in the economic upturn, which is caused by the optimism in people's mind [14], that is, the confidence to prevail. This interpretation linking optimism and war ignores the strength contrast between the warring parties. Not all wars are equally comprehensive, and there have always been wars of unequal strength. In such a war, one of the parties tends to have an absolute advantage, so the expectation of the outcome of the war is not directly related to the economic situation of the country. Optimism is not a major factor leading to war, but may somewhat serve as stimulation. In addition, Lenin attributed the war to competition between monopoly capital. This theory may seem plausible, but its scope of application is obviously too narrow. Lenin's theory of imperialism is only applicable to developed capitalist countries in the late stage of the development capitalism, but in reality, many wars take place among developing countries whose economies are still at their beginning stages. Therefore, the theory centered on competition among monopoly capital cannot explain most foreign wars. Moreover, even wars that occur during periods of economic expansion are likely to result from the potential expectation of economic recession, the "limits of growth" [15] faced during prosperity — a potential deficiency of market demand. So the downward pressure on the economy is the cause of war.