#### Hackers can only target individuals, not the system itself, and it will take months to acquire useful information

Sandhu 3/21 [(Serina, Senior Reporter at iNews, Digital Journalist for The Independent) “Elon Musk’s Starlink internet ‘likely to be attacked by Russian hackers’ seeking Ukraine military intel,” iNews, 3/21/2022] JL

Direct attacks on Starlink’s satellites are unlikely given the complexity of the IT system, so hackers will aim for the individuals who operate the system, he said. For example, sending a phishing email could give hackers initial access.

“Satellites are largely designed to send and receive data, meaning that Russia-linked actors with long-term access to these networks could siphon off sensitive information, such as military tracking data,” said Mr Horan.

“As such, any attacks launched against Starlink’s satellites will likely be aimed at gaining insights into topics of strategic interest to Moscow, such as potential impending assistance from Western governments or information that could help the Russian government determine where Ukraine or its Western allies’ defences are the weakest.”

However, work to figure out what information the system contains would take days, weeks or even months, said Mr Horan, adding that there was time for attacks to be shut down.

#### Interpretation: the affirmative must defend legislative action that prevents private entities from appropriating outer space

#### ‘Resolved’ preceding a colon indicates a legislative forum.

Blanche Ellsworth 81, English professor at SFSU and M.A. in English from UC Berkeley, 1/1/1981, *English Simplified*, 4th Edition, cc

A colon is also used to separate 3. THE SALUTATION OF A BUSINESS LETTER FROM THE BODY, Dear Sir Dear Ms. Weiner NOTE: In an informal letter, a comma follows the salutation: Dear Mary, Dear Uncle Jack 4. PARTS OF TITLES, REFERENCES, AND NUMERALS. TITLE: Principles of Mathematics: An Introduction REFERENCE: Luke 3:4—13 NUMERALS: 8:15 PM 5. PLACE OF PUBLICATION FROM PUBLISHER Indianapolis: Bobbs-Merrill 6. THE WORD RESOLVED FROM THE STATEMENT OF THE RESOLUTION. Resolved: That this committee go on record as favoring new legislation.

#### That entails a law

LII n.d. [(Legal Information Institute, non-profit, public service of Cornell Law School that provides no-cost access to current American and international legal research sources) “Legislation”] JL

Legislation refers to the preparation and enactment of laws by a legislative body through its lawmaking process. The legislative process includes evaluating, amending, and voting on proposed laws and is concerned with the words used in the bill to communicate the values, judgments, and purposes of the proposal. An idea becomes an item of legislative business when it is written as a bill. A bill is a draft, or tentative version, of what might become part of the written law. A bill that is enacted is called an act or statute.

#### Justice implies legal action

Merriam Webster ND [(Mesrriam Webster) “Justice” https://www.merriam-webster.com/dictionary/justice] BC

Essential Meaning of justice

1: the process or result of using laws to fairly judge and punish crimes and criminals

#### Just is the opposite of unjust

**Thesaurus plus n.d.** ["Just and Unjust," Opposite Meaning Words. https://thesaurus.plus/related/just/unjust]

Unjust

Show Definitions

 Unjust adjective – Not fair; marked by injustice or partiality or deception.

Just is an antonym for [unjust](https://thesaurus.plus/thesaurus/unjust) in [not fair](https://thesaurus.plus/thesaurus/not_fair) topic.

#### Violation: they defend private entities doing the plan themselves

#### Net benefits:

#### Topic education – their interpretation distracts from core controversies like how the plan is implemented – any reason they have inherency proves that political resistance to the plan is a relevant debate to have – also means you should negate on presumption because they have zero enforcement mechanism

#### Neg flex – eliminating politics and process arguments on a topic with infinite appropriation spec decks neg prep – lack of 1NC rejoinder kills clash –only terminal impact to debate – and arbitrarily privileges the aff

#### Drop the debater – deters future abuse and we indict the whole advocacy

## 1NC – CP

#### CP: Private entities except in Ukraine ought not engage in the exclusive use of Low Earth Orbit via Large Satellite Constellations.

#### Starlink has transformed Ukraine’s resistance – it’s the only reliable way to ensure connectivity

Lerman and Zakrzewski 3/19 [(Rachel, covers technology for The Washington Post in San Francisco, and Cat, technology policy reporter, tracking Washington's efforts to regulate Silicon Valley companies) “Elon Musk’s Starlink is keeping Ukrainians online when traditional Internet fails,” Washington Post, 3/19/2022] JL

Ukraine has already received thousands of antennas from Musk’s companies and European allies, which has proved “very effective,” Fedorov said in an interview with The Washington Post Friday.

“The quality of the link is excellent,” Fedorov said through a translator, using a Starlink connection from an undisclosed location. “We are using thousands, in the area of thousands, of terminals with new shipments arriving every other day.”

The use of Starlink as a stopgap measure for citizens and the government to stay connected during an invasion is a major test of the relatively new technology, experts say, and could have widespread implications for the future of war. Internet has become an essential tool for communication, staying informed and even powering weapons.

It’s also a test for Musk. The world’s richest man, valued at $232 billion according to the Bloomberg Billionaire‘s Index, makes a habit of turning to Twitter for brash promises and proclamations in the midst of world crises. Already this week, the Tesla CEO has challenged Putin to a fight and followed up by pledging he would use just one hand if Putin was scared. And he told Putin he could bring a bear.

He has fallen short on some past pledges, including making ventilators for coronavirus patients and efforts to help rescue Thai children stuck in a cave.

But this time, Fedorov and some experts say he’s come through. Tesla employees in Europe reportedly assembled systems to help power Starlink in Ukraine, and Fedorov said other European countries have sent Starlink equipment from their own supplies.

Musk responded to a request for comment on his efforts with Starlink and past efforts, telling The Post to give his regards “to your puppet master Besos😘😘.” (Amazon founder Jeff Bezos owns The Post.) Musk did not respond to a follow-up request specifically on his work with Starlink in Ukraine.

SpaceX declined to comment on its work in Ukraine.

Internet disruptions can be caused by power outages or by fiber optic cables being cut as a result of shelling, experts said. The Starlink technology is being used by civilians in areas under attack that have lost Internet service, and by government officials. Starlink terminals have also been provided to help the country’s tech companies stay online when the war has forced them to relocate. The Times of London reports that a Ukrainian unit is using Starlink to connect its drones attacking Russian forces.

Starlink has grown quickly in recent years, surpassing some satellite Internet competitors by launching more than 1,000 satellites into space. People can buy the service online for $99 a month, plus $499 for the equipment, but Starlink cautions it can take six or more months to ship in some cases.

A person familiar with Starlink’s effort in Ukraine, speaking on the condition of anonymity to discuss sensitive matters, said there are more than 5,000 terminals in the country.

Still, experts said that even a big Starlink network probably wouldn’t be enough power to keep an entire country online and operating at full-speed. But the terminals can serve as a reliable backup as Internet services falter. Fedorov said he and his staff are having discussions with other European leaders and companies about additional satellite and cellular technologies that could help keep Ukrainians online in the event of greater Internet outages.

Internet flows deteriorated on the first day of Russia’s invasion of Ukraine on Feb. 24 and have not fully recovered, according to data-monitoring services. But since that initial dip, connectivity has remained fairly stable, with mainly temporary, isolated outages even during heavy Russian shelling.

“Every day there are outages, but generally service comes back,” said Doug Madory, director of Internet analysis for Kentik, which monitors global data flows.

Even before Fedorov tweeted at Musk for help, SpaceX was working on a way to get Starlink to Ukraine. President and COO Gwynne Shotwell said in a talk at California Institute of Technology this month that the company had been working for several weeks to get regulatory approval to allow the satellites to communicate in Ukraine.

“But then they tweeted,” she said, according to SpaceNews. “There’s our permission.”

Fedorov’s agency is working to get Starlink terminals to regions where Internet access has been cut off, he said. The systems have in some instances been used to connect people when cellular networks in the country have been overloaded.

Fedorov said that he’s briefly texted with Musk and that the tech billionaire has also had a call with Ukrainian President Volodymyr Zelensky.

There are some concerns that accompany the use of the terminals. Like all satellite communications during war, Starlink signals could be used to detect the location of the antennas, experts say.

While it’s unclear if Russia can use the signals to target attacks, Musk instructed caution on Twitter.

“Important warning: Starlink is the only non-Russian communications system still working in some parts of Ukraine, so probability of being targeted is high,” he tweeted. He added that users should turn on the terminal only when needed and keep it far away from people.

Experts have warned that the devices could give away Ukrainians’ locations to Russian attackers, but that hasn’t been an issue so far, Fedorov said. The devices have usually been used in “densely populated areas where there would be a lot of civilians anyway.”

He said Russian cyberattacks have not ramped up on the systems — yet.

#### Starlink will secure Ukrainian victory – 2 internal links:

#### Information sharing – connectivity is key to morale, foreign support, and Russian infighting

Aral 3/1 [(Sinal, David Austin Professor of Management, IT, Marketing and Data Science at MIT,Director of the MIT Initiative on the Digital Economy, Ph.D. in Information Systems from MIT) “Ukraine is winning the information war,” Washington Post, 3/1/2022] JL \*brackets for ableist language

Today, the information war in Ukraine is more intense, more tightly contested and arguably more important than ever because motivating volunteer fighters at home and encouraging foreign support abroad are critical to success. And this time, it seems, Russia is losing. Reports abound on social media of more than 4,000 Russian casualties, images of [destroyed] ~~crippled~~ Russian helicopters and armored vehicles and cellphone videos of savage Russian missile attacks on civilian targets. This mix of official Ukrainian war statistics combined with videos (both verified and unverified), posted by Ukrainian citizens and sympathizers from the front lines, is painting a vivid picture of a homegrown resistance successfully slowing the advance of a much larger and ostensibly better organized military machine. Facebook posts showing Ukrainians kneeling in front of tanks to stop their progress and Twitter images of women and children sheltering in subways and basements set the emotional backdrop of senseless aggression against a peaceful nation. Viral videos and audio clips evoke a defiant optimism impossible to ignore: Ukrainian President Volodymyr Zelensky appearing via his cellphone walking the streets of Kyiv, unharmed, in a “proof of life” demonstration emphasizing his willingness to stay and fight for his country, despite a U.S. offer to evacuate him, for example, or the recording of soldiers in an isolated Ukrainian outpost on Snake Island, in the Black Sea, cursing and telling off the Russian Black Sea Fleet. These stories are spreading rapidly on social media and subsequently echoing through official news channels in a media feedback loop that amplifies the information war and broadcasts it on television sets all over the world.

Zelensky, in particular, is deftly outmaneuvering Putin in this information war. He rallied Ukrainian men to defend their homeland, used the encrypted messaging platform Telegram to speak directly to the Russian people to counter Putin’s narrative, urged the West to step up its assistance in defense of law, order and peace, and even pleaded with foreigners to cross the border into Ukraine to defend Western democracy. While misinformation exists on both sides, Zelensky gives the impression that he’s more committed to truth and transparency. In contrast, Russia has been secretive, obfuscating the true extent of its incursion into Ukraine, and out of touch, airing the rambling addresses of its leader. It’s as if Putin has forgotten that social media transitioned from text to real-time video around the time of the Crimean annexation. In today’s information war, Russian news claiming Zelensky had turned tail and fled was swiftly countered by a video selfie of the Ukrainian president in Kyiv, vowing to defend his homeland. The symbolic contrast between Zelensky striding through war-torn streets, confident even under fire, and Putin, seated, hunched over a large wooden desk in the safety of a secure office hundreds of miles away from the fighting, is stark.

This time, Facebook, YouTube, Twitter and Google are also proactively engaged in the information war. During the Crimean annexation, they were reactive and struggled to keep up with misinformation and false abuse reports. Today, in Ukraine, they have banned Russian state-owned media from advertising on their platforms and defiantly fact-checked Putin’s propaganda despite Russia’s protests and a full ban of Twitter and a partial ban of Facebook in Russia. Facebook has spun up a special operations center, staffed with native Russian and Ukrainian speakers, to monitor misinformation posted about the war, added warning labels to war-related images that its software detects are more than a year old, and restricted access to content from the state-affiliated Russian media outlets RT and Sputnik. YouTube is restricting access to Russian state-owned media outlets for users in Ukraine, removing Russian state-owned channels from recommendations, and limiting their content’s reach across the platform. Twitter has temporarily banned all ads in Ukraine and Russia, added labels to tweets with links to Russian state-affiliated media and downranked their content in algorithmic timelines. While numerous fake videos are circulating on TikTok about Ukraine, the Chinese-owned platform has no comprehensive policy on policing information about the conflict. Despite blocking state-owned Russian media in the European Union, this information flows freely in Ukraine and Russia on the platform, now dubbed “WarTok” by some observers, in part because it is organizing such videos into a convenient discover playlist by the same name.

The information war is critical to what happens next in Ukraine for several reasons. It motivates the resistance by inspiring Ukrainian citizens to take up arms in defense of their country and motivating them with social proof that they are united and not fighting alone. It encourages foreign assistance, pressuring Europe and the United States to step up their efforts to end the conflict. It fans the flames of protest in Russia, mobilizing the antiwar movement in Moscow and elsewhere in defiance of Putin’s aggression. And it may even eventually demoralize Russian troops, who must be wondering what on earth they are doing in Ukraine if the motivation for the intervention has been a lie all along. When Russia struck a Ukrainian television tower on Tuesday, it seemed to confirm Moscow’s keen awareness of the need to counter Ukraine’s information war and to highlight the importance of information in modern conflicts.

Information campaigns are difficult to quantify during the fog of war. But while it is hard to pinpoint the extent to which the information war is contributing to the overwhelming international unity against Putin’s aggression, one thing is clear: Social media, mainstream media and the narrative framing of the invasion of Ukraine undoubtedly will play an important role in how this conflict ends. Now, vigilance and fortitude are not only needed on the battlefield, where lives and territory will be won and lost, but also will be essential online, where the hearts and minds of the world will be won or lost.

#### Drone warfare – Starlink is key to surveillance and attacks

Brodkin 3/21 [(Jon, covers a wide array of IT and tech policy topics for Ars Technica, studied journalism and literature at Boston University) “Starlink helps Ukraine’s elite drone unit target and destroy Russian tanks,” Ars Technica, 3/21/2022] JL

SpaceX's Starlink Internet is proving to be useful for Ukraine's military as it fights the Russian invasion. In an article Friday titled, "Elon Musk's Starlink helping Ukraine to win the drone war," The Telegraph described how the satellite connection helps the Ukrainian army's Aerorozvidka (Aerial Reconnaissance) unit do its work of "using surveillance and attack drones to target Russian tanks and positions."

The Telegraph wrote:

Amid Internet and power outages, which are expected to get worse, Ukraine is turning to the newly available Starlink system for some of its communications. Drone teams in the field, sometimes in badly connected rural areas, are able to use Starlink to connect them to targeters and intelligence on their battlefield database. They can direct the drones to drop anti-tank munitions, sometimes flying up silently to Russian forces at night as they sleep in their vehicles.

The Ukrainian unit's "most sophisticated drones are connected using Starlink," The Times of London wrote. "If we use a drone with thermal vision at night, the drone must connect through Starlink to the artillery guy and create target acquisition," an Aerorozvidka officer told the paper.

The Times wrote that Aerorozvidka "has been picking off tanks, command trucks, and vehicles carrying electronic equipment since the invasion began," destroying dozens of "priority targets."

#### Ukrainian victory shores up global democracy – the alternative is mass genocide – that’s a decision rule

Applebaum 3/22 [(Anne, Senior Fellow at the Johns Hopkins School of Advanced International Studies and the Agora Institute, where she co-directs Arena, a program on disinformation and 21st century propaganda) “Ukraine Must Win,” The Atlantic, 3/22/2022] JL

Russian planners expected the entire war, the conquest of Ukraine, to last no more than six weeks. More than half that time has already passed. There must be an endgame, a moment when the conflict stops. The Ukrainians, and the democratic powers that support Ukraine, must work toward a goal. That goal should not be a truce, or a muddle, or a decision to maintain some kind of Ukrainian resistance over the next decade, or a vow to “bleed Russia dry,” or anything else that will prolong the fighting and the instability. That goal should be a Ukrainian victory.

Before you can achieve something, you have to imagine what it will look like. And in this war, victory can be imagined without difficulty. It means that Ukraine remains a sovereign democracy, with the right to choose its own leaders and make its own treaties. There will be no pro-Russian puppet regime in Kyiv, no need for a prolonged Ukrainian resistance, no continued fighting. The Russian army retreats back over the borders. Maybe those borders could change, or maybe Ukraine could pledge neutrality, but that is for the Ukrainians to decide and not for outsiders to dictate. Maybe international peacekeepers are needed. Whatever happens, Ukraine must have strong reasons to believe that Russian troops will not quickly return.

Imagine, too, the consequences of such a victory. In Washington, most people have long believed that Ukraine is part of a regional conflict, and that Ukraine is a piece of territory that the Russians care more about than we do and always will. But this is no longer true. The Ukrainians, and especially their president, Volodymyr Zelensky, have made their cause a global one by arguing that they fight for a set of universal ideas—for democracy, yes, but also for a form of civic nationalism, based on patriotism and a respect for the rule of law; for a peaceful Europe, where disputes are resolved by institutions and not warfare; for resistance to dictatorship. Zelensky has urged Americans to remember Pearl Harbor. He appealed to the German Parliament with the phrase “Never again”—a mantra used to mean that no Hitler would be allowed to arise again—and told members that, in light of the brutal war in his country, those words are now “worthless.” He called on the European Parliament to “prove that you indeed are Europeans” and admit Ukraine to the European Union.

This language is effective because it evokes the principles that bind together the majority of Europeans, Americans, and many other people around the world, reminding them of how much worse the world was in the bloodier past, and how much worse it could be in the future if those principles no longer matter. The words Zelensky uses also reverberate because they are true. A victory for Ukraine really will be a victory for all who believe in democracy and the rule of law. Citizens of existing democracies and members of the democratic opposition in Russia, Cuba, Belarus, and Hong Kong will all be emboldened. “Their struggle is ours,” a Venezuelan acquaintance told me last week. The institutions protecting the states that embody those ideas, most notably the European Union and NATO, will be strengthened too.

Zelensky’s words resonated further because the Russians have also given this conflict enormous significance. The Russian foreign minister has just declared that this war will change global politics: “This is not about Ukraine at all, but the world order. The current crisis is a fateful, epoch-making moment in modern history. It reflects the battle over what the world order will look like.” Much as Stalin once declared that, when the Second World War ended, “everyone imposes his own system as far as his army can reach,” President Vladimir Putin had planned for the Russian army to impose Russia’s autocratic, kleptocratic political system on all of Ukraine. Already, the Russian occupation of some eastern-Ukrainian towns resembles the Soviet occupation of Central Europe at the end of World War II. Public officials and civic leaders—mayors and police but also members of Parliament, journalists, museum curators—have been arrested and not seen since. Civilians have been terrorized at random. In Mariupol, authorities report that citizens are being forcibly deported to Russia, just as Soviet secret police deported Balts, Poles, and others to Russia after the invasions of 1939 and 1945. In the case of a Russian victory, these tactics would be applied all over Ukraine, creating mass terror, mass violence, and instability for years to come. And, yes, if we accept that outcome, autocrats from Minsk to Caracas to Beijing will take note: Genocide is now allowed*.*

#### Democracy caps a litany of converging existential threats.

Diamond 19, Professor of Political Science and Sociology at Stanford University, Senior Fellow at the Hoover Institution, Senior Fellow at the Freeman Spogli Institute for International Studies, PhD in Sociology from Stanford University, (Dr. Larry, Ill Winds: Saving Democracy from Russian Rage, Chinese Ambition, and American Complacency, p. 199-202)

The most obvious response to the ill winds blowing from the world’s autocracies is to help the winds of freedom blowing in the other direction. The democracies of the West cannot save themselves if they do not stand with democrats around the world. This is truer now than ever, for several reasons. We live in a globalized world, one in which models, trends, and ideas cascade across borders. Any wind of change may gather quickly and blow with gale force. People everywhere form ideas about how to govern—or simply about which forms of government and sources of power may be irresistible—based on what they see happening elsewhere. We are now immersed in a fierce global contest of ideas, information, and norms. In the digital age, that contest is moving at lightning speed, shaping how people think about their political systems and the way the world runs. As doubts about and threats to democracy are mounting in the West, this is not a contest that the democracies can afford to lose. Globalization, with its flows of trade and information, raises the stakes for us in another way. Authoritarian and badly governed regimes increasingly pose a direct threat to popular sovereignty and the rule of law in our own democracies. Covert flows of money and influence are subverting and corrupting our democratic processes and institutions. They will not stop just because Americans and others pretend that we have no stake in the future of freedom in the world. If we want to defend the core principles of self-government, transparency, and accountability in our own democracies, we have no choice but to promote them globally. It is not enough to say that dictatorship is bad and that democracy, however flawed, is still better. Popular enthusiasm for a lesser evil cannot be sustained indefinitely. People need the inspiration of a positive vision. Democracy must demonstrate that it is a just and fair political system that advances humane values and the common good. To make our republics more perfect, established democracies must not only adopt reforms to more fully include and empower their own citizens. They must also support people, groups, and institutions struggling to achieve democratic values elsewhere. The best way to counter Russian rage and Chinese ambition is to show that Moscow and Beijing are on the wrong side of history; that people everywhere yearn to be free; and that they can make freedom work to achieve a more just, sustainable, and prosperous society. In our networked age, both idealism and the harder imperatives of global power and security argue for more democracy, not less. For one thing, if we do not worry about the quality of governance in lower-income countries, we will face more and more troubled and failing states. Famine and genocide are the curse of authoritarian states, not democratic ones. Outright state collapse is the ultimate, bitter fruit of tyranny. When countries like Syria, Libya, and Afghanistan descend into civil war; when poor states in Africa cannot generate jobs and improve their citizens’ lives due to rule by corrupt and callous strongmen; when Central American societies are held hostage by brutal gangs and kleptocratic rulers, people flee—and wash up on the shores of the democracies. Europe and the United States cannot withstand the rising pressures of immigration unless they work to support better, more stable and accountable government in troubled countries. The world has simply grown too small, too flat, and too fast to wall off rotten states and pretend they are on some other planet. Hard security interests are at stake. As even the Trump administration’s 2017 National Security Strategy makes clear, the main threats to U.S. national security all stem from authoritarianism, whether in the form of tyrannies from Russia and China to Iran and North Korea or in the guise of antidemocratic terrorist movements such as ISIS.1 By supporting the development of democracy around the world, we can deny these authoritarian adversaries the geopolitical running room they seek. Just as Russia, China, and Iran are trying to undermine democracies to bend other countries to their will, so too can we contain these autocrats’ ambitions by helping other countries build effective, resilient democracies that can withstand the dictators’ malevolence. Of course, democratically elected governments with open societies will not support the American line on every issue. But no free society wants to mortgage its future to another country. The American national interest would best be secured by a pluralistic world of free countries—one in which autocrats can no longer use corruption and coercion to gobble up resources, alliances, and territory. If you look back over our history to see who has posed a threat to the United States and our allies, it has always been authoritarian regimes and empires. As political scientists have long noted, no two democracies have ever gone to war with each other—ever. It is not the democracies of the world that are supporting international terrorism, proliferating weapons of mass destruction, or threatening the territory of their neighbors.

## 1NC – CP

#### CP: Private entities ought not engage in the exclusive use of Low Earth Orbit via Large Satellite Constellations except for large satellite constellations equipped with space nuclear thermal and electric propulsion.

#### Space militarization is inevitable – new satellite constellations with nuclear thermal propulsion are key to maneuverability and resilience that secure US space dominance

Stone 7/8 [(Christopher, Professor of Space Strategy at Missouri State University's Graduate Department of Defense and Strategic Studies, Senior Fellow for Space Studies for the Mitchell Institute’s Spacepower Advantage Research Center) “Maneuver warfare in space: The strategic imperative for nuclear thermal propulsion,” Defense News, 7/8/2021] JL

It is important to understand that while there will always be a need for space missions that provide support to warfighters, the way they are conducted, protected, and defended must change given China and Russia’s rapid development of counterspace weapons. While mostly out of sight of the public, military and commercial space operators are already experiencing a contested space environment. Purposeful interference, like the jamming of space-based assets and their communication links to their terrestrial control facilities, occurs on a routine basis. In addition, allied space-faring nations like France have had adversary spacecraft rendezvous, with their national security satellites—meaning they approached them closely, to within visual range or closer—without warning or prior coordination.7 While it is possible to interpret these incidents as reconnaissance activities, it is more likely they are preparatory efforts for more aggressive actions in space by China and Russia. And, though not exactly the same, these actions could be compared to aggressive posturing of naval craft at sea or airspace infringements in the air in that they are likely meant to intimidate or incite a defensive response. The implications of these threats cannot be overstated. They will alter numerous U.S. military operating assumptions and demand new capabilities, like the ability to maneuver rapidly between orbits to provide offensive, defensive, and warfighting support capabilities from space wherever needed.

It also cannot be overstated that modern terrestrial military operations cannot be executed without space-based systems. Consider the U.S. Space Force’s GPS satellite constellation. GPS provides positioning, navigation, and timing information globally and is inextricably integrated with much of the free world’s critical infrastructure. If an attack significantly degraded this one constellation, it would disrupt national and international air travel, banking networks, data collection, and other operations and networks upon which our society depends. The GPS constellation also provides navigation and timing signals the U.S. military needs to conduct many of its operations, including precision air drops in support of disaster relief missions and precision strikes in time of war. This is just one example of why the increasing adversary threats to space assets need to be addressed seriously.

The stark vision of a contested space domain is articulated in DOD’s 2020 Defense Space Strategy, which describes China as the “most immediate and serious threat” to U.S. national security objectives in space.8 This strategy argues that a more resilient national security space architecture is needed to counter emerging threats. Resiliency measures include the development of satellite constellations that can absorb limited kinetic and nonkinetic attacks and continue to provide critical services to U.S. air, land, and sea forces worldwide—in other words, constellations with enough nodes that there is no single point of failure. This is currently not the case with most current GEO constellations that rely on a handful of large, monolithic satellites that can be easily targeted. Enemy attacks that eliminate a relatively small number of satellites in these constellations could greatly disrupt the overhead surveillance, global communications, and other capabilities they provide.

One operating concept to facilitate this strategy is to launch what is known as proliferated LEO satellite constellations. The proliferated LEO satellite concept entails deploying hundreds, even thousands of small satellites in constellations to form a “mesh” network that does not have a single point of failure whose destruction would have an outsized effect. Denying enemies the ability to inflict a quick knockout blow is exactly what force designs like this are intended to achieve. However, proliferating satellites in LEO alone will not be enough to address the full range of space weapons that China and Russia are pursuing.9

To this point, U.S. satellites—whether they are in legacy monolithic constellations or proliferated constructs—operate in orbits that are predictable and can be tracked by adversaries that have even a basic space tracking network. China believes that both types of constellations are “easy to attack and difficult to defend.” Plus, not every satellite mission system can operate in a proliferated LEO constellation.10 In addition to creating constellations that eliminate critical points of failure, DOD should begin to deploy satellites that can move, or maneuver, to avoid attacks and change orbits as needed. Without this flexibility and maneuverability, DOD’s push to field larger numbers of satellites per constellation may simply provide more targets for an adversary to destroy.11 While this does present a dilemma to the adversary, it becomes a more surmountable one as their space offensive capabilities improve.

The ability for satellites to accomplish small maneuvers in space is not new. Current satellite constellations are controlled by either chemical or electric propulsion. Electric propulsion, while very efficient, is very slow. Chemical propellant, while very powerful with thrust, is not fuel-efficient and as such only provides limited options in a dynamic, warfighting domain such as space. Most satellites can use chemical propellant-powered thrusters to maintain their desired orbit, execute limited maneuvers like adjusting their position to perform a specific tasking, or deorbit after mission completion. Given the cost and other challenges associated with launching mass into space, satellites typically carry small amounts of chemical propellant. Expending this limited store of propellant to avoid rapidly moving threats would reduce a satellite’s operational lifespan, which would prematurely end its mission life and require an early replacement.

A better way to harness the advantages of maneuver in space is to develop a more powerful and fuel-efficient means of doing so, which is why space nuclear thermal and electric propulsion technologies must be part of DOD’s future space force design. This technology will allow DOD to adopt a space strategy that includes fielding a maneuverable force that is more survivable and has other operational defensive and offensive benefits. In short, SNTP will empower an entirely new era of maneuver warfare in space.

SNTP technology has existed for several decades. From the 1960s to the 1980s, the United States matured SNTP technologies but never operationalized them simply because the threat environment at the time did not require the ability to rapidly maneuver on orbit. The situation is now radically different—China has already shifted to a strategy of maneuver warfare in space that leverages space-based and ground-based weapons systems, and by 2040 they plan for their architecture to include space vehicles with nuclear thermal and electric propulsion.12 The era of change we are seeing on orbit is akin to the time when mechanized armor first showed up on the battlefield in World War I. Numerous modes of military operations that had previously been critical to warfare, including horse cavalry, were rendered obsolete by tanks, aircraft, and machine guns. Those who failed to recognize and adapt to this new reality were massively overcome.

#### US space dominance prevents global nuclear war

**Zubrin 15** [(Robert Zubrin, president of Pioneer Energy, a senior fellow with the Center for Security Policy) “US Space Supremacy is Now Critical,” Space News, 1/22/15, https://spacenews.com/op-ed-u-s-space-supremacy-now-critical/] TDI

The United States needs a new national security policy. For the first time in more than 60 years, we face the real possibility of a large-scale conventional war, and we are woefully unprepared. Eastern and Central Europe is now so weakly defended as to virtually invite invasion. The United States is not about to go to nuclear war to defend any foreign country. So deterrence is dead, and, with the German army cut from 12 divisions to three, the British gone from the continent, and American forces down to a 30,000-troop tankless remnant, the only serious and committed ground force that stands between Russia and the Rhine is the Polish army. It’s not enough. Meanwhile, in Asia, the powerful growth of the Chinese economy promises that nation eventual overwhelming numerical force superiority in the region. How can we restore the balance, creating a sufficiently powerful conventional force to deter aggression? It won’t be by matching potential adversaries tank for tank, division for division, replacement for replacement. Rather, the United States must seek to totally outgun them by obtaining a radical technological advantage. This can be done by achieving space supremacy.To grasp the importance of space power, some historical perspective is required. Wars are fought for control of territory. Yet for thousands of years, victory on land has frequently been determined by dominance at sea. In the 20th century, victory on both land and sea almost invariably went to the power that controlled the air. In the 21st century, victory on land, sea or in the air will go to the power that controls space. The critical military importance of space has been obscured by the fact that in the period since the United States has had space assets, all of our wars have been fought against minor powers that we could have defeated without them. Desert Storm has been called the first space war, because the allied forces made extensive use of GPS navigation satellites. However, if they had no such technology at their disposal, the end result would have been just the same. This has given some the impression that space forces are just a frill to real military power — a useful and convenient frill perhaps, but a frill nevertheless. But consider how history might have changed had the Axis of World War II possessed reconnaissance satellites — merely one of many of today’s space-based assets — without the Allies having a matching capability. In that case, the Battle of the Atlantic would have gone to the U-boats, as they would have had infallible intelligence on the location of every convoy. Cut off from oil and other supplies, Britain would have fallen. On the Eastern front, every Soviet tank concentration would have been spotted in advance and wiped out by German air power, as would any surviving British ships or tanks in the Mediterranean and North Africa. In the Pacific, the battle of Midway would have gone very much the other way, as the Japanese would not have wasted their first deadly airstrike on the unsinkable island, but sunk the American carriers instead. With these gone, the remaining cruisers and destroyers in Adm. Frank Jack Fletcher’s fleet would have lacked air cover, and every one of them would have been hunted down and sunk by unopposed and omniscient Japanese air power. With the same certain fate awaiting any American ships that dared venture forth from the West Coast, Hawaii, Australia and New Zealand would then have fallen, and eventually China and India as well. With a monopoly of just one element of space power, the Axis would have won the war. But modern space power involves far more than just reconnaissance satellites. The use of space-based GPS can endow munitions with 100 times greater accuracy, while space-based communications provide an unmatched capability of command and control of forces. Knock out the enemy’s reconnaissance satellites and he is effectively blind. Knock out his comsats and he is deaf. Knock out his navsats and he loses his aim. In any serious future conventional conflict, even between opponents as mismatched as Japan was against the United States — or Poland (with 1,000 tanks) is currently against Russia (with 12,000) — it is space power that will prove decisive. Not only Europe, but the defense of the entire free world hangs upon this matter. For the past 70 years, U.S. Navy carrier task forces have controlled the world’s oceans, first making and then keeping the Pax Americana, which has done so much to secure and advance the human condition over the postwar period. But should there ever be another major conflict, an adversary possessing the ability to locate and target those carriers from space would be able to wipe them out with the push of a button. For this reason, it is imperative that the United States possess space capabilities that are so robust as to not only assure our own ability to operate in and through space, but also be able to comprehensively deny it to others. Space superiority means having better space assets than an opponent. Space supremacy means being able to assert a complete monopoly of such capabilities. The latter is what we must have. If the United States can gain space supremacy, then the capability of any American ally can be multiplied by orders of magnitude, and with the support of the similarly multiplied striking power of our own land- and sea-based air and missile forces be made so formidable as to render any conventional attack unthinkable. On the other hand, should we fail to do so, we will remain so vulnerable as to increasingly invite aggression by ever-more-emboldened revanchist powers. This battle for space supremacy is one we can win. Neither Russia nor China, nor any other potential adversary, can match us in this area if we put our minds to it. We can and must develop ever-more-advanced satellite systems, anti-satellite systems and truly robust space launch and logistics capabilities. Then the next time an aggressor commits an act of war against the United States or a country we are pledged to defend, instead of impotently threatening to limit his tourist visas, we can respond by taking out his satellites, effectively informing him in advance the certainty of defeat should he persist. If we desire peace on Earth, we need to prepare for war in space.

#### Only the private sector can spearhead NTP – NASA is too slow and has bowed out

Wendel 20 [(JoAnna, Space.com contributor) “Private companies find role in developing nuclear power for space travel” Space.com, 4/6/2020. https://www.space.com/commercial-nuclear-power-for-faster-space-travel.html] BC

Nuclear technology has powered spacecraft such as NASA's Mars rovers, the Cassini mission and the two Voyagers that are currently exploring the outer reaches of our solar system. But those fuel sources rely on the passive decay of radioactive plutonium, converting heat from that process into electricity to power the spacecraft.

Instead, the CST panelists discussed Nuclear Thermal Propulsion (NTP), a technology developed in the 1960s and '70s that relies on the splitting, or fission, of hydrogen atoms. Although fission is associated with more warlike images, the panel's experts emphasized the safety of nuclear thermal propulsion, which would use low-enriched uranium.

An NTP-powered spacecraft would pump hydrogen propellant through a miniature nuclear reactor core. Inside this reactor core, high energy neutrons would split uranium atoms in fission reactions; those freed neutrons would smack into other atoms and trigger more fission. The heat from these reactions would convert the hydrogen propellent into gas, which would produce thrust when forced through a nozzle.

This chain reaction is the key to NTP's power, panelist Venessa Clark, CEO of Atomos Space, a company that’s developing thermonuclear propulsion powered spacecraft to provide in-space transportation options to satellite operators, told Space.com. A soda-can-size fission reactor could propel humans to Mars in just three to four months, she said, about twice as fast as the currently estimated time it could take a chemically propelled ship to carry humans to the Red Planet.

"The reason we want to use a reactor is we have a lot of power from [it], which is really what enables us to be so agile and move such heavy payloads so quickly," Clark said.

So where does the commercial sector fit in? According to Jeff Thornburg, CEO of Interstellar Technologies, an aerospace engineering company focused on propulsion, and another panelist, it's the speed that commercial ventures offer, which can get new technologies off the ground both literally and figuratively.

"I know how fast we've changed the dynamic and how we develop technologies for the commercial space sector for launch now, which didn't exist 20 years ago," Thornburg told Space.com. He wants to apply that same methodology to developing fast and efficient nuclear propulsion.

"I don't think the government's going to be able to move quickly enough to stay competitive in this technology area," Thornburg said. He noted that NASA is currently focused on its Artemis lunar program and launching to the moon doesn't necessarily require nuclear technology.

Sending astronauts to Mars and minimizing their time in a dangerous radiation environment however, may require a faster propulsion system, and that's what NTP technology might provide.

But the government still has to play some role, both Clark and Thornburg said. Government agencies like NASA and the military branches may be the first clients for these commercial companies. Clark noted NASA's recent pushes to partner with the private sector, such as its commercial lunar payload services program and its commercial crew program.

"Government players, NASA and also now the Air Force are looking at procuring services rather than funding the development of technology, which is really exciting for us," Clark said.

## 1NC – Case

### Collisions

#### Use or lose is wrong – It’d be irrational AND never be contemplated by any state.

Kroenig 18 Matthew Kroenig, Associate Professor in the Department of Government and the Edmund A. Walsh School of Foreign Service at Georgetown, The Logic of American Nuclear Strategy: Why Strategic Superiority Matters, Oxford UPress, pp. 137-142

The second, and more common, argument as to why nuclear superiority might be destabilizing is because the state in the position of nuclear inferiority (in this case, America’s adversaries) may feel “use ’em or lose ’em” (UELE) pressures, but this argument also withers under interrogation.26

According to strategic stability theorists, a US nuclear advantage increases the danger of nuclear war because the inferior opponent may fear that its nuclear arsenal is vulnerable to a first strike. Rather, than wait for the adversary (in this case the United States) to move first and wipe out, or seriously blunt, its strategic forces, the argument goes, the inferior state may decide to intentionally launch a nuclear war early in a crisis in order to avoid suffering a disarming first strike. This is the logic most often invoked by strategic stability theorists when they claim that US nuclear advantages are destabilizing. This is also the precise problem identified and inspired by Wohlstetter’s basing studies.

Use ’em or lose ’em enjoys a certain superficial plausibility, but, upon closer inspection, there are two fundamental reasons why the logic simply does not hold up. First, it ignores the fact that the superior state retains a healthy ability to retaliate. So, even if the inferior state is worried about having its nuclear weapons eliminated in a first strike, the decision to launch its nuclear weapons first as a coping mechanism would be a decision to intentionally launch a nuclear war against a state with at least a secure, second-strike capability. This means that even if the inferior state launches its nuclear weapons first, it will be virtually guaranteed to suffer devastating nuclear retaliation. Moreover, given that it is in a situation of extreme inferiority (so extreme that it might even be vulnerable to a preemptive nuclear strike), this would mean intentionally launching a devastating nuclear war that will likely turn out much worse for itself then for its opponent. It would simply be irrational for a state to intentionally launch a nuclear war against a state with an assured retaliatory capability.

Let us consider a concrete example. The United States maintains nuclear superiority over China, as we have seen in previous chapters. Strategic stability theorists want us to believe that if the United States takes additional steps to further enhance its superiority, then China would face even greater temptations to launch a nuclear first strike against the US homeland in the event of a serious crisis. In other words, strategic stability theorists hold that China would be so worried about losing a devastating nuclear war against United States that it would intentionally choose to start a devastating nuclear war against the United States. The argument does not make sense.

#### Constellations are comparatively less vulnerable to hacking

Moriyasu 4/21 [(Ken, reporter and editor with 20-plus years of experience at Nikkei, Japan's top financial newspaper, and Nikkei Asia) “China can 'grapple' US satellites with robotic arm, commander says,” Nikkei Asia, 4/21/2021] JL

Sen. Angus King, an independent from Maine, noted that "in a conflict, the very first thing that an enemy will try to do is a major cyberattack and to try to blind us." King asked whether having a constellation of small satellites, rather than large, multibillion-dollar satellites, would be harder to disable at the beginning of a conflict.

"Small satellites, many satellites in orbit, provides us a ... resilient capability that would be very difficult to degrade," Dickinson replied. "Whether it's communications, whether it's [intelligence, surveillance and reconnaissance], whether it's missile warning, those types of activities I think will absolutely be more redundant, more resilient, if we have a what we call a mesh network if you will, in a constellation."

#### Orbit alteration and autonomous avoidance solve collisions

Kan 12/1 [(Michael, PCMag reporter since October 2017, covers a wide variety of news topics, including consumer devices, the PC industry, cybersecurity, online communities, and gaming) “Starlink Satellite Orbits Changed to Avoid Debris After Russia's Missile Test,” PC Magazine, 12/1/2021] JL

SpaceX has altered the orbits for its [Starlink](https://www.pcmag.com/how-to/what-is-starlink-spacex-satellite-internet-service-explained) satellites, likely to prevent them from colliding with debris from Russia’s anti-satellite missile test.

On Tuesday, SpaceX CEO Elon Musk mentioned the issue after NASA abruptly delayed a spacewalk on the International Space Station due to the threat of space debris. In his [tweet](https://twitter.com/elonmusk/status/1465761470147346435?s=20), Musk said: “We had to shift some Starlink satellite orbits to reduce probability of collision. Not great, but not terrible either.”

Musk didn’t explicitly blame the space debris on Russia’s anti-satellite missile test. Nevertheless, the “Not great, but not terrible” quote may be a subtle jab at the Russian government. The [same line](https://www.youtube.com/watch?v=Mg5HOnq7zD0) is used in the HBO series *Chernobyl*, which dramatizes the 1986 nuclear plant disaster in the Soviet Union. (In the show, a nuclear plant worker utters the line “Not great, but not terrible,” when in reality the conditions at the facility are catastrophic.)

Last month, the US was quick to [condemn](https://www.pcmag.com/news/report-russian-anti-satellite-weapons-test-causes-dangerous-space-debris) Russia’s anti-satellite missile test, which involved the Kremlin sending up a missile to destroy one of its own defunct satellites. The ensuing impact caused hundreds of thousands of pieces of debris to spill out into orbit, according to the US.

Because space debris can travel up to 17,500 miles per hour, even a small artifact can cause serious damage if strikes a spacecraft or an astronaut. "Russia's dangerous and irresponsible behavior jeopardizes the long-term sustainability of outer space,” the US State Department said at the time.

However, Russia [claims](https://tass.com/science/1362125) the resulting debris poses no danger to any space activity. The Kremlin also points out other countries have embarked on their own anti-satellite missile tests too.

To avoid space debris, SpaceX has equipped each Starlink satellite with an “autonomous collision avoidance” system. The same satellites will eventually descend and burn up in Earth’s atmosphere within one to five years if the propulsion system on board ever fails.

#### No hacking – SpaceX is honing defenses and can stop jamming

Malik 3/5 [(Tariq, Editor-in-Chief of Space.com, BA in Journalism and Astronomy from the University of Southern California) “Elon Musk says SpaceX focusing on cyber defense after Starlink signals jammed near Ukraine conflict areas,” Space, 3/5/2022] JL

SpaceX founder and CEO Elon Musk said Friday that his company is now focusing on cyber defense and overcoming signal jamming of its Starlink internet satellites amid Russia's ongoing invasion of Ukraine.

Musk and SpaceX sent Starlink terminals to Ukraine at the request of a government official after internet service was disrupted across the country by the Russian invasion. A shipment of Starlink ground terminals, which use an antenna and terminal to access the satellite broadband service, arrived in Ukraine by Monday Feb. 28). With the terminals in use, SpaceX is working to keep them online, Musk said.

"Some Starlink terminals near conflict areas were being jammed for several hours at a time," Musk wrote in a Twitter statement Friday (March 1). "Our latest software update bypasses the jamming."

Musk later said SpaceX is shifting its focus to keeping its Starlink service uninterrupted in Ukraine and likely elsewhere.

"SpaceX reprioritized to cyber defense & overcoming signal jamming," he wrote Friday. Musk quipped that the measures were a bit of unexpected quality assurance work for the Starlink system.

#### Cyber-attacks won’t escalate---collateral damage, international blowback, reciprocal use, and empirics---robust quantitative data proves

Gudgel 16---Ph.D. Candidate in Public Policy with a Focus on U.S. Cybersecurity Policy at George Mason Universty [John E. Gudgel, “Cyber War versus Cyber Realities: Cyber Conflict in the International System” *Small Wars & Insurgencies*, Taylor and Francis Group, Date Accessed: 4-16-17]

Valeriano and Maness view cyber conflict through the lens of international relations and primarily focus on cyber interactions among states and directed towards states in the realm of foreign policy. They argue: ‘while cyberspace is a separate domain, it is not unconnected from the normal political domain that is the genesis of conflicts’ (p. 15). Following an introductory chapter outlining the contours of the cyber conflict world, eight subsequent chapters build and defend their theoretical framework for the analysis and prediction of cyber conflict in the international system. One of their major conclusions is that ‘cyber conflict has not changed how states operate, it has not led to a revolution in military affairs, and the fears associated with the tactic are overblown’ (p. 209).

A key component of the authors’ framework described in Chapter 3 is their Theory of Cyber Restraint that holds that due to fears of collateral damage, blowback, and replication states will restrain themselves from unleashing the full weight of their cyber capabilities. In delineating this theory, Valeriano and Maness stake out a clear middle path between authors such as Richard Clarke and Robert Knake who believe that cyber war has already begun,2 and Thomas Rid who contends that cyber war will never take place.3 They frame their approach as cyber moderation: the concept that cyber conflict will occur, but that the conflicts themselves will be trivial and will not significantly change state behavior (p. 39). From their theory and approach, they then propose nine hypotheses on interstate cyber interactions.

One of the primary contributions of the authors’ research is the construction of an open source and peer-vetted database of cyber incidents and disputes between countries called the Dyadic Cyber Incident and Dispute Dataset (DCID). The 1.0 version of the dataset currently contains 111 cyber incidents (defined as short-term isolated cyber operations) and 45 cyber disputes (defined as longer-term operations that can contain several incidents) between state-to-state rivals over an 11-year period (2001 to 2011) including 21 cyber incidents and 5 cyber disputes between China and the United States. In creating this dataset, the authors recognized the attribution problem and only included incidents and disputes where state-based involvement was explicit and evident (p. 84).

Using this dataset, Valeriano and Maness in Chapters 4 and 5 quantitatively analyze interstate cyber actions including the ‘scope, length, and damage inflicted by cyber disputes among rival states’ (p. 78) from 2001 to 2011. Some of the research questions they address include: What factors might predict the occurrence, targets, and level of severity in cyber conflict between states? What are the foreign policy implications of cyber conflict? Do cyber incidents influence and lead to more conflictual relations?

What they found was ‘that the actual magnitude and pace of cyber disputes among rivals do not match popular perception; only 20 of 126 active rivals have engaged in cyber conflict, and their interactions have been limited in terms of magnitude and frequency’ (p. 18). Further, they found that most cyber incidents are regional (e.g. India–Pakistan), focused predominately on espionage and low-level DDoS attacks, and were largely ineffective in getting states to change behavior. There was also little evidence of state-supported or sponsored groups utilizing cyber terrorism. They back up their quantitative data with a series of case studies looking at the most significant recent cyber conflicts involving state (Chapter 6) and non-state (Chapter 7) actors. They then propose a system of rules and norms in cyberspace based on the Just War tradition (Chapter 8).

#### Won’t go nuclear.

Fung, 16 — Brian Fung; Reporter focusing on telecommunications, media, and competition—MSc, international relations. Citing Maj. General Jack Weinstein. (5-26-2016; "The real reason America controls its nukes with ancient floppy disks;" *Washington Post*; https://www.washingtonpost.com/news/the-switch/wp/2016/05/26/the-real-reason-america-controls-its-nukes-with-ancient-floppy-disks/; //GrRv)

As it happens, a similar logic underpins the U.S. military’s continued use of floppy disks. The fact that America’s nuclear forces are disconnected from digital networks actually acts as a buffer against hackers. As Maj. General Jack Weinstein told CBS’s “60 Minutes” in 2014: Jack Weinstein: I'll tell you, those older systems provide us some -- I will say huge safety when it comes to some cyber issues that we currently have in the world. Lesley Stahl: Now, explain that. Weinstein: A few years ago we did a complete analysis of our entire network. Cyber engineers found out that the system is extremely safe and extremely secure on the way it's developed. Stahl: Meaning that you're not up on the Internet kind of thing? Weinstein: We're not up on the Internet. Stahl: So did the cyber people recommend you keep it the way it is? Weinstein: For right now, yes. In other words, the rise of hackers and cyberwarfare is exactly why even technologically obsolete systems can still serve a valuable purpose.

#### Sat attacks don’t cause nuke war

Zarybnisky 18 [Eric J. Zarybnisky, MA in National Security Studies from the Naval War College, PhD in Operations Research from the MIT Sloan School of Management, Lt Col, USAF. Celestial Deterrence: Deterring Aggression in the Global Commons of Space. March 28, 2018. <https://apps.dtic.mil/dtic/tr/fulltext/u2/1062004.pdf>]

PREVENTING AGGRESSION IN SPACE

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

### Astronomy

#### No link – only compromises astronomy for objects further away than Neptune, but 1AC Spencer is all about asteroids that are way closer – in blue

It turns out, some astronomers have reason to be concerned. Certain types of astronomy may be more negatively affected than others, one peer-reviewed study shows, particularly those kinds that scour large swaths of the sky over long periods of time looking for faint, faraway objects. That means scientists looking for distant objects beyond Neptune — including the hunt for the mysterious Planet Nine — might have trouble when Starlink is complete. Additionally, Starlink may be much more visible during twilight hours, or the first few hours of the night, which could be a major problem in the hunt for massive asteroids headed toward Earth. “It depends on what science you’re doing, and that’s really what it comes down to,” Jonathan McDowell, an astrophysicist at Harvard and spaceflight expert who wrote the study accepted by Astrophysical Journal Letters, tells The Verge.

#### No internal link – none of their ev explains how astronomy solves asteroid impacts – at best, we know they’re coming but that doesn’t do anything

#### Detection alone is inadequate

Hasco 5/4 [(Linda, reporter at Penn Live) “NASA simulation confirms there’s no technology able to stop a massive asteroid from hitting,” Penn Live, 5/4/2021] JL

Simulations carried out by leading space agencies have concluded. There currently is no technology available that could stop a massive asteroid from “wiping out” Europe.

A report by Independent said that NASA conducted the week-long exercise, which concluded from the hypothetical impact scenario, that even with a six-month advance notice, current capabilities could not prevent a catastrophe.

Participants in the simulation, which was conducted during a planetary defense conference hosted by the United Nations, said the only course of action on such short notice would be evacuation of an area before an asteroid hit. However, the simulation’s impact zone covered large parts of North Africa and Europe.

Reportedly, the hypothetical impact exercise revealed that governments are dreadfully unprepared for this type of disaster.

Lindley Johnson, Nasa’s Planetary Defense Officer noted that this kind of exercise helps reveal who the “key players are in a disaster event, and who needs to know what information and when,” the report cited.

Johnson added that the exercises help with communication among the planetary defense community and their governments to ensure a coordinated effort in the event of a future potential impact threat.

The news of the simulation’s failure evoked a response from SpaceX boss Elon Musk, who said the current inadequate capability to deal with an impact threat was “one of many reasons why we need larger and more advanced rockets.”

SpaceX recently secured a $2.89 billion contract with NASA to develop its next-generation Starship spacecraft. SpaceX claims that Starship, when combined with its Super Heavy rocket Booster, will be “the world’s most powerful launch vehicle ever developed,” and could “theoretically” assist in missions designed to redirect the path of an Earth-bound asteroid.

NASA is working on asteroid deflection technology which will attempt to change the orbit of an asteroid and hopefully give credence that such a strategy could be effective at mitigating the threat of dangerous near-Earth objects in the future.

#### No risk of extinction from asteroids---the probability of one hitting earth is extremely slim and countries developing prevention methods now

Inigo Monzon, IBT Correspondent, 9-2-2019, "Scientist Reveals Truth About Earth’s Chances Of Surviving An Asteroid Impact", International Business Times, 9-2-2019, https://www.ibtimes.com/scientist-reveals-truth-about-earths-chances-surviving-asteroid-impact-2820951, hec)

Dr. Lewiss Dartnell, a professor of science communication, believes that humans have a very good chance of enduring an asteroid impact. Despite what happened to the dinosaurs 66 million years ago, Dartnell thinks that humans are not in danger of going extinct due to an asteroid strike. The professor noted that in order to wipe out all life on Earth, an asteroid has to be hundreds or even thousands of kilometers long. Although NASA has already detected and identified asteroids that are certainly big enough to kill planets, the agency noted that none of these are currently on a collision course with Earth. “The Earth is not going to be destroyed by an asteroid,” Dartnell told Mashable India. “Alright, so a different question might be, could all life on Earth be driven to extinction by asteroids?” “Again, the answer would be that no,” he continued. “There’s no asteroid big enough that on a collision with the Earth could do that.” Dartnell, however, believes that there asteroids out there that can easily take out cities. Despite this, he still believes that chances of city-killers hitting Earth are very slim. One of the currently known asteroids that are capable of destroying entire cities is Apophis. Scientists once thought that his asteroid, which measures about 1,214 feet long, was in danger of colliding with Earth in the next decade. However, after follow-up observations, space agencies ruled out a possible collision between Apophis and Earth in the near future. “If we were very, very unlucky, and they strike over a major city, then they could destroy the city,” Dartnell said. “But the chances of that happening are very unlikely.” “Asteroid Apophis is one of the asteroids that we are tracking and we know that it is not going to impact for the next few decades and will continue on trail,” the professor added. Aside from the asteroid’s slim chances, space agencies from various countries are hatching their own plans to save Earth from getting hit by a massive space boulder.

### Ozone

#### 1AC Pultarova is about rocket launches – means any other activity in space thumps, like colonization and military usage – also concludes that holes are temporary

"We know that alumina does deplete ozone just from rocket launches themselves because a lot of solid-fuel rockets use, or have, alumina as a byproduct," Boley said. "That creates these little temporary holes in the stratospheric ozone layer. That's one of the biggest concerns about compositional changes to the atmosphere that spaceflight can cause."

#### Even if ozone increasing now, 1AC Browne concludes that holes are long term inevitable because of global warming – blue

It could have alarming implications for the way our current world is headed, regarding rising global temperatures. Researchers from the University of Southampton have been investigating an extinction event that occurred at the end of the Devonian geological period.

During their study, they found evidence that plant spores from around the time had been damaged by UV radiation, suggesting that the Earth’s ozone layer was not providing sufficient protection from the sun’s deadly rays.

While it is already known that ozone depletion could lead to an extinction event, the scientists were alarmed by the reason behind why the ozone depletion seemed to have occurred.

The researchers discovered that this particular ozone erasure could have been linked to global warming, which the scientists described as a “new mechanism for mass extinctions.”

#### Tourism thumps

Marais 21 Eloise Marais 7-19-2021 "Space tourism: rockets emit 100 times more CO₂ per passenger than flights – imagine a whole industry" <https://theconversation.com/space-tourism-rockets-emit-100-times-more-co-per-passenger-than-flights-imagine-a-whole-industry-164601> (Associate Professor in Physical Geography, UCL)//Elmer

The commercial race to get tourists to space is heating up between Virgin Group founder Sir Richard Branson and former Amazon CEO Jeff Bezos. On Sunday 11 July, Branson ascended 80 km to reach the edge of space in his piloted Virgin Galactic VSS Unity spaceplane. Bezos’ autonomous Blue Origin rocket is due to launch on July 20, coinciding with the anniversary of the Apollo 11 Moon landing. Though Bezos loses to Branson in time, he is set to reach higher altitudes (about 120 km). The launch will demonstrate his offering to very wealthy tourists: the opportunity to truly reach outer space. Both tour packages will provide passengers with a brief ten-minute frolic in zero gravity and glimpses of Earth from space. Not to be outdone, Elon Musk’s SpaceX will provide four to five days of orbital travel with its Crew Dragon capsule later in 2021. What are the environmental consequences of a space tourism industry likely to be? Bezos boasts his Blue Origin rockets are greener than Branson’s VSS Unity. The Blue Engine 3 (BE-3) will launch Bezos, his brother and two guests into space using liquid hydrogen and liquid oxygen propellants. VSS Unity used a hybrid propellant comprised of a solid carbon-based fuel, hydroxyl-terminated polybutadiene (HTPB), and a liquid oxidant, nitrous oxide (laughing gas). The SpaceX Falcon series of reusable rockets will propel the Crew Dragon into orbit using liquid kerosene and liquid oxygen. Burning these propellants provides the energy needed to launch rockets into space while also generating greenhouse gases and air pollutants. Large quantities of water vapour are produced by burning the BE-3 propellant, while combustion of both the VSS Unity and Falcon fuels produces CO₂, soot and some water vapour. The nitrogen-based oxidant used by VSS Unity also generates nitrogen oxides, compounds that contribute to air pollution closer to Earth. Roughly two-thirds of the propellant exhaust is released into the stratosphere (12 km-50 km) and mesosphere (50 km-85 km), where it can persist for at least two to three years. The very high temperatures during launch and re-entry (when the protective heat shields of the returning crafts burn up) also convert stable nitrogen in the air into reactive nitrogen oxides. These gases and particles have many negative effects on the atmosphere. In the stratosphere, nitrogen oxides and chemicals formed from the breakdown of water vapour convert ozone into oxygen, depleting the ozone layer which guards life on Earth against harmful UV radiation. Water vapour also produces stratospheric clouds that provide a surface for this reaction to occur at a faster pace than it otherwise would. Space tourism and climate change Exhaust emissions of CO₂ and soot trap heat in the atmosphere, contributing to global warming. Cooling of the atmosphere can also occur, as clouds formed from the emitted water vapour reflect incoming sunlight back to space. A depleted ozone layer would also absorb less incoming sunlight, and so heat the stratosphere less. Figuring out the overall effect of rocket launches on the atmosphere will require detailed modelling, in order to account for these complex processes and the persistence of these pollutants in the upper atmosphere. Equally important is a clear understanding of how the space tourism industry will develop. Virgin Galactic anticipates it will offer 400 spaceflights each year to the privileged few who can afford them. Blue Origin and SpaceX have yet to announce their plans. But globally, rocket launches wouldn’t need to increase by much from the current 100 or so performed each year to induce harmful effects that are competitive with other sources, like ozone-depleting chlorofluorocarbons (CFCs), and CO₂ from aircraft. During launch, rockets can emit between four and ten times more nitrogen oxides than Drax, the largest thermal power plant in the UK, over the same period. CO₂ emissions for the four or so tourists on a space flight will be between 50 and 100 times more than the one to three tonnes per passenger on a long-haul flight. In order for international regulators to keep up with this nascent industry and control its pollution properly, scientists need a better understanding of the effect these billionaire astronauts will have on our planet’s atmosphere.

#### No Ozone Impact.

Ridley 14 (Matthew White Ridley, BA and PhD in Zoology from Oxford. “THE OZONE HOLE WAS EXAGGERATED AS A PROBLEM,” *Rational Optimist*, 9/25/14, <http://www.rationaloptimist.com/blog/the-ozone-hole-was-exaggerated-as-a-problem.aspx>) dwc 19

Serial hyperbole does the environmental movement no favours My recent Times column argued that the alleged healing of the ozone layer is exaggerated, but so was the impact of the ozone hole over Antarctica: The ozone layer is healing. Or so said the news last week. Thanks to a treaty signed in Montreal in 1989 to get rid of refrigerant chemicals called chlorofluorocarbons (CFCs), the planet’s stratospheric sunscreen has at last begun thickening again. Planetary disaster has been averted by politics. For reasons I will explain, this news deserves to be taken with a large pinch of salt. You do not have to dig far to find evidence that the ozone hole was never nearly as dangerous as some people said, that it is not necessarily healing yet and that it might not have been caused mainly by CFCs anyway. The timing of the announcement was plainly political: it came on the 25th anniversary of the treaty, and just before a big United Nations climate conference in New York, the aim of which is to push for a climate treaty modelled on the ozone one. Here’s what was actually announced last week, in the words of a Nasa scientist, Paul Newman: “From 2000 to 2013, ozone levels climbed 4 per cent in the key mid-northern latitudes.” That’s a pretty small change and it is in the wrong place. The ozone thinning that worried everybody in the 1980s was over Antarctica. Over northern latitudes, ozone concentration has been falling by about 4 per cent each March before recovering. Over Antarctica, since 1980, the ozone concentration has fallen by 40 or 50 per cent each September before the sun rebuilds it. So what’s happening to the Antarctic ozone hole? Thanks to a diligent blogger named Anthony Watts, I came across a press release also from Nasa about nine months ago, which said: “ Two new studies show that signs of recovery are not yet present, and that temperature and winds are still driving any annual changes in ozone hole size.” As recently as 2006, Nasa announced, quoting Paul Newman again, that the Antarctic ozone hole that year was “the largest ever recorded”. The following year a paper in Nature magazine from Markus Rex, a German scientist, presented new evidence that suggested CFCs may be responsible for less than 40 per cent of ozone destruction anyway. Besides, nobody knows for sure how big the ozone hole was each spring before CFCs were invented. All we know is that it varies from year to year. How much damage did the ozone hole ever threaten to do anyway? It is fascinating to go back and read what the usual hyperventilating eco-exaggerators said about ozone thinning in the 1980s. As a result of the extra ultraviolet light coming through the Antarctic ozone hole, southernmost parts of Patagonia and New Zealand see about 12 per cent more UV light than expected. This means that the weak September sunshine, though it feels much the same, has the power to cause sunburn more like that of latitudes a few hundred miles north. Hardly Armageddon. The New York Times reported “an increase in Twilight Zone-type reports of sheep and rabbits with cataracts” in southern Chile. Not to be outdone, Al Gore wrote that “hunters now report finding blind rabbits; fisherman catch blind salmon”. Zoologists briefly blamed the near extinction of many amphibian species on thin ozone. Melanoma in people was also said to be on the rise as a result. This was nonsense. Frogs were dying out because of a fungal disease spread from Africa — nothing to do with ozone. Rabbits and fish blinded by a little extra sunlight proved to be as mythical as unicorns. An eye disease in Chilean sheep was happening outside the ozone-depleted zone and was caused by an infection called pinkeye — nothing to do with UV light. And melanoma incidence in people actually levelled out during the period when the ozone got thinner.