# 1NC vs Sage MP

## OFF

### 1NC - OFF

T-Outer Space

#### Interpretation: Topical affirmatives must defend the appropriation of outer space

#### Outer space starts 372 miles above the surface of earth.

National Geographic No Date [National Geographic Society, "Atmosphere," <https://www.nationalgeographic.org/encyclopedia/atmosphere/>] Sachin

Earth’s atmosphere stretches from the surface of the planet up to as far as 10,000 kilometers (6,214 miles) above. After that, the atmosphere blends into space. Not all scientists agree where the actual upper boundary of the atmosphere is, but they can agree that the bulk of the atmosphere is located close to Earth’s surface—up to a distance of around eight to 15 kilometers (five to nine miles). While oxygen is necessary for most life on Earth, the majority of Earth’s atmosphere is not oxygen. Earth’s atmosphere is composed of about 78 percent nitrogen, 21 percent oxygen, 0.9 percent argon, and 0.1 percent other gases. Trace amounts of carbon dioxide, methane, water vapor, and neon are some of the other gases that make up the remaining 0.1 percent. The atmosphere is divided into five different layers, based on temperature. The layer closest to Earth’s surface is the troposphere, reaching from about seven and 15 kilometers (five to 10 miles) from the surface. The troposphere is thickest at the equator, and much thinner at the North and South Poles. The majority of the mass of the entire atmosphere is contained in the troposphere—between approximately 75 and 80 percent. Most of the water vapor in the atmosphere, along with dust and ash particles, are found in the troposphere—explaining why most of Earth’s clouds are located in this layer. Temperatures in the troposphere decrease with altitude. The stratosphere is the next layer up from Earth’s surface. It reaches from the top of the troposphere, which is called the tropopause, to an altitude of approximately 50 kilometers (30 miles). Temperatures in the stratosphere increase with altitude. A high concentration of ozone, a molecule composed of three atoms of oxygen, makes up the ozone layer of the stratosphere. This ozone absorbs some of the incoming solar radiation, shielding life on Earth from potentially harmful ultraviolet (UV) light, and is responsible for the temperature increase in altitude. The top of the stratosphere is called the stratopause. Above that is the mesosphere, which reaches as far as about 85 kilometers (53 miles) above Earth’s surface. Temperatures decrease in the mesosphere with altitude. In fact, the coldest temperatures in the atmosphere are near the top of the mesosphere—about -90°C (-130°F). The atmosphere is thin here, but still thick enough so that meteors will burn up as they pass through the mesosphere—creating what we see as “shooting stars.” The upper boundary of the mesosphere is called the mesopause. The thermosphere is located above the mesopause and reaches out to around 600 kilometers (372 miles). Not much is known about the thermosphere except that temperatures increase with altitude. Solar radiation makes the upper regions of the thermosphere very hot, reaching temperatures as high as 2,000°C (3,600°F). The uppermost layer, that blends with what is considered to be outer space, is the exosphere. The pull of Earth’s gravity is so small here that molecules of gas escape into outer space.

#### Starlink’s satelites reach 340 Miles above earth’s surface.

Mann 19, [Adam Mann, 5-24-2019, "Starlink: SpaceX's satellite internet project," Space, <https://www.space.com/spacex-starlink-satellites.html>] Sachin

The first 60 Starlink satellites were launched on May 23, 2019, aboard a SpaceX Falcon 9 rocket. The satellites successfully reached their operational altitude of 340 miles (550 kilometers) — low enough to get pulled down to Earth by atmospheric drag in a few years so that they don't become space junk once they die.

#### Violation: 340 miles is less than the 372 miles necessary to be considered outer space; they explicitly defend only LEO

#### Vote neg:

#### 1] Limits and ground: the aff interpretation explodes the topic to allow any aff about space generally which structurally alters the neg research burden because there’s a qualitative difference between outer space and the atmosohere. Means we get no ground bc of how unpredictable the AC could be from round to round – kills core neg generics like space col bad and mining that don’t link if you specify a part of space

#### 2] Precision – Justifies the aff arbitrarily doing away with words in the resolution which gives way to affs about anything which obliterates neg prep.

#### Use competing interps - Topicality is a binary question, you can’t be reasonably topical and it invites a race to the bottom of intervention

#### Drop the debater – dropping the argument doesn’t rectify abuse since winning T proves why we don’t have the burden of rejoinder against their aff.

#### No RVIS – it’s your burden to be topical

### 1NC - OFF

Unilat CP

#### The United States federal government should:

#### --Substantially increase active debris removal

#### --Should declare debris in space to be abandoned property, with the right to salvage, and make our expired satellites available for salvage

#### -- Contributing to debris removal projects and establishing a space situational awareness catalogue that requires satellite declassification and notice in the case of impending collision with the governments of formal allies of the United States

#### --ensure standardization and integration of all shared space situational awareness data.

#### Unilat solves comparatively much better than international cooperation for ADR---maintains leadership

--coop takes too long – proposed debris review in 1980 thru COPOUS and nothing happened

--timeframe is key – need to start now which flips solvency

--sufficiency - could remove 5 pieces now and make enviro more stable

--causes follow on – once we have the tech, others realize it’s feasible and do it too

--leadership is a nb – we are seen as taking moral highground to clean up

Ansdell 10 – PhD in Astronomy-U of Hawaii, MA in Space Policy-GWU

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US Leadership by Example

Need to Initiate Unilateral Action

International cooperation in space has rarely resulted in cost-effective or expedient solutions, especially in politically-charged areas of uncertain technological feasibility. The International Space Station, because of both political and technical setbacks, has taken over two decades to deploy and cost many billions of dollars—far more time and money than was originally intended. Space debris mitigation has also encountered aversion in international forums. The topic was brought up in COPUOS as early as 1980, yet a policy failed to develop despite a steady flow of documents on the increasing danger of space debris (Perek 1991). In fact, COPUOS did not adopt debris mitigation guidelines until 2007 and, even then, they were legally non-binding.

Space debris removal systems could take decades to develop and deploy through international partnerships due to the many interdisciplinary challenges they face. Given the need to start actively removing space debris sooner rather than later to ensure the continued benefits of satel- lite services, international cooperation may not be the most appropriate mechanism for instigating the first space debris removal system. Instead, one country should take a leadership role by establishing a national space debris removal program. This would accelerate technology development and demonstration, which would, in turn, build-up trust and hasten international participation in space debris removal.

POSSIBILITIES OF LEADERSHIP

As previously discussed, a recent NASA study found that annually removing as little as five massive pieces of debris in critical orbits could significantly stabilize the long-term space debris environment (Liou and Johnson 2007). This suggests that it is feasible for one nation to unilaterally develop and deploy an effective debris removal system. As the United States is responsible for creating much of the debris in Earth’s orbit, it is a candidate for taking a leadership role in removing it, along with other heavy polluters of the space environment such as China and Russia.

There are several reasons why the United States should take this leadership role, rather than China or Russia. First and foremost, the United States would be hardest hit by the loss of satellites services. It owns about half of the roughly 800 operating satellites in orbit and its military is significantly more dependent upon them than any other entity (Moore 2008). For example, GPS precision-guided munitions are a key component of the “new American way of war” (Dolman 2006, 163-165), which allows the United States to remain a globally dominant military power while also waging war in accordance with its political and ethical values by enabling faster, less costly war fighting with minimal collateral damage (Sheldon 2005). The U.S. Department of Defense recognized the need to protect U.S. satellite systems over ten years ago when it stated in its 1999 Space Policy that, “the ability to access and utilize space is a vital national interest because many of the activities conducted in the medium are critical to U.S. national security and economic well-being” (U.S. Department of Defense 1999, 6). Clearly, the United States has a vested interest in keeping the near-Earth space environment free from threats like space debris and thus assuring U.S. access to space

Moreover, current U.S. National Space Policy asserts that the United States will take a “leadership role” in space debris minimization. This could include the development, deployment, and demonstration of an effective space debris removal system to remove U.S. debris as well as that of other nations, upon their request. There could also be international political and economic advantages associated with being the first country to develop this revolutionary technology. However, there is always the danger of other nations simply benefiting from U.S. investment of its resources in this area. Thus, mechanisms should also be created to avoid a classic “free rider” situation. For example, techniques could be employed to ensure other countries either join in the effort later on or pay appropriate fees to the United States for removal services.

Recommendations for Leadership in Space Debris Removal

Going forward, the U.S. government should engage the commercial sector in space debris removal. Government contracts with several commercial firms would create a competitive environment, encouraging innovation and cost minimization. Having several companies working on the problem at the same time would also accelerate remediation as several critical orbits could be addressed at once. Furthermore, early investments in a domestic space debris removal industry would give the United States a head start in what may become a critical industry over the coming decades.

#### Causes international follow on --- Russia and China will go along separately later

--Russia and China will go along – otherwise they’d be pariahs and feel left out

Hays & Vedda 18 – Sr. Space Policy Analyst-Principal DOD Space Advisor Staff & Prof of Space Policy-GWU; Sr. Policy Analyst-Center for Space Policy & former Prof of Space & IR-UND

Dr. Peter L. Hays, Senior Space Policy Analyst with Falcon Research supporting the Principal Department of Defense Space Advisor Staff where he helps to develop and implement space policy and strategy initiatives, adjunct professor at GWU’s Space Policy Institute, Associate Director of the Eisenhower Center for Space and Defense Studies, former Senior Policy Analyst for the National Security Space Office in the U.S. Department of Defense, Visiting Fellow at the Institute for National Strategic Studies at National Defense University & at the USAF Academy School of Advanced Airpower Studies, and Executive Editor of *Joint Force Quarterly*, PhD in IR-Fletcher School at Tufts, and Dr. James A. Vedda, Senior Policy Analyst in the Center for Space Policy and Strategy at The Aerospace Corporation, Co-founder & former Professor in the Department of Space Studies at the University of North Dakota, has been responsible for performing policy research and analyses for various U.S. government customers, including NASA, the Federal Aviation Administration, the Department of Commerce, the Air Force, and the National Geospatial-Intelligence Agency, among others, formerly worked at ANSER Inc. where he supported the Space Policy Directorate in the Office of the Secretary of Defense, PhD in PoliSci-U of F, MA in Science, Tech & Public Policy-GW, MAJOR POLICY ISSUES IN EVOLVING GLOBAL SPACE OPERATIONS, Study by The Mitchell Institute for Aerospace Studies in collaboration with The Aerospace Corporation's Center for Space Policy and Strategy, Interviewing a range of anonymous senior decisionmakers in the commercial space industry & government, 2018, https://aerospace.org/sites/default/files/2018-05/Space\_Policy\_FINAL\_interactive\_0.pdf

“The US government should support the development of best practices by following the lead of US commercial corporations, which have great sway internationally. For example, in human spaceflight, it is likely that US companies will lead the way in sub-orbital and orbital flights at least over the next decade. Coordination is already taking place among these companies in this regard. Similarly, asteroid mining companies are already coordinating informally on norms. The US Government could endorse these processes and begin to support these norms through its policy statements (such as the National Space Policy), enlisting other governments and their corporations to support them as well. Over time, if the bulk of Western governments and their corporations adopt such standards, China, Russia, and other possible outliers will likely find it beneficial to eventually join them. This may be easier than a straight political process.”

#### US commercial space leadership is necessary and sufficient to solve global Chinese dominance

--CP promulgates a set of standards initiated by the US – makes us first mover and shores up commercial space leadership

--China will dominate space and use it to create a new era of heg – need to have leadership and strong commercial sector

--will get to space and control info flows – selling satellites for cheap to poorest and broadcasting lies about US + shielding events in Tibet – undermines US cred and soft power

--will also get huge money from space and do sbsp – means they’ll have free energy to hold over the rest of the world

--Commercial sector key – need creative disruption, not bureaucracy and groupthink of the DOD to get to space quicker and more innovatively

Autry and Kwast 19 – Director of the Southern California Commercial Spaceflight Initiative-USC, PhD & former Prof of Entrepreneurship & Strategy-UC Irvine; Lt. Gen & Cmdr-USAF, Prof-Air University

Greg Autry, PhD & MBA-UC Irvine, Director of the Southern California Commercial Spaceflight Initiative-USC, served on the NASA Agency Review Team and as White House Liaison at NASA, former Professor of Entrepreneurship, Strategy, & Econ-UC Irvine, on the editorial board of the New Space Journal, co-author of Death by China, Beijing’s Fight for the Final Frontier, and Steven L. Kwast, Lt Gen-USAF, Commander & President of Air University-Maxwell AFB, MA in Public Policy-Harvard's Kennedy School of Government, former National Defense Fellow-Institute for the Study of Conflict, Ideology and Policy at Boston University, America Is Losing the Second Space Race to China, 22 August 2019, https://foreignpolicy.com/2019/08/22/america-is-losing-the-second-space-race-to-china/

America Is Losing the Second Space Race to China The private sector can give the United States a much-needed rocket boost. The current U.S. space defense strategy is inadequate and on a path to failure. President Donald Trump’s vision for a Space Force is big enough. As he said on June 18, “It is not enough to merely have an American presence in space. We must have American dominance in space.” But the Air Force is not matching this vision. Instead, the leadership is currently focused on incremental improvements to existing equipment and organizational structures. Dominating the vast and dynamic environment of space will require revolutionary capabilities and resources far deeper than traditional Department of Defense thinking can fund, manage, or even conceive of. Success depends on a much more active partnership with the commercial space industry— and its disruptive capabilities.

U.S. military space planners are preparing to repeat a conflict they imagined back in the 1980s, which never actually occurred, against a vanished Soviet empire. Meanwhile, China is executing a winning strategy in the world of today. It is burning hard toward domination of the future space markets that will define the next century. They are planning infrastructure in space that will control 21st-century telecommunications, energy, transportation, and manufacturing. In doing so, they will acquire trillion-dollar revenues as well as the deep capabilities that come from continuous operational experience in space. This will deliver space dominance and global hegemony to China’s authoritarian rulers.

Despite the fact that many in the policy and intelligence communities understand exactly what China is doing and have been trying to alert leadership, Air Force leadership has convinced the White House to fund only a slightly better satellite command with the same leadership, while sticking a new label onto their outmoded thinking. A U.S. Space Force or Corps with a satellite command will never fulfill Trump’s call to dominate space. Air Force leadership is demonstrating the same hubris that Gen. George Custer used in convincing Congress, over President Ulysses S. Grant’s better experience intuition, that he could overtake the Black Hills with repeating rifles and artillery. That strategy of technological overconfidence inflamed conflict rather than subduing it, and the 7th Cavalry were wiped out at the Battle of the Little Bighorn.

The West was actually won by the settlers, ranchers, miners, and railroad barons who were able to convert the wealth of the territory itself into the means of holding it. They laid the groundwork that made the 20th century the American Century and delivered freedom to millions of people in Europe and Asia. Of course, they also trampled the indigenous people of the American West in their wake—but empty space comes with no such bloody cost. The very emptiness and wealth of this new, if not quite final, frontier, however, means that competition for resources and strategic locations in cislunar space (between the Earth and moon) will be intense over the next two decades. The outcome of this competition will determine the fate of humanity in the next century.

China’s impending dominance will neutralize U.S. geopolitical power by allowing Beijing to control global information flows from the high ground of space. Imagine a school in Bolivia or a farmer in Kenya choosing between paying for a U.S. satellite internet or image provider or receiving those services for free as a “gift of the Chinese people.” It will be of little concern to global consumers that the news they receive is slanted or that searches for “free speech” link to articles about corruption in Western democracies. Nor will they care if concentration camps in Tibet and the Uighur areas of western China are obscured, or if U.S. military action is presented as tyranny and Chinese expansion is described as peacekeeping or liberation.

China’s aggressive investment in space solar power will allow it to provide cheap, clean power to the world, displacing U.S. energy firms while placing a second yoke around the developing world. Significantly, such orbital power stations have dual use potential and, if properly designed, could serve as powerful offensive weapons platforms.

China’s first step in this process is to conquer the growing small space launch market. Beijing is providing nominally commercial firms with government-manufactured, mobile intercontinental ballistic missiles they can use to dump launch services on the market below cost. These start-ups are already undercutting U.S. pricing by 80 percent. Based on its previous success in using dumping to take out U.S. developed industries such as solar power modules and drones, China will quickly move upstream to attack the leading U.S. launch providers and secure a global commercial monopoly. Owning the launch market will give them an unsurmountable advantage against U.S. competitors in satellite internet, imaging, and power.

The United States can still build a strategy to win. At this moment, it holds the competitive advantage in every critical space technology and has the finest set of commercial space firms in the world. It has pockets of innovative military thinkers within groups like the Defense Innovation Unit, under Mike Griffin, the Pentagon’s top research and development official. If the United States simply protects the intellectual property its creative minds unleash and defend its truly free markets from strategic mercantilist attack, it will not lose this new space race. The United States has done this before. It beat Germany to the nuclear bomb, it beat the Soviet Union to the nuclear triad, and it won the first space race.

None of those victories was achieved by embracing the existing bureaucracy. Each of them depended on the president of the day following the only proven path to victory in a technological domain: establish a small team with a positively disruptive mindset and empower that team to investigate a wide range of new concepts, work with emerging technologies, and test innovative strategies. Today that means giving a dedicated Space Force the freedom to easily partner with commercial firms and leverage the private capital in building sustainable infrastructure that actually reduces the likelihood of conflict while securing a better economic future for the nation and the world.

#### Hegemony solves extinction

Keck 14

Zachary Keck is Managing Editor of The Diplomat, The Diplomat, January 24, 2014, “America’s Relative Decline: Should We Panic?”, http://thediplomat.com/2014/01/americas-relative-decline-should-we-panic/

Regardless of your opinion on U.S. global leadership over the last two decades, however, there is good reason to fear its Regardless of your opinion on U.S. global leadership over the last two decades, however, there is good reason to fear its relative decline compared with China and other emerging nations. To begin with, hegemonic transition periods have historically been the most destabilizing eras in history. This is not only because of the malign intentions of the rising and established power(s). Even if all the parties have benign, peaceful intentions, the rise of new global powers necessitates revisions to the “rules of the road.” This is nearly impossible to do in any organized fashion given the anarchic nature of the international system, where there is no central authority that can govern interactions between states.

We are already starting to see the potential dangers of hegemonic transition periods in the Asia-Pacific (and arguably the Middle East). As China grows more economically and militarily powerful, it has unsurprisingly sought to expand its influence in East Asia. This necessarily has to come at the expense of other powers, which so far has primarily meant the U.S., Japan, Vietnam and the Philippines. Naturally, these powers have sought to resist Chinese encroachments on their territory and influence, and the situation grows more tense with each passing day. Should China eventually emerge as a global power, or should nations in other regions enjoy a similar rise as Kenny suggests, this situation will play itself out elsewhere in the years and decades ahead.

All of this highlights some of the advantages of a unipolar system. Namely, although the U.S. has asserted military force quite frequently in the post-Cold War era, it has only fought weak powers and thus its wars have been fairly limited in terms of the number of casualties involved. At the same time, America’s preponderance of power has prevented a great power war, and even restrained major regional powers from coming to blows. For instance, the past 25 years haven’t seen any conflicts on par with the Israeli-Arab or Iran-Iraq wars of the Cold War. As the unipolar era comes to a close, the possibility of great power conflict and especially major regional wars rises dramatically. The world will also have to contend with conventionally inferior powers like Japan acquiring nuclear weapons to protect their interests against their newly empowered rivals.

But even if the transitions caused by China’s and potentially other nations’ rises are managed successfully, there are still likely to be significant negative effects on international relations. In today’s “globalized” world, it is commonly asserted that many of the defining challenges of our era can only be solved through multilateral cooperation. Examples of this include climate change, health pandemics, organized crime and terrorism, global financial crises, and the proliferation of weapons of mass destruction, among many others.

A unipolar system, for all its limitations, is uniquely suited for organizing effective global action on these transnational issues. This is because there is a clear global leader who can take the initiative and, to some degree, compel others to fall in line. In addition, the unipole’s preponderance of power lessens the intensity of competition among the global players involved. Thus, while there are no shortages of complaints about the limitations of global governance today, there is no question that global governance has been many times more effective in the last 25 years than it was during the Cold War

#### Data-sharing with allies solves the aff

Loverro 14 – Deputy Assistant Secretary of Defense for Space Policy, Department of Defense

Douglas L., 3/12. “STATEMENT OF MR. DOUGLAS L. LOVERRO DEPUTY ASSISTANT SECRETARY OF DEFENSE FOR SPACE POLICY BEFORE THE SENATE COMMITTEE ON ARMED SERVICES SUBCOMMITTEE ON STRATEGIC FORCES.” https://www.armed-services.senate.gov/download/loverro\_03-12-14

Our efforts here go beyond mere words – they are backed by actions. As I have discussed before, a key aspect of improving spaceflight safety, and assuring we can monitor the space environment more closely, is our space situational awareness (SSA) capabilities. We have been working on this for some time, and I am happy to report that we have made some real progress over the last year. That progress comes in two forms – new sensors and information sharing agreements.

On the sensor front, we have remained on a constant path for the last several years to reposition sensors where they can do the most good and to invest in new sensors where needed. Last year we reported that we had entered into an agreement with Australia to relocate and repurpose a launch tracking radar, the C-Band radar, from Antigua to western Australia to aid in our ability to monitor activities at low altitude in the southern hemisphere. That work is now underway. We complemented that effort with a second agreement signed with Australia this past November to relocate the DARPA-developed Space Surveillance Telescope to western Australia to give us an unmatched ability to track deep space objects in that critical region of the world. Additionally, after years of focused effort, and a sequestration-imposed six-month delay, we will soon award the contract for the first Space Fence site. The Space Fence will provide an unprecedented ability to track an order-of-magnitude greater number of objects in low earth orbit, supporting long-term spaceflight safety.

The Department has also made great strides in more transparently sharing SSA information with other space operators. Over the past year, U.S. Strategic Command (USSTRATCOM) has continued to pursue SSA sharing agreements with commercial companies and foreign governments, consistent with existing legislative authority. This year, USSTRATCOM signed five agreements with other governments – Australia, Japan, Italy, Canada, and France – and increased to forty-one our agreements with commercial satellite operators. Many more agreements are in varying stages of negotiation. We are committed to providing SSA services to enhance spaceflight safety for all.

While the purpose of these agreements is to allow us to share more advanced space flight safety products with other space-faring nations, they really serve to lay the groundwork for the next stage of effort – two-way data sharing. The space environment is too big and too complex for a single nation to bear the entire cost of monitoring it. Cost-effective SSA requires cooperation among space actors. The increasingly congested space environment means that an unparalleled level of information sharing is needed to promote safe and responsible operations in space and to reduce the likelihood of mishaps, misperceptions, and mistrust. We are currently engaged in detailed technical discussions with several nations that have space situational awareness capabilities to explore opportunities for two-way information exchange. This type of sharing will increase SSA information available to the United States while limiting unnecessary duplication of SSA capabilities. In short, we save money and improve safety for us and our allies.

### 1NC - OFF

Cyber DA

#### Cyber attacks on critical infrstructure are coming now

Underwood 20 [Kimberly Underwood is a reporter on emerging communication technologies, cyberwarfare, the intelligence community, military command operations and weaponry research. “China is Retooling, and Russia Seeks Harm to Critical Infrastructure.” June 24, 2020. https://www.afcea.org/content/china-retooling-and-russia-seeks-harm-critical-infrastructure]

Intelligence leader warns of the mounting threats of cyber espionage, digital attacks and influence operations from adversaries. U.S. adversaries are trying to take control of cyberspace as a medium, resulting in implications to our freedom of maneuver and access in cyberspace, says Brig. Gen. Gregory Gagnon, USAF, director of Intelligence (A2), Headquarters Air Combat Command (ACC), Joint Base Langley-Eustis. Increasing cyberspace activity is coming from China, Russia, Iran and North Korea. “We are seeing it not just in volume, but we are seeing an expansion in the ways that they use cyberspace, whether it is to steal information, whether it is to directly influence our citizens or whether it is to disrupt critical infrastructure,” Gen. Gagnon reports. The general spoke at the AFCEA Tidewater chapter’s recent monthly virtual luncheon. China and Russia continue to pose the greatest espionage and cyber attack threats to the United States, but the intelligence leader anticipates that other adversaries and strategic competitors will also build and integrate cyber espionage, cyber attacks and influence operations into how they conduct business. “Our strategic competitors will increasingly use cyber space capabilities including cyber espionage, cyber attack and continued influence operations to seek political, economic and military advantage over the United States, our allies and our partners,” he said. “This is not an ‘if,’ it is a yes. They are doing it and they will continue.” Gen. Gagnon warned that China in particular is using cyber espionage to collect intelligence, target critical infrastructure and steal intellectual property. It is all part of China’s plan to move from being a regional actor to being seen as a global power. The shift also means a greater role for the adversary’s military. The Chinese military is in the process of transitioning from a defensive, inflexible ground-based force charged with domestic and peripheral security to a joint, highly agile, expeditionary and power projecting arm of Chinese foreign policy, he noted. “What is going on in China is a dynamic revectoring of the objectives and goals of the People's Liberation Army,” Gen. Gagnon said. “This is not a small change. This is a major change in course and direction. They're doing it to be a power projection arm of a Chinese foreign policy that engages both in military diplomacy and operations around the globe, but also in predatory economic activity.” Moreover, China’s military spending in 2018 exceeded $200 billion, an increase of about 300% since 2002, the general stated. And while it is not the $750 billion that the United States government spends every year on military defense, the Chinese funding does not reflect the same level of investment in manpower or healthcare. A good portion of their $200 billion directly funds technology and capabilities. “A big chunk of our budget is not buying kit,” Gen. Gagnon explained. “If you're the CCP [Chinese Communist Party], you don't have the same extensive retirement programs that you have to pay for,” he said. “You don't have this extensive healthcare which you have to provide. So, when you think about $200 billion, think about that buying kit and buying operations. That is significant.” To the industry, Gen. Gagnon warned companies that Beijing will authorize Chinese espionage against key U.S technologies. “Many of your corporations hold this technology,” he stressed. “They are trying to undercut your ability to be profitable by developing those same technologies in China. They are competing against us in the international market. I will tell you that China's persistent cyber espionage threat and their growing tech threat to our core military and critical infrastructure will continue to be persistent. China remains the most active strategic competitor responsible for cyber espionage against corporations and allies.” China, like Russia, is also increasing its information warfare against the United States. “They are becoming more adept at using social media to deliver messages directly to the U.S. population that alter the way we think, the way we behave and the way we decide,” the general observed. The improvement of their cyber attack capabilities and ways to alter information online is intended to shape views inside China, shift the mindset of Chinese people around the world, as well as to try to shape the world’s view, not just of China, but also of the United States. “You are seeing that play out in the pandemic, how people view us around the world,” he offered. “We're also concerned about Chinese intelligence and security services,” the A2 continued. “They use Chinese information technology firms as routine and systemic espionage platforms against the United States and against our allies. Many of you are tracking what is in the news about 5G and Huawei, and that's what we're talking about.” As for Russia, their highly capable operations of cyber espionage, influence and cyber attacks continue to target the United States and its allies. In particular, Russia’s form of integrating cyber espionage attacks and influence operations, or information confrontation, is very effective, Gen. Gagnon emphasized. “If you think about it, they’re generally playing with the weaker hand, so they have been rather brilliant on the international stage in achieving their foreign policy objectives,” he said. In addition, Moscow is staging cyberattack assets to disrupt or damage U.S. military or civilian information systems during the COVID-19 pandemic. “There is activity that they undertake on a day-to-day basis to try to gain a decisive military intelligence,” he stated. “Their security services continue to target our systems, both for U.S. information systems and critical infrastructure, as well as the networks of our NATO and Five-Eye partners. They do it for positional advantage in cyberspace to be able to do the five Ds: deceive, deny, disrupt, degrade and destroy our assets, but also to gain intelligence on how systems are established and set up so that they can maintain attack vectors.” Russia also is targeting U.S. critical infrastructure, the general cautioned. “Russia has the ability to execute cyber attacks in the United States that can generate localized temporary disruptive effects on critical infrastructure, such as disrupting electric distribution networks for at least a few hours.” In fact, he warned, Moscow is mapping out critical infrastructure with the long-term goal of being able to cause “substantial damage.”

#### Megaconstellations function as critical infrastructure that increase resiliency and protect against cyberattacks

Hallex and Cottom 20 [Matthew A. Hallex is a Research Staff Member at the Institute for Defense Analyses. Travis S. Cottom is a Research Associate at the Institute for Defense Analyses. “Proliferated Commercial Satellite Constellations: Implications for National Security.” 2020. https://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-97/jfq-97\_20-29\_Hallex-Cottom.pdf?ver=2020-03-31-130614-940]

While potentially threatening the sustainability of safe orbital operations, new proliferated constellations also offer opportunities for the United States to increase the resilience of its national security space architectures. Increasing the resilience of U.S. national security space architectures has strategic implications beyond the space domain. Adversaries such as China and Russia see U.S. dependence on space as a key vulnerability to exploit during a conflict. Resilient, proliferated satellite constellations support deterrence by denying adversaries the space superiority they believe is necessary to initiate and win a war against the United States.28 Should deterrence fail, these constellations could provide assured space support to U.S. forces in the face of adversary counterspace threats while imposing costs on competitors by rendering their investments in counterspace systems irrelevant. Proliferated constellations can support these goals in four main ways. First, the extreme degree of disaggregation inherent in government and commercial proliferated constellations could make them more resilient to attacks by many adversary counterspace systems. A constellation composed of hundreds or thousands of satellites could withstand losing a relatively large number of them before losing significant capability. Conducting such an attack with kinetic antisatellite weapons—like those China and Russia are developing—would require hundreds of costly weapons to destroy satellites that would be relatively inexpensive to replace. Second, proliferated constellations would be more resilient to adversary electronic warfare. Satellites in LEO can emit signals 1,280 times more powerful than signals from satellites in GEO.29 They JFQ 97, 2nd Quarter 2020 Hallex and Cottom 25 also are faster in the sky than satellites in more distant orbits, which, combined with the planned use of small spot beams for communications proliferated constellations, would shrink the geographic area in which an adversary ground-based jammer could effectively operate, making jammers less effective and easier to geolocate and eliminate.30 Third, even if the United States chooses not to deploy national security proliferated constellations during peacetime, industrial capacity for mass-producing proliferated constellation satellites could be repurposed during a conflict. Just as Ford production lines shifted from automobiles to tanks and aircraft during World War II, one can easily imagine commercial satellite factories building military reconnaissance or communications satellites during a conflict. Fourth, deploying and maintaining constellations of hundreds or thousands of satellites will drive the development of low-cost launches to a much higher rate than is available today. Inexpensive, high-cadence space launch could provide a commercial solution to operationally responsive launch needs of the U.S. Government. In a future where space launches occur weekly or less, the launch capacity needed to augment national security space systems during a crisis or to replace systems lost during a conflict in space would be readily available.31

#### Cyberattacks cause extinction---false warnings, stealing nukes, and introducing vulnerability

Ernest J. Moniz et al. 18, Ernest J. Moniz is the CEO of the Nuclear Threat Initiative, served as the thirteenth United States Secretary of Energy from 2013 to January 2017. Sam Nunn, and Des Browne, September 2018, “Nuclear Weapons in the New Cyber Age,” https://media.nti.org/documents/Cyber\_report\_finalsmall.pdf

The Cyber Threat to Nuclear Weapons and Related Systems

Cyber-based threats target all sectors of society—from the financial sector to the entertainment industry, from department stores to insurance companies. Governments face an even more critical challenge when it comes to cyberattacks on their most critical systems. Attacks on critical infrastructure could have extraordinary consequences, but a successful cyberattack3 on a nuclear weapon or related system—a nuclear weapon, a delivery system, or the related Nuclear Command, Control, and Communications (NC3) systems—could have existential consequences. Cyberattacks could lead to false warnings of attack, interrupt critical communications or access to information, compromise nuclear planning or delivery systems, or even allow an adversary to take control of a nuclear weapon.

Given the level of digitization of U.S. systems and the pace of the evolving cyber threat, one cannot assume that systems with digital components—including nuclear weapons systems—are not or will not be compromised. Among the reasons: nuclear weapons and delivery systems are periodically upgraded, which may include the incorporation of new digital systems or components. Malware could be introduced into digital systems during fabrication, much of which is not performed in secure foundries. In addition, there are a range of external dependencies, such as connections to the electric grid, that are outside the control of defense officials but directly affect nuclear systems. Finally, the possibility always exists that an insider, either purposefully or accidentally, could enable a cybersecurity lapse by introducing malware into a critical system.

Increased use of digital systems may also adversely affect the survivability of nuclear systems. New technologies can enhance reliability and performance, but they can also lead to new vulnerabilities in traditionally survivable systems, such as submarines or mobile missile launchers.4

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Undersea Cables DA

#### Military communications are susceptible to attack --- new tech makes clipping underseas cables feasible --- causes national security threats and pre-emptive nuclear attacks

Clark 16 [Bryan Clark (aka The Nightstalker) is a senior fellow with the Center for Strategic and Budgetary Assessments, in Washington. (2016) Undersea cables and the future of submarine competition, Bulletin of the Atomic Scientists, 72:4, 234-237, DOI: 10.1080/00963402.2016.1195636]

Countries also depend on undersea cables for national security. Aside from their contribution to a country’s economic health, nations rely on undersea cables to coordinate military operations, conduct diplomatic missions, and collect intelligence. Radiofrequency circuits used by communications satellites have too little bandwidth to accommodate the terabytes of sensor data recorded by various devices, or to fill operational orders needed to support global military operations. For this reason, classified military communications use the same network of submarine cables as civilian and unclassified data, making them susceptible to eavesdropping taps, the likes of which the United States is reported to have conducted on older copper communication cables during the Cold War. Tapping today’s fiber-optic cables is theoretically possible, but it is easier to cut or damage them and significantly impact the cables’ users. And while the exact location of cables is not publicly available, improvements to “bottom survey” equipment and unmanned undersea vehicles are making finding cables easier and faster. In time-sensitive military or diplomatic operations, the loss of communications for a few minutes or hours can be catastrophic. With financial transactions, the loss of even fractions of a second can cost millions of dollars as high-speed trades miss their targets and other transactions fail to go through or are lost entirely. The dozens of cable outages that occur each year do not cause a complete loss of service, but they do slow data-transfer speeds as information is re-routed through fewer intact cables. Most of these cable breaks happen in relatively shallow water, when rough weather moves cables around until they break or fishing trawlers catch a cable in a net. Some outages, however, have more nefarious origins. In 2013, three divers with hand tools cut the main cable connecting Egypt with Europe, reducing Egypt’s Internet bandwidth by 60%. Repairing a submarine cable at sea is difficult and time consuming. First the break has to be located using built-in monitoring systems that can indicate the cable segment in which the break is likely to have occurred. Cable repair ships then must go to that location and pull up the cable until they get to the damaged spot. A new section of cable can then be spliced in, which can take several days to complete. In addition to the cables themselves, their onshore termination points are particularly vulnerable – and easier to find than a submerged cable. Sometimes consisting of a non-descript building on a beach or marshland, these locations are often the junction of several cables that are then connected with terrestrial phone and cellular networks. An accident or attack on one of them could have the same effect, in the short-term, of cutting multiple cables at once. Because they are easier to monitor, a break at the termination point could be diagnosed more quickly; but it may be harder to repair because more damage could be caused to an exposed cable than one hundreds of feet underwater. As more cables are installed on the ocean floor, redundancy will increase the resilience of communication networks. But as the case of Egypt shows, the reduction of bandwidth from cutting one or more cables can still be significant. Although communications are not completely lost, lowered bandwidth may have a similar effect on time-critical transmissions as a complete loss of connectivity. For example, stock exchanges must be tightly synchronized for buyers and sellers to work off the same prices. Similarly, military cryptology systems tie codes to time standards; if bandwidth goes down, networks can “drop synch” and be unable to properly decode messages. Given the likely economic and military impacts of cable breaks, the ability to threaten or protect submarine cables and their shore landings will be increasingly important in future conflicts. In a crisis, an aggressor could use multiple coordinated attacks on cables to compel an opponent to back down or employ them as part of an opening offensive to cut off the defender’s military forces from national commanders, intelligence data, and sensor information. Cable attacks could also be highly destabilizing, since they could prevent a nuclear-armed opponent from controlling and monitoring its strategic weapons and early-warning systems. In response, the country targeted could choose to place its nuclear weapons in a higher alert condition – or initiate a preemptive attack.

#### Megaconstellations make undersea cables obsolete and shift away

Rao et. al. 20 [Varun Rao, project manager, Northwestern. Rahul Rao is Senior Lecturer in Politics at SOAS University of London. Yasir Aheer, senior manager, Accenture. “The Cloud Beneath Our Feet.” Sept. 9, 2020. https://www.ourfewcents.com/post/the-cloud-beneath-our-feet]  
In a world where our doorbells, headphones and printers are wireless, it may surprise readers to read that over 97% of internet traffic is transmitted through physical fibre-optic cables, laid on the sea bed. Each undersea cable consists of between 4 and 200 optical fibres, each of which can transmit about 400GB per second. There are approximately 1.2 million km worth of undersea cables currently in operation, a spider’s web of 0s and 1s crisscrossing the Earth carrying an estimated $10 trillion of financial transfers, and over 1 sextillion bytes of data every day. Most cables are no thicker than a garden hose, an astonishing fact given they transmit data at the rate of terabytes per second. Worryingly, these cables are largely protected only by the sheer vastness of the ocean (a topic we’ve explored previously). Given how tenuous this safeguarding is, it is unsurprising that there are over 200 cable failures every year. Most people are oblivious to cable damage incidents because providers, mostly Internet giants like Google, Facebook, Amazon and Microsoft, have deliberately built redundancy into their systems, meaning that most countries are serviced by multiple cables. In the event that one cable suffers a failure, internet traffic is seamlessly re-routed to the existing intact cables, if there are any. However, a total of 19 countries rely on a single cable to provide them internet, including Kazakhstan, Azerbaijan, Togo and Sierra Leone. While countries like the US, UK and Japan are supported by 91, 54 and 26 cables respectively, over 5% of the world’s population live in countries supported by only two cables. As island nations, Australia and New Zealand are particularly vulnerable in this respect, the latter being supported by just three cables. The majority of cable failures each year are inadvertently caused by humans, rather than natural causes. The aforementioned blackout in Tonga was apparently caused by a ships’ anchor damaging an undersea cable. Eight cables were damaged during an earthquake in 2006, causing internet outages in Taiwan, Hong Kong, China, Japan, Korea and the Philippines. When ships accidentally severed cables in the Mediterranean in 2008, 80% of the connectivity between Europe and the Middle East was knocked out in a matter of hours. In 2017, Australians were warned about slow internet speeds due to cable damage caused by typhoons. In 2018, the entire country of Mauritania was forced offline when a fishing trawler damaged an important cable link to Europe. 28 million Yemenis suffered a similar fate in January 2020, when a single cable was severed. That’s just accidental breakages. There remains the terrifying possibility of deliberate attacks by unfriendly agents. We’ve previously expounded on the dangers of confidential messages being decrypted by hostile actors. What better avenue for this manner of espionage than poorly guarded optic fibres strung out in the vastness of the ocean, far from prying eyes? Far more terrifying is the prospect of a complete loss of internet connectivity for entire countries, crippling economies and causing massive social unrest. The cables are also vulnerable to attack, bizarrely enough, from sharks. Given that sharks are so ancient they reportedly predate trees, it is ironic that one of the newest inventions on Earth, the internet, is vulnerable to one of the oldest. It appears that the truth is once again stranger than, or at least as strange as, fiction - in the comedy The IT Crowd, technically incompetent IT Manager Jen Barber is convinced the “Internet” in fact lives inside a small black box\*. So why do we use physical undersea cables, with all the attendant risks, when we could use satellite communications instead? Simply put, because fibre-optic cables use light to transmit information, they are both faster and cheaper to use for the mind boggling scale of internet traffic. Rather surprisingly, given the discussion above, the standard measure of cable downtime is measured in a mere seconds per year, indicating their reliability in adverse conditions. And of course, repairs are far easier to undertake on the seabed than in Earth orbit. **Is the future in the skies?** Although the first Space Race was aimed at setting foot on the Moon (a swashbuckling story we’ve covered here), of late focus has shifted to launching satellites into Earth orbit. As a result, there are now over 2600 satellites in orbit, with 180 belonging to SpaceX specifically to provide internet services. Looking ahead, satellite internet would offer the next quantum leap in internet accessibility, while potentially sidestepping some of the intractable issues faced by undersea cables. Remarkably, the development of geostationary satellite communication was heavily influenced by a 1945 publication by the prescient sci-fi author Arthur C. Clarke, a full 20 years before the first commercial example was launched. At current speeds, satellite connectivity is not a feasible option for high-volume data transfers, such as video games or videoconferencing, and all the usual problems apply - limited bandwidth, slow speeds, high latency and data limitations. However, for some rural areas this is the only method of getting online. In Australia for example, people in remote areas rely on the NBN Sky Muster Plus satellite service, limitations notwithstanding. Recent advances have helped. The cost to build and launch satellites has dropped significantly (also here) over the past few years. Over 46 thousand satellites are projected to be launched in the next few years, more than five times the number of objects ever launched into space in mankind’s history. Some have even gone so far as to call this the new-age Space Race. Tesla’s Starlink project is the most ambitious of these projects, with 120 satellites currently in orbit (a number they hope will rise to 12,000). The target is to offer satellite services in the USA and Canada by the end of 2020.