# China SBSP Aff

## 1AC—Plan

#### Plan: States should ban the appropriation of outer space for space-based solar power by private entities.

#### The OST needs to be reformed via international agreements, norms and institutions to account for SBSP – existing legislation fails

Wood 12 Leet Wood, 2012, “Projecting power: The security implications of space-based solar power”, Bulletin of the Atomic Scientists, [https://journals.sagepub.com/doi/pdf/10.1177/0096340211433005 DD](https://journals.sagepub.com/doi/pdf/10.1177/0096340211433005%20DD) AG

While space-based solar power offers the promise of abundant, clean energy, the technology can be used to project power in more than one sense. The unique characteristics of the system mean that it has profound international security implications, yet these issues remain substantially unaddressed. Not only is the concept of the system largely absent from the policy and political science literature, but it does not fall under the effective auspices of international law. The Outer Space Treaty of 1967 is silent on most aspects of the militarization of space aside from the use and deployment of weapons of mass destruction, and even in this respect its scope is ill-defined (UN Office for Outer Space Affairs, 1967). While there have been some attempts in recent years to begin discussion about a treaty banning conventional weapons in space (often spearheaded by China), even these notional efforts only address actual weapons, not power systems (CD 1839, 2008).

The individual component technologies of the space solar power system are mature, but the space infrastructure required to construct and maintain such a system will take years, if not decades, to develop. In practical terms, this is not as long as it sounds. The establishment of international agreements, norms, or institutions capable of handling an issue as complex and potentially important as space-based solar power is itself often the work of decades. There are a number of ways in which the international community could address concerns about the system, from nonbinding principles of conduct to more formalized treaties, but such agreements cannot be expected to emerge spontaneously. Debate on the issue should begin now, lest development of this potentially transformative technology outpace the international communityÕs ability to effectively assimilate it.

#### The plan builds norms, allows strategic signaling and bolsters US leadership

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Norms of behavior are a topic that many are familiar with but most struggle to define. In sociology, norms are defined as informal understandings that govern the behavior of members of a society (Scott & Marshall, 2009). The field of international relations defines norms as standards of appropriate behavior for actors with a given identity (Bjorkdahl, 2002). In the space context, norms have come to mean both “top down” high-level principles intended to inform the development of new international legal regimes and “bottom up” best practice guidelines intended to inform day-to-day operations (Schaffer, 2017).

The air, maritime, and even cyber domains are replete with examples of successful norms that increase the safety and efficiency of activities while also providing a measure of geopolitical stability and security benefits. Yet despite sixty-plus years of human activities in space, the space domain has yet to see the same development of norms. This is partly because human activities in space to this point have been largely limited to those of large governments and have been free from armed conflict—conditions that have limited the incentives to create norms of behavior and instead favored maximum freedom of action for all involved.

Recent trends in the space domain are changing the equation. The space domain is rapidly becoming more like the air, land, and maritime domains with the globalization of capabilities, burgeoning commercial activities, and tighter integration into all levels of military activities. The return of great power competition has created greater geopolitical tensions and concerns over future conflicts on Earth extending into space. As a result, there is a growing push from the United States and other countries for initiatives to develop norms of behavior for space activities that can help prevent future conflicts, or at the very least mitigate their harmful effects, and complement efforts to defend and protect military space capabilities (Schulte & Schaffer, 2012). Developing norms of behavior can also help with escalation dynamics, as they can help distinguish between routine and unusual behaviors. This distinction can aid risk and threat identification, particularly in a regime that has increasing commercial activities, and enable better signaling of intent.

This chapter discusses norms of behavior for space activities with a focus on military activities and potential conflict. It begins with an overview of recent initiatives to develop norms of behavior for space activities, including the reasons why they were successful or not. It then proposes ideas and concepts for future initiatives that could be undertaken to strengthen the safety, stability, and sustainability of the space regime, and concludes with an argument why the United States should actively engage in bilateral and multilateral fora to develop norms of behavior for space.

Recent Norm-Building Efforts for Space

Over the last decade, there have been three major multilateral efforts to develop norms of behavior for space. Although not all were specifically aimed at addressing security issues, they are useful examples to examine as they elide some of the procedural, political, and substantive challenges that future efforts to establish norms are likely to face.

International Code of Conduct for Outer Space

The first norm-building effort was the European Union-led International Code of Conduct (ICOC) for Outer Space Activities. The concept of the ICOC was formulated by European leaders during the mid2000s to make progress on space security issues in the face of continued geopolitical deadlock at the Conference on Disarmament and a US presidential administration that opposed the development of new legal regimes for space that limited freedom of action (Broad & Chang, 2010). The idea was to develop a set of voluntary “rules of the road” that could serve as transparency and confidence building measures (TCBMs) to enhance the safety, security, and sustainability of space (European Commission, 2015). In December 2008, the member states of the European Union (EU) approved the first draft of the code of conduct. After the 2009 Lisbon Treaty gave the EU new powers to engage in foreign and security policy making, the High Representative of the Union for Foreign Affairs and Security Policy to was given a mandate in September 2010 to conduct multilateral negotiations on the ICOC. The European External Action Service held multiple rounds of open consultations, culminating in a meeting in New York in August 2015 to try and finalize the negotiations. However, the final meeting failed to produce a consensus document, and instead the matter was referred to the United Nations General Assembly and remains in limbo (Krepon, 2015).

The ICOC failed to achieve traction for multiple reasons. The first is that it faced a mix of outright opposition and belated support from the United States. Domestically, Republicans in Congress considered the ICOC to be “stealth arms control” and took measures to try to limit US support. The Obama Administration supported the ICOC on paper but chose not to take an active role in promoting or negotiating it. The second major reason the ICOC failed was disagreement over the issue of selfdefense (Rajagopalan, 2015). Article 4.2 of the ICOC reiterated the right of States to exercise individual or collective self-defense under Article 51 of the United Nations Charter. Originally included as a nod to the US domestic critics, Article 4.2 was opposed by several developing countries who felt it was a loophole to allow the weaponization of space and created hesitation in many other countries who were not sure what it allowed or did not allow. The third major reason it failed was due to objections over the process (Johnson, 2014). Many developing countries felt they had been excluded from the process and did not have enough of a voice. Some also objected to its development outside of the United Nations process. Russia, with assistance from China, was able to leverage these concerns to sway many of the developing countries against the ICOC during the final negotiations in 2015 (Krepon, 2015). Although still voluntary, the ICOC would have been the first major international agreement on security-related space activities.

United Nations Group of Governmental Experts on Transparency and Confidence Building Measures in Outer Space Activities

The second norm-building effort was the United Nations Group of Governmental Experts (GGE) on Transparency and Confidence Building Measures in Outer Space Activities. The GGE on Space TCBMs was formed by then-Secretary General Ban Ki-Moon in 2011 after a request from the First Committee on the UN General Assembly (United Nations General Assembly, 2011). The GGE on Space TCBMs consisted of fifteen international experts nominated by Member States who were tasked with examining and reporting on methods for improving cooperation in space, and on reducing the risks of misunderstanding, mistrust, and miscalculations. The GGE’s recommendations included taking steps such as increasing information exchange on space policies and military space expenditures, forecast natural hazards in space, and international orbital break-ups (United Nations General Assembly, 2013).

The GGE on Space TCBMS was mostly successful in its efforts. The experts were able to reach consensus and published their report in July 2013. The United Nations General Assembly endorsed the report and encouraged all member nations review and implement the proposed measures through relevant national mechanisms on a voluntary basis. However, to date there has been little actual steps taken to formally implement the major recommendations of the GGE’s report aside from a joint meeting of the UN First and Fourth Committees (Hitchens, 2015). As a result, there is still a lack of transparency in military and dual-use space activities that could be a source of future misperceptions and tensions

Long-Term Sustainability of Outer Space Activities Working Group

The third norm-building effort is the Long-Term Sustainability (LTS) of Outer Space Activities Working Group within the United Nations Committee on the Peaceful Uses of Outer Space. Created in 2010, the LTS Working Group was tasked with producing a consensus report containing voluntary best-practice guidelines for all space actors to help ensure the long-term sustainable use of outer space. The LTS Working Group explored guidelines in four areas: (1) sustainable space utilization supporting sustainable development on Earth; (2) space debris, space operations, and tools to support space situational awareness sharing; (3) space weather; and (4) regulatory regimes and guidance for new actors in the space arena.

Despite troubles along the way, the LTS Working Group was able to reach consensus on more than 20 draft guidelines. Initial progress on creating draft guidelines was hindered by increasingly belligerent Russian statements and obtuse proposals for additional guidelines following the European and American sanctions after the annexation of Crimea and invasion of Ukraine. However, unlike what happened during the final ICOC negotiations, Russia was unable to convince other countries, including China and Brazil, to oppose the LTS effort, and progress eventually continued.

Consensus was reached on an initial set of 12 guidelines in February 2016 (Weeden & Samson, 2018b) and an additional nine guidelines, along with the perambulatory text, were agreed to in June 2018 (United Nations Office for Outer Space Affairs, n.d.). However, Russian obstruction prevented agreement on a General Assembly Resolution adopting the guidelines.

Future Efforts to Build Norms for Space Conflicts

Future conflicts in space could have devastating consequences for the long-term sustainability of space and the ability to use space for benefits on Earth. Thus, it is important that the United States looks to ways to prevent space from becoming the flashpoint for future conflicts, or from future conflicts on Earth from extending into space. Although not the entire answer, initiatives to develop norms of behavior can help in this regard. These future norm-building efforts can be grouped into two categories: efforts to create norms that help prevent future conflicts in space, and efforts to create norms that help manage the disastrous impacts from future conflicts in space.

Norms to help prevent future conflicts Norm-building efforts that help prevent future conflicts would essentially be extensions of the concepts and recommendations from the GGE on Space TCBMs. The main goal would be to develop norms that reducing the risks of misunderstanding, mistrust, and miscalculations that could spark or escalate conflict in space. I describe three areas on which to focus.

(1) Norms of behavior for rendezvous and proximity operations (RPO) in space. RPOs involve the deliberate altering of a satellite’s trajectory so that it comes close to another space object. In recent years, RPO technologies have started proliferating to more countries and private sector entities and are being explored for a wide range of civil and commercial applications such as satellite servicing and removal of space debris. Developing norms of behavior for civil and commercial RPO would not only increase the safety and efficiency of such activities, but also help discriminate them from potential hostile military activities in space.

(2) Norms of behavior for how militaries interact with each other in space. In a period of growing competition, innocuous or accidental behavior could be mistaken as a hostile or aggressive act, and during actual crisis, a mistake or accident could serve as the spark that escalates a situation towards armed conflict. An excellent model for this type of norm would be the Incidents at Sea Agreement, which was a treaty signed by the United States and Soviet Union in 1972 that outlined how American and Soviet ships and aircraft should interact with each other ("Agreement Between the Government", n.d.). The Incidents at Sea Agreement included steps to avoid collisions, maintaining safe distances, use of signals when maneuvering in close proximity, and avoiding activities that could be interpreted as hostile attacks. As the United States, Russia, China, and other countries increase their national security activities in space, they should consider negotiating a similar bilateral or multilateral “incidents in space agreement” to outline steps that can be taken to reduce misperceptions and increase stability in space (Listner, 2009).

(3) Norms of behavior for the testing and development of counterspace weapons. Over the last two decades, the United States, Russia, and China, among other countries, have been developing and testing a range of counterspace capabilities to deceive, disrupt, deny, degrade, or destroy space systems (Weeden & Samson, 2018a). Some of these counterspace capabilities are non-kinetic or reversible, while others involve the use of ASAT weapons to destroy satellites. Previous destructive ASAT tests have created thousands of pieces of orbital space debris, which pose a long-term hazard to commercial, civil, and military space activities (Weeden, 2010). Surprise ASAT testing could be highly escalatory and create misperceptions of actual attacks, particularly if a country has limited space situational awareness. Thus, it behooves all countries to encourage norms of behavior in ASAT testing to prevent, or at the very least minimize, the creation of long-lived orbital debris and provide prior notification of tests (Porras, 2018).

Norms to manage conflicts

Although every effort should be taken to try to prevent future conflicts from extending into space, we also must consider the possibility that they still might. While conflict may not yet be entirely preventable, humanity has taken steps to limit the indiscriminate nature of conflict and minimize the humanitarian suffering it creates. This includes development of International Humanitarian Law (IHL), also known as the Law of Armed Conflict (LOAC), which includes both formal treaties, agreed to by states and state practice that has over time developed into customary international law. IHL defines the circumstances by which states may use armed force, and limits the effects caused by armed conflict.

One important norm-building initiative for space would be the development of a manual on how IHL applies to conflicts in outer space. Such manuals already exist for the maritime, air, and cyber domains, and were developed by experts and practitioners to provide advice to military lawyers on the application and use of IHL in their respective domains. While not binding agreements, the manuals have nonetheless had an impact on how militaries conduct activities in peacetime, periods of tension, and armed conflict. Two efforts have begun to develop such a manual for space: (1) the Manual on International Law Applicable to Military Activities in Space (MILAMOS), led by McGill University in Canada (Manual on International Law Applicable to Military Uses of Outer Space, 2018); and (2) the Woomera Manual, led by the University of Adelaide in Australia and Exeter University in the United Kingdom (The Woomera Manual on International Law of Military Space Operations, 2018). Both are in their early stages, and it remains to be seen if they will be successful.

Importance of US Engagement on Norms

The United States has historically played a key role in shaping the few norms and legal principles that already exist in space. The peaceful uses of outer space, the principle at the heart of international space law, arose from the US desire to be able to use space for intelligence purposes (Loverro, 2017). As a result, the United States was able to influence the outer space legal regime in a way that greatly benefited its national security priorities and capabilities.

However, in recent years, US influence in the key multilateral fora that are actively discussing norms has waned. This is partly due to domestic politics, as seen in the ICOC negotiations, and partly due to the lack of a clear vision for what the goal of such engagement should be (Loverro, 2017). As was seen during the ICOC and LTS Working Group, Russia and China have been able to exploit the absence of the United States to try and shape the discussions towards their benefit.

As the current trends in the space domain force new thinking and discussions on the future of the space governance regime, the United States should once again be a force for increased order in space. That begins by seizing the diplomatic initiative to push for the creation of new norms of behavior in space that reflect US principles and priorities and serve as the foundation for an updated governance regime that enhances the safety, security, and stability, and sustainability of future outer space activities.

#### Clarifying space rules with China is key to solve

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All three major players thus recognize space as a military domain of operations, and appear to act accordingly. They generally focus on developing new terrestrially-focused space applications and security of extant space assets (through deterrence or active defense) rather than offensive space operations. This focus is reasonable given the likelihood of kinetic activities only serving to diminish each state’s own use of space for terrestrially useful applications through the creation of orbital debris or adverse political or military reactions.

Space may be an infinite expanse, but its useful zones or orbits for space and terrestrial applications are limited. As the number of sovereign and “newspace” actors seeking finite advantageous orbital locations, the range of military capabilities, and the number of states developing counterspace capacities all grow, so will tensions related to space activities. With new technologies now bringing old security concerns to the fore, the space race is at a new inflection point: geostationary orbit-reaching ASATs, RPOs, lasers, and hypersonic weapons may now be an imminent and distributed reality. Although kinetic-only options have an implicit practical limitation if the launching state also intends to use space (due to debris), emerging nonkinetic and nonattributable technology may allow for hostile activities without collateral harm to one’s own assets, and without a guarantee of any response or reprisal. As the military space environment leans towards one of realistic threat of action—not just major-state planning for a distant, potential technological future—the national security space community is coming to a crossroads. One way to address competition in this congested, contested environment may be through shared understandings of the law governing state behavior in space.

Room for International Law in Military Space Operations?

Any discussion of international law and military space operations starts with two fundamental questions: does international law apply and, if so, how? It is well settled that international law applies in outer space, both as the law governing the interaction of states, and under the specialized regime of outer space law set forth in Article III of the OST. Whether and how the law of armed conflict (LOAC) applies to military space activities appears less established, however. U.S. views appear clear, but the views of other military space actors are less so given the paucity of open source materials or statements on topic.

The U.S. applies LOAC to all military operations in outer space—space is a warfighting domain, where military members conduct military operations. In accordance with DoD Directive 2311.01E, “[m]embers of the DoD Components comply with the law of war during all armed conflicts, however such conflicts are characterized, and in all other military operations.”20 The DoD Law of War Manual explains:

[LOAC] regulate[s] the conduct of hostilities, regardless of where they are conducted, … includ[ing] the conduct of hostilities in outer space. In this way, the application of [LOAC] to activities in outer space is the same as its application to activities in other environments, such as the land, sea, air, or cyber domains. U.S. partners—NATO states, Australia, and Japan—do not necessarily have similarly clear articulations, but share this general disposition towards the application of international law (and particularly LOAC) and can be expected to extend it to military activities in outer space.22

For the United States, adherence to the law is strategically advantageous and contributes positively to legitimacy and operational success.23 DoD’s National Defense Strategy focuses on near-peer competition, enhancing lethality for credible deterrence of (or reactions to) threats, and competition along the full spectrum of military operations (above and below the threshold of armed attack).24 One of three pillars is to strengthen alliances and international cooperation, including by “maintaining the rules which underwrite a free and open international order” and deepening interoperability with allies.25

Less information regarding China and Russia’s views on international law and military space operations is openly available. Their doctrine documents and seeks efforts to advance the draft Treaty on the Prevention of Placement of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects (PPWT); a No First Placement of Weapons resolution; and a Code of Conduct in Space suggest at least some reliance on international law. Questions remain, however, concerning whether these states will actually adhere to the law even if a treaty comes into force, a concern animating U.S. views on space cooperation.26 Thus, U.S. diplomats openly lament the lack of verification and trust and confidence building measures in the PPWT draft and other arms and Code discussions.27

The next question is how international law applies. U.S. policy is to compete in the full spectrum of military operations, including when adversaries use “areas of competition short of open warfare to achieve their ends.”28 The jus ad bellum, LOAC, law of state responsibility, and law of friendly relations are therefore all implicated. However, the technology, geophysics, and geopolitics of outer space make tackling the contours and the sometimes domainspecific intricacies of general principles and customary international law a challenge. State practice will therefore be a, if not the, significant determining factor.

Applying International Law in Space: Key Issues and Challenges

As in other arenas of international engagement, international law is the primary mechanism for creating, implementing, and enforcing shared understandings of the rights, privileges, and duties of states, nonstate entities, and individuals in space. State actors seek to maintain freedom of action and protect their sovereign national interests.

Doing so often requires cooperative efforts and states are therefore willing to create mechanisms for greater understanding and foreseeable and predictable responses to challenges. The existing foundations of outer space law—the five primary international law treaties on outer space—are the fruits of earlier efforts to provide a critical foundation for this complex environment. Treaty law is the strongest, most enforceable, and most likely to define and regulate state behavior, and therefore to provide concrete guidance and parameters for states to assess threats, including the use of force in, through, or from outer space, and appropriate forcible and nonforcible responses. The likelihood of new treaties being developed and coming into force is slim, however, given the steadily growing cast of characters with an equally expansive set of competing interests in outer space. As a result, customary international law is the most likely tool for development of rules, as states develop patterns of practice and a willingness to accept such practice as binding legal obligation.

#### They’ll Say Yes--- they have a shared interest in stability and that builds coop

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China is focused on developing its own capabilities in the space domain, and increasingly depends on space-based assets for both economic and military aims that may be partly incompatible, and even in competition, with other key players, especially the United States. China sees space as critical to defending its national security and securing its role as a rising power. From China’s perspective, the most urgent problem is that the space capability gap between the United States and China is growing. China also seeks a voice in the creation of international norms and institutions — particularly because it perceives that it must accept rules that have been decided mainly by the United States.

As the two nations act on these differing priorities and goals, tensions in the space domain have had ramifications for the overall bilateral relationship. Recent testing and development of anti-satellite capabilities by China, and a doctrinal focus on “active defense” have caused the United States to openly call for a stronger focus on space protection and warfighting. From the Chinese perspective, it is necessary to develop such capabilities to support national security, close the power gap, and defend itself from American aggression.,

Failure to reconcile their differences in this domain could lead to a renewed arms race that could be to the detriment of both sides. Both countries have acknowledged the importance of developing a more stable, cooperative, and long-lasting bilateral relationship in space. Washington still hopes that Beijing can be a constructive partner for greater international space security. While China still chafes at the largely American constructed rules-based order, it likewise has a clear interest in using its development of space capabilities to promote bilateral cooperation and to play a role the formation of new international regimes. Both of these dynamics were evident in recent United Nations discussions on space governance, with an isolated Russia attempting to undermine international consensus on new guidelines for enhancing the long-term sustainability of space activities.

### Advantage—Microwaves

#### Two scenarios for escalation:

#### [1] A Chinese solar station risks miscalc – shifts in solar panels misfire microwave beaming guns.

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An intensive energy beam would need to penetrate the cloud efficiently and hit a ground station directly and precisely. Researchers at the Bishan facility will work on these and other projects. A solar energy plant is not efficient because it only operates during the day, and the atmosphere reflects or absorbs nearly half the energy in the sunlight. Since the 1960s, some space scientists and engineers have been attracted to the idea of a solar station in space. From an altitude of 36,000km (22,400 miles) or above, a geo-stationary solar plant can avoid the Earth’s shadow and see the sun 24 hours a day. The energy loss in the atmosphere could also be reduced to the minimum (about 2 per cent) by sending the energy in the form of high-frequency microwaves. Over the last few decades, various forms of solar power stations have been proposed from around the world but they remained theoretical because of major technical challenges. At Bishan, Chinese researchers would first need to prove that wireless power transfer worked over a long distance. Although the engineer and inventor Nikola Tesla popularised the idea in the late 19th century, the technology has been limited to only a small number of short-range applications, such as the wireless charger for smartphones. Tesla failed in part because he made the electricity travel in the air like waves in all directions. To increase the effective range, the energy must be concentrated into a highly focused beam. The Chinese researchers received wireless energy emitted from a balloon 300 metres (980 feet) above the ground. When the Bishan facility is complete, they plan to increase the range to more than 20km with an airship collecting solar energy from the stratosphere, according to the China Science Daily. In Bishan, researchers will also experiment with some alternative applications of the technology, such as using the energy beam to power drones. The core experimental zone will be 2 hectares (4.9 acres) and surrounded by a clearance zone five times larger. Local residents are not allowed to enter the buffer zone for their own safety, according to the district government. The safety risk of a space solar plant is not negligible, according to some recent studies in China. When the huge solar panels turn to chase the sun, for instance, they could produce small but persistent vibrations in the microwave beaming gun that could cause a misfire. The “space farm” would therefore need an extremely sophisticated flight control system to maintain its aim at a tiny spot on Earth. Another hazard would be radiation. According to one calculation by a research team with Beijing Jiaotong University last year, residents could not live within a 5km range of the ground receiving station for the 1GW Chinese solar plant in space. Even a train more than 10km away could experience problems such as sudden loss of communication because the frequency of the energised microwave would affect Wi-Fi.

#### High Power Microwave weapons destroy satellites. No “not a weapon”– HPM tech is dual use which makes its deployment unpredictable and impossible to enforce.

Larson 1/10 (Caleb Larson, Caleb Larson, a defense journalist based in Europe and holds a Master of Public Policy degree from the Willy Brandt School of Public Policy. He lives in Berlin and writes on U.S. and Russian foreign and defense policy, German politics and culture., 1-10-2022, accessed on 1-28-2022, 19FortyFive, "The US Navy Has Big Plans for High-Power Microwave Weapons", https://www.19fortyfive.com/2022/01/the-us-navy-has-big-plans-for-high-power-microwave-weapons/)//phs st

The U.S. Navy has announced the first test of its on-orbit power-beaming system on the U.S. Air Force's X-37B mini-space shuttle, just a day after the successful launch of that vehicle on its latest mission to space. These experiments could have game-changing implications for power generation on Earth, especially for facilities in remote areas and for unmanned aircraft, but they also underscore the potential applications of high-powered microwaves and other directed energy beams as weapons in space to jam, blind, or even destroy critical sensors and other components on opponents' satellites. The U.S. Naval Research Laboratory's (NRL) Photovoltaic Radio-frequency Antenna Module (PRAM) is one of a number of publicly disclosed payloads onboard the X-37B, which blasted off from Cape Canaveral Air Force Station in Florida on top of a United Launch Alliance Atlas V rocket on May 17, 2020. This is the reusable space plane's sixth trip into orbit since 2010 and it had just completed its fifth mission, which lasted a record-setting 780 days, in October 2019. Much about the craft and its missions remain highly classified. PRAM is a self-contained module that is a foot long, a foot wide, and around two inches tall. The system uses a solar panel on top to collect sunlight and then converts that into a microwave beam. In principle, a receiver on Earth could then take the beam and convert it back into energy that could be used to power traditional electric devices. You can read more about the history of this concept and the science behind it in this past War Zone piece. "PRAM converts sunlight for microwave power transmission. We could’ve also converted for optical power transmission," Chris Depuma, the PRAM program manager at NRL, said in a statement. "Converting to optical might make more sense for lunar applications because there’s no atmosphere on the Moon. The disadvantage of optical is you could lose a lot of energy through clouds and atmosphere." The Navy team plans to test how efficiently PRAM converts energy and its associated thermal performance in space, rather than in a terrestrial laboratory setting. NRL hopes these experiments will inform the development of future prototypes and could lead to a full system installed on a dedicated spacecraft. In principle, a constellation of solar-energy-collecting power-beaming satellites could provide near-limitless, clean power anywhere on Earth. This could completely transform how power is supplied for both military and civilian activities in the most remote areas. It could potentially power propulsion systems on long-endurance drones, allowing them to stay aloft indefinitely, something The War Zone has previously explored in detail. "To our knowledge, this experiment is the first test in orbit of hardware designed specifically for solar power satellites," Paul Jaffe, PRAM principal investigator at NRL, said in his own statement. This "could play a revolutionary role in our energy future." However, if a power-beaming system can take solar energy, convert it into a microwave beam, and direct that beam at a specific location, one has to wonder if that concept could not also be adapted into a space-based weapon. The idea of using high-powered microwaves to disrupt, or even destroy, electronic systems in space, as well as on Earth, is hardly new. The U.S. military alone has already explored various types of high-powered microwave weapons that can scramble or damage electronic systems and is evaluating new designs, right now. These include systems that can disrupt enemy computer networks, knock down small drones, and fry the electronics in incoming missiles to throw them off course, among others. A sufficiently powerful burst of microwave energy could cause enough damage to cause a mission kill on satellites. A 2019 report from the U.S. Defense Intelligence Agency (DIA) specifically highlighted ground and space-based high-powered microwaves, as well as other directed energy weapons, including lasers, as potential future threats to American assets in orbit. It also listed a slew of other possible dangers, including jamming and "killer satellites" capable of launching various types of kinetic and non-kinetic attacks. The Russians and the Chinese both already have various anti-satellite capabilities, including air-launched and ground-based kinetic interceptors, and are continuing to develop new capabilities given the traditional advantage that the United States has in space-based capabilities, including intelligence gathering, early warning, communications and data sharing, navigation, and more. The U.S. military itself has a number of other highly-classified counter-space capabilities and other countries, such as India, are also developing their own means to challenge opponents assets' in orbit. There is also renewed discussion about space-based weapons, mostly as a means to counter anti-satellite threats or for missile defense, in recent years. "Directed energy weapons (high energy lasers or particle beam) or space-based interceptors provide the best overall hope of a hard kill" to destroy future hypersonic weapons, according to a report the NATO Science & Technology Organization released in March. In 2019, France also notably announced plans to eventually deploy small laser-armed satellites to protect other space-based assets. As NRL's researchers noted with regards to PRAM, the vacuum of space removes many of the obstacles that deflect and diffuse directed energy beams on Earth. This means it could require less starting power to generate a beam with sufficient energy to disrupt or damage another target in space, even if it were shielded from common solar radiation. Many military-grade weapons and other systems are also hardened against electromagnetic radiation, but are still vulnerable to a suitably powerful microwave attack. Highly maneuverable satellites or other spacecraft – the X-37B would be an ideal platform itself – could also maneuver the system very close to its target. This could, in turn, reduce the power and range requirements for high-powered microwave or other directed energy weapons. A high-powered microwave also has the benefit of not needing to physically break up the target to destroy it, meaning that an attack would not cause a cloud of dangerous space debris that could threaten friendly assets in space.

#### Miscalc – downed satellites causes miscalc and goes nuclear.

Blatt 20 [Talia, joint concentration in Social Studies and Integrative Biology at Harvard, specialization in East Asian geopolitics and security issues] “Anti-Satellite Weapons and the Emerging Space Arms Race,” Harvard International Review, May 26, 2020, <https://hir.harvard.edu/anti-satellite-weapons-and-the-emerging-space-arms-race/> TG //rct phs st

Despite their deterrent functions, ASATs are more likely to provoke or exacerbate conflicts than dampen them, especially given the risk they [pose](https://thebulletin.org/2019/06/arms-control-in-outer-space-the-russian-angle-and-a-possible-way-forward/) to early warning satellites. These satellites are a crucial element of US ballistic missile defense, capable of [detecting missiles](https://www.globalsecurity.org/space/world/japan/warning.htm) immediately after launch and tracking their paths. Suppose a US early warning satellite goes dark, or is shut down. Going dark could signal a glitch, but in a world in which other countries have ASATs, it could also signal the beginning of an attack. Without early warning satellites, the United States is much more susceptible to nuclear missiles. Given the strategy of counterforcing—[targeting](https://www.belfercenter.org/sites/default/files/files/publication/isec_a_00273_LieberPress.pdf) nuclear silos rather than populous cities to prevent a nuclear counterattack—the Americans might believe their nuclear weapons are imminently at risk. It could be [twelve hours](https://books.google.com/books?id=ET8lDwAAQBAJ&pg=PA1&lpg=PA1&dq=%22Protecting+Space+Assets%22+johnson-freese&source=bl&ots=6Oq0IdeBjw&sig=ACfU3U1G6Hj8QdP4JlCRNxA6i5XplZwHyg&hl=en&sa=X&ved=2ahUKEwj1n-jT2YzpAhUugnIEHUuMCu4Q6AEwA3oECAkQAQ#v=onepage&q=%22Protecting%20Space%20Assets%22%20johnson-freese&f=false) before the United States regains satellite function, which is too long to wait to put together a nuclear counterattack. The United States, therefore, might move to mobilize a nuclear attack against Russia or China over what might just be a piece of debris shutting off a satellite. Additionally, accidental warfare, or strategic miscalculation, is uniquely likely in space. It is [much easier](https://books.google.com/books?id=VyXTDwAAQBAJ&pg=PA339&lpg=PA339&dq=space+offense+dominant&source=bl&ots=Mw0bgJ51qf&sig=ACfU3U3DeZiEHpr9nfszlCbJZIoyyssIpg&hl=en&sa=X&ved=2ahUKEwjrs-WD3IzpAhVulHIEHbL0AE4Q6AEwCXoECAoQAQ#v=onepage&q=space%20offense%20dominant&f=false) to hold an adversary’s space systems in jeopardy with destructive ASATs than it is to [sustainably defend](https://www.cnas.org/publications/commentary/the-us-military-should-not-be-doubling-down-on-space) a system, which is expensive and in some cases not technologically feasible because of limitations on satellite movement. Space is therefore [considered](https://books.google.com/books?id=VyXTDwAAQBAJ&pg=PA339&lpg=PA339&dq=space+offense+dominant&source=bl&ots=Mw0bgJ51qf&sig=ACfU3U3DeZiEHpr9nfszlCbJZIoyyssIpg&hl=en&sa=X&ved=2ahUKEwjrs-WD3IzpAhVulHIEHbL0AE4Q6AEwCXoECAoQAQ#v=onepage&q=space%20offense%20dominant&f=false) offense-dominant; offensive tactics like weapons development are prioritized over defensive measures, such as [improving GPS](https://www.politico.com/story/2018/04/06/outer-space-war-defense-russia-china-463067) or making satellites more resistant to jamming. As a result, countries are left with poorly defended space systems and rely on offensive posturing, which increases the risk that their actions are perceived as aggressive and incentivizes rapid, risky counterattacks because militaries cannot rely on their spaced-based systems after first strikes. There are several hotspots in which ASATs and offensive-dominant systems are particularly relevant. Early warning satellites [play](https://www.politico.com/story/2018/04/06/outer-space-war-defense-russia-china-463067) a central role in US readiness in the event of a conflict involving North Korea. News of North Korean missile launches comes from these satellites. Given North Korea’s [history](https://www.bbc.com/news/world-asia-pacific-11813699) of nuclear provocations, unflinchingly hostile rhetoric towards the United States and South Korea, and diplomatic opacity, North Korea is always a threatening, unknowable adversary, but recent developments have magnified the risk. With the health of Kim Jong-un [potentially in jeopardy](https://apnews.com/f5d302ae65b03838173e40848223b771), a succession battle or even civil war on the peninsula [raises the chances](https://www.express.co.uk/news/world/1273890/Kim-Jong-un-dead-North-Korea-nuclear-weapon-news-latest-death-US) of loose nukes. If the regime is terminal, traditional MAD risk calculus will become moot; with nothing to lose, North Korea would have no reason to hold back its nuclear arsenal. Or China [might decide](https://foreignpolicy.com/2020/04/28/kim-jong-un-china-north-korea/) to seize military assets and infrastructure of the regime. If the US does not have its early warning satellites because they have been taken out in an ASAT attack, the US, South Korea, and Japan are all in imminent nuclear peril, while China could be in a position to fundamentally reshape East Asian geopolitics. The South China Sea is another hotspot in which ASATs could risk escalation. China [is developing](https://missiledefenseadvocacy.org/missile-threat-and-proliferation/todays-missile-threat/china-anti-access-area-denial-coming-soon/) Anti-Access Area Denial (A2/AD) in the South China Sea, a combination of long range radar with air and maritime defense meant to deny US freedom of navigation in the region. Given the disputed nature of territory in the South China Sea, the United States and its allies do not want China to successfully close off the region.

#### Nuke war causes extinction – Ice Age, famines, and war won’t stay limited

Edwards 17 [Paul N. Edwards, CISAC’s William J. Perry Fellow in International Security at Stanford’s Freeman Spogli Institute for International Studies. Being interviewed by EarthSky. How nuclear war would affect Earth’s climate. September 8, 2017. earthsky.org/human-world/how-nuclear-war-would-affect-earths-climate] Note, we are only reading parts of the interview that are directly from Paul Edwards – MMG //rct phs st

In the nuclear conversation, what are we not talking about that we should be?

We are not talking enough about the climatic effects of nuclear war. The “nuclear winter” theory of the mid-1980s played a significant role in the arms reductions of that period. But with the collapse of the Soviet Union and the reduction of U.S. and Russian nuclear arsenals, this aspect of nuclear war has faded from view. That’s not good. In the mid-2000s, climate scientists such as Alan Robock (Rutgers) took another look at nuclear winter theory. This time around, they used much-improved and much more detailed climate models than those available 20 years earlier. They also tested the potential effects of smaller nuclear exchanges. The result: an exchange involving just 50 nuclear weapons — the kind of thing we might see in an India-Pakistan war, for example — could loft 5 billion kilograms of smoke, soot and dust high into the stratosphere. That’s enough to cool the entire planet by about 2 degrees Fahrenheit (1.25 degrees Celsius) — about where we were during the Little Ice Age of the 17th century. Growing seasons could be shortened enough to create really significant food shortages. So the climatic effects of even a relatively small nuclear war would be planet-wide. What about a larger-scale conflict? A U.S.-Russia war currently seems unlikely, but if it were to occur, hundreds or even thousands of nuclear weapons might be launched. The climatic consequences would be catastrophic: global average temperatures would drop as much as 12 degrees Fahrenheit (7 degrees Celsius) for up to several years — temperatures last seen during the great ice ages. Meanwhile, smoke and dust circulating in the stratosphere would darken the atmosphere enough to inhibit photosynthesis, causing disastrous crop failures, widespread famine and massive ecological disruption. The effect would be similar to that of the giant meteor believed to be responsible for the extinction of the dinosaurs. This time, we would be the dinosaurs. Many people are concerned about North Korea’s advancing missile capabilities. Is nuclear war likely in your opinion? At this writing, I think we are closer to a nuclear war than we have been since the early 1960s. In the North Korea case, both Kim Jong-un and President Trump are bullies inclined to escalate confrontations. President Trump lacks impulse control, and there are precious few checks on his ability to initiate a nuclear strike. We have to hope that our generals, both inside and outside the White House, can rein him in. North Korea would most certainly “lose” a nuclear war with the United States. But many millions would die, including hundreds of thousands of Americans currently living in South Korea and Japan (probable North Korean targets). Such vast damage would be wrought in Korea, Japan and Pacific island territories (such as Guam) that any “victory” wouldn’t deserve the name. Not only would that region be left with horrible suffering amongst the survivors; it would also immediately face famine and rampant disease. Radioactive fallout from such a war would spread around the world, including to the U.S. It has been more than 70 years since the last time a nuclear bomb was used in warfare. What would be the effects on the environment and on human health today? To my knowledge, most of the changes in nuclear weapons technology since the 1950s have focused on making them smaller and lighter, and making delivery systems more accurate, rather than on changing their effects on the environment or on human health. So-called “battlefield” weapons with lower explosive yields are part of some arsenals now — but it’s quite unlikely that any exchange between two nuclear powers would stay limited to these smaller, less destructive bombs.

#### [2] Space race – U.S.-China space race is close now, but China is looking to close the gap by militarizing.

Bender, 21 (Bryan Bender, Bryan Bender is a senior national correspondent for POLITICO, where he focuses on the Pentagon, NASA, and the defense and aerospace industries. He was previously the national security reporter for the Boston Globe, where he covered U.S. military operations in the Middle East, Asia, Latin America, and the Balkans. He also writes about terrorism and government secrecy. He is an adjunct professor at the Walter Cronkite School of Journalism at Arizona State University and the author of “You Are Not Forgotten,“ the story of an Iraq War veteran’s search for a missing World War II fighter pilot in the South Pacific., 12-31-2021, accessed on 2-4-2022, POLITICO, "‘We’re falling behind’: 2022 seen as a pivotal lap in the space race with China ", https://www.politico.com/news/2021/12/31/2022-space-race-china-us-526271)//phs st

The new year could be a turning point in what’s steadily defining the next chapter in the space age: The fierce competition between the United States and China for economic and military dominance. Washington, D.C., and Beijing are jockeying for advantage — and international partners — to develop the moon and are locked in what increasingly looks like an arms race that could threaten the growth of satellite constellations and space stations. And so far, international efforts to reduce tensions and encourage sustainable growth in low-Earth orbit and beyond have made little progress. "We are in a race that we might win but it is certainly conceivable that China may advance in certain areas of space faster than we do," said Sen. Jerry Moran of Kansas, the top Republican on the Commerce Subcommittee on Space and Science. "It is to our advantage to do everything to see that for at least the things we determine to be significantly important, we achieve as quickly as possible and hopefully before our adversaries do." "I trust how we will use space to be advantageous to not only the United States but the world," he added in an interview. "But I don't trust others to do that." China is showing no sign of slowing its pace to surpass the U.S. and other powers in space transportation and exploration, say current and former officials and space industry experts. “It’s becoming more and more clear how dominant China wants to be with regard to space and the space economy,” said Steve Kwast, a retired Air Force lieutenant general and space strategist. “They see the profit margin, they see the economic revenue stream and they see the national security implications.” The competition will play out in myriad ways in 2022 that could ultimately determine which country seizes the upper hand. Who will be the traffic cop? A big question is who will lead the global space industry in managing the historic growth in satellites that are increasingly at risk of colliding with orbital debris — or each other — if not better coordinated. “It becomes harder and harder to corral and the importance continues to grow, and grow quickly,” said Dan Dumbacher, president of the American Institute of Aeronautics and Astronautics. “The U.S. is a leader in that arena and we want to stay in front of that conversation to make sure it’s going in a good direction.” But before taking on a greater role globally, Washington needs to finally iron out what U.S. agency is in charge, whether the Commerce Department or the Federal Aviation Administration, which licenses space launches. That is among the agenda items facing Vice President Kamala Harris, who chairs the National Space Council, which held its first meeting earlier this month. “I haven't seen much of any desire on the part of this administration to take the significant steps necessary to first of all decide what agency is going to be in charge of this … and then fund it properly,” said Robert Walker, former GOP chair of the House Science Committee. “Part of this is a problem on Capitol Hill,” he added. “It’s a jurisdictional dispute between a couple of chairmen on Capitol Hill.” But the stakes are high. “We’re falling behind,” said Walker, who is now head of moonWalker Associates, a space consulting firm. “The danger is someone like China will come up with their system for that and the world will rally around that.”Weapons in space The recent Russian test of an anti-satellite weapon was a stark reminder of the consequences of an unregulated low-Earth orbit. “That is an issue that is going to get worse and worse,” predicted Rand Simberg, a space policy analyst. “We can't keep deliberately blowing things up. That Russian test made a hell of a mess.” Walker also predicts “continuing challenges from China and probably even an increase in China and Russia’s attacks on our space infrastructure,” including electronic attacks on satellites. He sees as an ominous sign China’s baseless complaint to the U.N. this month that SpaceX’s mega constellation of Starlink communications satellites is designed to threaten China’s nearby space station. “What I think that means is they have every intention of going after some of our space assets, both commercial and military,” Walker said. “We need to fund the research we are doing into advanced weaponry in order to stave off that challenge.”

#### HPM allows China to pull ahead of the U.S. – Chinese solar stations give China an excuse to develop HPM tech and hide it in space.

Kania 1/20 [Elsa Kania is an analyst at the Long Term Strategy Group. Elsa is a graduate of Harvard College and was a 2014–2015 Boren Scholar in Beijing, China, The PLA’s Potential Breakthrough in High-Power Microwave Weapons, 1-20-2022,No Publication,https://thediplomat.com/2017/03/the-plas-potential-breakthrough-in-high-power-microwave-weapons/, 1-29-2022 amrita]

**Chinese scientists** have reportedly **achieved** unexpected **success in** their **development of** a high-power microwave (**HPM**) weapon. This promising form of directed energy weapon combines “soft” and “hard kill” capabilities through the disruption or even destruction of enemy electronics systems. Such **a** powerful **“new concept weapon” possesses unique advantages,** including its potential speed, range, accuracy, flexibility, and reusability. The PLA’s future HPM weapons could have multiple defensive and offensive functions that would enhance its combat capabilities. In the near term, the PLA’s probable employment of this HPM **could be** as **a ship-borne anti-missile system** or to reinforce China’s air defense systems. Potentially, such a weapon system **would undermine the efficacy o**f even the most **advanced U.S. missiles, such a**s the Long Range Anti-Ship Missile (**LRASM**) currently under development. **Its** likely **applications could** also include its **use as an anti-satellite** (ASAT) **we**apon or incorporation with missiles in order **to overcome enemy air defenses.** Once operationalized, this new weapon could thus contribute to China’s anti-access/area-denial (A2/AD) capabilities. The PLA’s apparent breakthrough in HPM weapons **reflects a track record of** consistent **progress** over the course of decades of concentrated efforts. Given the limitations of the available information, it is difficult to compare the extent of U.S. and Chinese progress in this domain. Until the past several years, the U.S. military’s 50 or so years of research on HPM weapons could be dismissed as an apparent dead end. Only recently, the U.S. Air Force Research Laboratory successfully developed and is preparing to field the Counter-electronics High-Powered Microwave Advanced Missile Project (CHAMP), which could target an enemy’s electronics from an aircraft or missile. While **the** full **extent of current U.S. efforts is unknown,** the PLA’s reported advance in **the development of HPM** weapons could **indicate that Chinese capabilities** may have the potential to **keep pace with** those of the **U**nited **S**tates in this disruptive technology. Reports of a Major Breakthrough In January, Huang Wenhua, deputy director of the Northwest Institute of Nuclear Technology, received a first prize National Science and Technology Progress Award for his research on directed energy. This prize was evidently awarded for his development of a HPM weapon, given his extensive research on the topic and accounts of his remarks at the time. According to Huang, the system in question was initially tested successfully in November 2010 in northwest China, in what he referred to as the Huahai exercise. By his characterization, the completion of the exercise, verification, and experimentation is a “pioneering” achievement, since comparable advances had yet to be achieved elsewhere in the world. Huang also highlighted that this “disruptive technology,” in which a “major breakthrough” has occurred, would increase China’s capabilities in future electronic information confrontation. Enjoying this article? Click here to subscribe for full access. Just $5 a month. At this point, the actual capabilities and current status of this weapon system remain unknown. In an operational context, its efficacy would depend on a number of factors, including its output power, effective range, firing rate, and power requirements. However, Huang’s frequent publications and patents indicate continuing progress. Based on his prior writings, this HPM weapon could be intended for initial employment as a ship-borne anti-missile system. For instance, in 2009, ahead of its initial test, Huang co-authored a paper focused on the utility of HPM weapons against anti-ship missiles. The authors noted that HPM weapons could be used to degrade and damage the electronics of an incoming missile, interfering with, for instance, its data link, GPS receivers, and other guidance mechanisms. Contextualizing Chinese Advances in HPM Weapons This reported breakthrough seemingly reflects the success of China’s long-term agenda for the research and development of HPM weapons. Since Chinese efforts to create directed energy weapons date back to the 1970s and have intensified since the 1990s, **this** apparent **advance reflects** the results of **long-term research** at a number of critical institutions and the consistent funding for their work. Throughout his career, over the course of nearly 20 years in this field, Huang Wenhua has been instrumental in research and development of HPM technology. Since the early 1990s, Huang has engaged in research related to HPM weapons, under the aegis of the Northwest Institute of Nuclear Technology’s Key Laboratory of High-Power Microwave Technology. The National High-Technology Research and Development Plan or “863 Plan” has provided extensive funding to this research agenda, including through a subsidiary fund focused on HPM technology, with the guidance of its X07 expert group, of which Huang served as the director. Future Prospects for the PLA’s HPM Weapons Evidently, the PLA’s pursuit of HPM weapons has remained a consistent priority that will likely continue to receive high-level support at the level of the Central Military Commission (CMC). Notably, Liu Guozhi, who recently became the director of the new CMC Science and Technology Commission, previously served as the commander of the PLA’s Nuclear Test Base in Xinjiang and the director of the Northwest Institute of Nuclear Technology. Liu himself has received multiple awards for his own research on HPM weapons and pulsed power, initially collaborating with Huang on this research agenda. As such, he will likely prove a pivotal figure in the PLA’s efforts to advance this technological dimension of military innovation. Looking forward, **the PLA** could continue to **achieve significant progress in** **HPM** weapons, along with multiple forms of directed energy weapons, seeking **to rival U.S. tech**nological advances. In response to the Third Offset, the PLA has only intensified its focus on these “new concept weapons,” while also developing countermeasures to U.S. directed energy weapons. Although it is difficult to evaluate their future trajectory and likely timeframe at this point, the eventual fielding of the PLA’s HPM weapons will serve as a critical force multiplier for its war-fighting capabilities.

#### Chinese tech supremacy causes nuclear war.

Kroenig 18 [Matthew, Deputy Director for Strategy, Scowcroft Center for Strategy and Security; Associate Professor of Government and Foreign Service, Georgetown University, “Will disruptive technology cause nuclear war?” The Bulletin, 11/12/2018, https://thebulletin.org/2018/11/will-disruptive-technology-cause-nuclear-war/]

Recently, analysts have argued that emerging technologies with military applications may undermine nuclear stability (see here, here, and here), but the logic of these arguments is debatable and overlooks a more straightforward reason why new technology might cause nuclear conflict: by upending the existing balance of power among nuclear-armed states. This latter concern is more probable and dangerous and demands an immediate policy response.

For more than 70 years, the world has avoided major power conflict, and many attribute this era of peace to nuclear weapons. In situations of mutually assured destruction (MAD), neither side has an incentive to start a conflict because doing so will only result in its own annihilation. The key to this model of deterrence is the maintenance of secure second-strike capabilities—the ability to absorb an enemy nuclear attack and respond with a devastating counterattack.

Recently analysts have begun to worry, however, that new strategic military technologies may make it possible for a state to conduct a successful first strike on an enemy. For example, Chinese colleagues have complained to me in Track II dialogues that the United States may decide to launch a sophisticated cyberattack against Chinese nuclear command and control, essentially turning off China’s nuclear forces. Then, Washington will follow up with a massive strike with conventional cruise and hypersonic missiles to destroy China’s nuclear weapons. Finally, if any Chinese forces happen to survive, the United States can simply mop up China’s ragged retaliatory strike with advanced missile defenses. China will be disarmed and US nuclear weapons will still be sitting on the shelf, untouched.

If the United States, or any other state acquires such a first-strike capability, then the logic of MAD would be undermined. Washington may be tempted to launch a nuclear first strike. Or China may choose instead to use its nuclear weapons early in a conflict before they can be wiped out—the so-called “use ‘em or lose ‘em” problem.

According to this logic, therefore, the appropriate policy response would be to ban outright or control any new weapon systems that might threaten second-strike capabilities.

This way of thinking about new technology and stability, however, is open to question. Would any US president truly decide to launch a massive, bolt-out-of-the-blue nuclear attack because he or she thought s/he could get away with it? And why does it make sense for the country in the inferior position, in this case China, to intentionally start a nuclear war that it will almost certainly lose? More important, this conceptualization of how new technology affects stability is too narrow, focused exclusively on how new military technologies might be used against nuclear forces directly.

Rather, we should think more broadly about how new technology might affect global politics, and, for this, it is helpful to turn to scholarly international relations theory. The dominant theory of the causes of war in the academy is the “bargaining model of war.” This theory identifies rapid shifts in the balance of power as a primary cause of conflict.

International politics often presents states with conflicts that they can settle through peaceful bargaining, but when bargaining breaks down, war results. Shifts in the balance of power are problematic because they undermine effective bargaining. After all, why agree to a deal today if your bargaining position will be stronger tomorrow? And, a clear understanding of the military balance of power can contribute to peace. (Why start a war you are likely to lose?) But shifts in the balance of power muddy understandings of which states have the advantage.

You may see where this is going. New technologies threaten to create potentially destabilizing shifts in the balance of power.

For decades, stability in Europe and Asia has been supported by US military power. In recent years, however, the balance of power in Asia has begun to shift, as China has increased its military capabilities. Already, Beijing has become more assertive in the region, claiming contested territory in the South China Sea. And the results of Russia’s military modernization have been on full display in its ongoing intervention in Ukraine.

Moreover, China may have the lead over the United States in emerging technologies that could be decisive for the future of military acquisitions and warfare, including 3D printing, hypersonic missiles, quantum computing, 5G wireless connectivity, and artificial intelligence (AI). And Russian President Vladimir Putin is building new unmanned vehicles while ominously declaring, “Whoever leads in AI will rule the world.”

If China or Russia are able to incorporate new technologies into their militaries before the United States, then this could lead to the kind of rapid shift in the balance of power that often causes war.

If Beijing believes emerging technologies provide it with a newfound, local military advantage over the United States, for example, it may be more willing than previously to initiate conflict over Taiwan. And if Putin thinks new tech has strengthened his hand, he may be more tempted to launch a Ukraine-style invasion of a NATO member.

Either scenario could bring these nuclear powers into direct conflict with the United States, and once nuclear armed states are at war, there is an inherent risk of nuclear conflict through limited nuclear war strategies, nuclear brinkmanship, or simple accident or inadvertent escalation.

This framing of the problem leads to a different set of policy implications. The concern is not simply technologies that threaten to undermine nuclear second-strike capabilities directly, but, rather, any technologies that can result in a meaningful shift in the broader balance of power. And the solution is not to preserve second-strike capabilities, but to preserve prevailing power balances more broadly.

When it comes to new technology, this means that the United States should seek to maintain an innovation edge. Washington should also work with other states, including its nuclear-armed rivals, to develop a new set of arms control and nonproliferation agreements and export controls to deny these newer and potentially destabilizing technologies to potentially hostile states.

These are no easy tasks, but the consequences of Washington losing the race for technological superiority to its autocratic challengers just might mean nuclear Armageddon

#### No US heg means cascading prolif and extinction – deterrence doesn’t check and pursuit of heg is inevitable.

Brands 15 ( Hal Brands is on the faculty at the Sanford School of Public Policy at Duke University The Elliott School of International Affairs The Washington Quarterly Summer 2015 38:2 pp. 7–28)

One can tell a similar story about the relative stability of the post-war order. As even some leading offshore balancers have acknowledged, the lack of conflict in regions like Europe in recent decades is not something that has occurred naturally. It has occurred because the “American pacifier” has suppressed precisely the dynamics that previously fostered geopolitical turmoil. That pacifier has limited arms races and security competitions by providing the protection that allows other countries to under-build their militaries. It has soothed historical rivalries by affording a climate of security in which powerful countries like Germany and Japan could be revived economically and reintegrated into thriving and fairly cooperative regional orders. It has induced caution in the behavior of allies and adversaries alike, deterring aggression and dissuading other destabilizing behavior. As John Mearsheimer has noted, the United States “effectively acts as a night watchman,” lending order to an otherwise disorderly and anarchical environment.45

What would happen if Washington backed away from this role? The most logical answer is that both U.S. influence and global stability would suffer. With respect to influence, the United States would effectively be surrendering the most powerful bargaining chip it has traditionally wielded in dealing with friends and allies, and jeopardizing the position of leadership it has used to shape bilateral and regional agendas for decades. The consequences would seem no less damaging where stability is concerned. As offshore balancers have argued, it may be that U.S. retrenchment would force local powers to spend more on defense, while perhaps assuaging certain points of friction with countries that feel threatened or encircled by U.S. presence. But it equally stands to reason that removing the American pacifier would liberate the more destabilizing influences that U.S. policy had previously stifled. Long-dormant security competitions might reawaken as countries armed themselves more vigorously; historical antagonisms

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#### Extinction comes first!

**Pummer 15** [Theron, Junior Research Fellow in Philosophy at St. Anne's College, University of Oxford. “Moral Agreement on Saving the World” Practical Ethics, University of Oxford. May 18, 2015] AT

**There appears to be lot of disagreement in moral philosophy. Whether these many apparent disagreements are deep and irresolvable, I believe there is at least one thing it is reasonable to agree on right now**, whatever general moral view we adopt**: that it is very important to reduce the risk that all intelligent beings on this planet are eliminated by an enormous catastrophe, such as a nuclear war.** How we might in fact try to reduce such existential risks is discussed elsewhere. My claim here is only that **we – whether we’re consequentialists, deontologists, or virtue ethicists – should all agree that we should try to save the world.** According to consequentialism, we should maximize the good, where this is taken to be the goodness, from an impartial perspective, of outcomes. **Clearly one thing that makes an outcome good is that the people in it are doing well. There is little disagreement here.** If the happiness or well-being of possible future people is just as important as that of people who already exist, and if they would have good lives, it is not hard to see how **reducing existential risk is easily the most important thing in the whole world. This is for the familiar reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. There are so many possible future people that reducing existential risk is arguably the most important thing in the world, even if the well-being of these possible people were given only 0.001% as much weight as that of existing people.** Even on a wholly person-affecting view – according to which there’s nothing (apart from effects on existing people) to be said in favor of creating happy people – the case for reducing existential risk is very strong. As noted in this seminal paper, **this case is strengthened by the fact that there’s a good chance that many existing people will, with the aid of life-extension technology, live very long and very high quality lives. You might think what I have just argued applies to consequentialists only. There is a tendency to assume that, if an argument appeals to consequentialist considerations (the goodness of outcomes), it is irrelevant to non-consequentialists. But that is a huge mistake.** **Non-consequentialism is the view that there’s more that determines rightness than the goodness of consequences or outcomes; it is not the view that the latter don’t matter.** Even John Rawls wrote, “**All ethical doctrines worth our attention take consequences into account in judging rightness. One which did not would simply be irrational, crazy.**” **Minimally plausible versions of deontology and virtue ethics must be concerned in part with promoting the good, from an impartial point of view.** **They’d thus imply very strong reasons to reduce existential risk**, at least when this doesn’t significantly involve doing harm to others or damaging one’s character. What’s even more surprising, perhaps, is that even if our own good (or that of those near and dear to us) has much greater weight than goodness from the impartial “point of view of the universe,” indeed even if the latter is entirely morally irrelevant, we may nonetheless have very strong reasons to reduce existential risk. **Even egoism, the view that each agent should maximize her own good, might imply strong reasons to reduce existential risk.** It will depend, among other things, on what one’s own good consists in. If well-being consisted in pleasure only, it is somewhat harder to argue that egoism would imply strong reasons to reduce existential risk – perhaps we could argue that one would maximize her expected hedonic well-being by funding life extension technology or by having herself cryogenically frozen at the time of her bodily death as well as giving money to reduce existential risk (so that there is a world for her to live in!). I am not sure, however, how strong the reasons to do this would be. But views which imply that, if I don’t care about other people, I have no or very little reason to help them are not even minimally plausible views (in addition to hedonistic egoism, I here have in mind views that imply that one has no reason to perform an act unless one actually desires to do that act). **To be minimally plausible, egoism will need to be paired with a more sophisticated account of well-being.** To see this, it is enough to consider, as Plato did, the possibility of a ring of invisibility – **suppose that, while wearing it, Ayn could derive some pleasure by helping the poor, but instead could derive just a bit more by severely harming them. Hedonistic egoism would absurdly imply she should do the latter. To avoid this implication, egoists would need to build something like the meaningfulness of a life into well-being**, in some robust way, where this would to a significant extent be a function of other-regarding concerns (see chapter 12 of this classic intro to ethics). But **once these elements are included, we can (roughly, as above) argue that this sort of egoism will imply strong reasons to reduce existential risk.** Add to all of this Samuel Scheffler’s recent intriguing arguments (quick podcast version available here) that most of what makes our lives go well would be undermined if there were no future generations of intelligent persons. On his view, my life would contain vastly less well-being if (say) a year after my death the world came to an end. So obviously if Scheffler were right I’d have very strong reason to reduce existential risk. **We should also take into account moral uncertainty.** **What is it reasonable for one to do, when one is uncertain not (only) about the empirical facts, but also about the moral facts?** I’ve just argued that **there’s agreement among minimally plausible ethical views that we have strong reason to reduce existential risk – not only consequentialists, but also deontologists, virtue ethicists, and sophisticated egoists should agree.** But **even those (hedonistic egoists) who disagree should have a significant level of confidence that they are mistaken, and that one of the above views is correct. Even if they were 90% sure that their view is the correct one** (and 10% sure that one of these other ones is correct), **they would have pretty strong reason, from the standpoint of moral uncertainty, to reduce existential risk.** Perhaps most disturbingly still, **even if we are only 1% sure that the well-being of possible future people matters, it is at least arguable that, from the standpoint of moral uncertainty, reducing existential risk is the most important thing in the world.** Again, this is largely for the reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. (For more on this and other related issues, see this excellent dissertation). Of course, it is uncertain whether these untold trillions would, in general, have good lives. It’s possible they’ll be miserable. **It is enough for my claim that there is moral agreement in the relevant sense if**, at least given certain empirical claims about what future lives would most likely be like, **all minimally plausible moral views would converge on the conclusion that we should try to save the world.** While there are some non-crazy **views that place significantly greater moral weight on avoiding suffering than on promoting happiness**, for reasons others have offered (and for independent reasons I won’t get into here unless requested to), they nonetheless **seem to be fairly implausible views.** And **even if things did not go well for our ancestors, I am optimistic that they will overall go fantastically well for our descendants, if we allow them to. I suspect that most of us alive today – at least those of us not suffering from extreme illness or poverty – have lives that are well worth living, and that things will continue to improve.** Derek Parfit, whose work has emphasized future generations as well as agreement in ethics, described our situation clearly and accurately: “We live during the hinge of history. **Given the scientific and technological discoveries of the last two centuries, the world has never changed as fast.** We shall soon have even greater powers to transform, not only our surroundings, but ourselves and our successors. **If we act wisely in the next few centuries, humanity will survive its most dangerous and decisive period.** Our descendants could, if necessary, go elsewhere, spreading through this galaxy…. **Our descendants might, I believe, make the further future very good. But that good future may also depend in part on us. If our selfish recklessness ends human history, we would be acting very wrongly.**” (From chapter 36 of On What Matters)

#### Existential threats outweigh – all life has infinite value and extinction eliminates the possibility for future generations – err aff, because of innate cognitive biases

**GPP 17** (Global Priorities Project, Future of Humanity Institute at the University of Oxford, Ministry for Foreign Affairs of Finland, “Existential Risk: Diplomacy and Governance,” Global Priorities Project, 2017, <https://www.fhi.ox.ac.uk/wp-content/uploads/Existential-Risks-2017-01-23.pdf>,

1.2. THE ETHICS OF EXISTENTIAL RISK In his book Reasons and Persons, Oxford philosopher Derek Parfit advanced an influential argument about the importance of avoiding extinction: I believe that if we destroy mankind, as we now can, this outcome will be much worse than most people think. **Compare three outcomes: (1) Peace. (2) A nuclear war that kills 99% of the world’s existing population. (3) A nuclear war that kills 100%.** (2) would be worse than (1), and (3) would be worse than (2). Which is the greater of these two differences? **Most people believe that the greater difference is between (1) and (2).** **I believe that the difference between (2) and (3) is very much greater**. ... **The Earth will remain habitable for at least another billion years.** **Civilization began only a few thousand years ago.** **If we do not destroy mankind, these few thousand years may be only a tiny fraction of the whole of civilized human history.** **The difference between (2) and (3) may thus be the difference between this tiny fraction and all of the rest of this history.** **If we compare this possible history to a day, what has occurred so far is only a fraction of a second.65** In this argument, it seems that Parfit is assuming that the survivors of a nuclear war that kills 99% of the population would eventually be able to recover civilisation without long-term effect. As we have seen, this may not be a safe assumption – but for the purposes of this thought experiment, the point stands. **What makes existential catastrophes especially bad is that they would “destroy the future,” as** another Oxford philosopher, Nick **Bostrom, puts it.**66 **This future could potentially be extremely long and full of flourishing, and would therefore have extremely large value.** In standard risk analysis, when working out how to respond to risk, we work out the expected value of risk reduction, by weighing the probability that an action will prevent an adverse event against the severity of the event. **Because the value of preventing existential catastrophe is so vast, even a tiny probability of prevention has huge expected value.**67 Of course, there is persisting reasonable disagreement about ethics and there are a number of ways one might resist this conclusion.68 Therefore, it would be unjustified to be overconfident in Parfit and Bostrom’s argument. **In some areas, government policy does give significant weight to future generations.** For example, in assessing the risks of nuclear waste storage, governments have considered timeframes of thousands, hundreds of thousands, and even a million years.69 Justifications for this policy usually appeal to principles of intergenerational equity according to which future generations ought to get as much protection as current generations.70 Similarly, widely accepted norms of sustainable development require development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs.71 **However, when it comes to existential risk, it would seem that we fail to live up to principles of intergenerational equity.** **Existential catastrophe would not only give future generations less than the current generations; it would give them nothing.** Indeed, **reducing existential risk plausibly has a quite low cost for us in comparison with the huge expected value it has for future generations.** In spite of this, relatively little is done to reduce existential risk. **Unless we give up on norms of intergenerational equity, they give us a strong case for significantly increasing our efforts to reduce existential risks.** 1.3. WHY EXISTENTIAL RISKS MAY BE SYSTEMATICALLY UNDERINVESTED IN, AND THE ROLE OF THE INTERNATIONAL COMMUNITY **In spite of the importance of existential risk reduction, it probably receives less attention than is warranted.** As a result, concerted international cooperation is required if we are to receive adequate protection from existential risks. 1.3.1. Why existential risks are likely to be underinvested in **There are several reasons why existential risk reduction is likely to be underinvested in.** **Firstly, it is a global public good.** **Economic theory predicts that such goods tend to be underprovided.** **The benefits of existential risk reduction are widely and indivisibly dispersed around the globe from the countries responsible for taking action.** Consequently, a country which reduces existential risk gains only a small portion of the benefits but bears the full brunt of the costs. Countries thus have strong incentives to free ride, receiving the benefits of risk reduction without contributing. As a result, too few do what is in the common interest. **Secondly**, as already suggested above, **existential risk reduction is an intergenerational public good: most of the benefits are enjoyed by future generations who have no say in the political process.** **For these goods, the problem is temporal free riding: the current generation enjoys the benefits of inaction while future generations bear the costs. Thirdly**, many **existential risks**, such as machine superintelligence, engineered pandemics, and solar geoengineering, **pose an unprecedented and uncertain future threat.** Consequently, it is hard to develop a sati sfactory governance regime for them: there are few existing governance instruments which can be applied to these risks, and it is unclear what shape new instruments should take. In this way, our position with regard to these emerging risks is comparable to the one we faced when nuclear weapons first became available. **Cognitive biases also lead people to underestimate existential risks.** **Since there have not been any catastrophes of this magnitude, these risks are not salient to politicians and the public.**72 This is an example of the misapplication of the availability heuristic, a mental shortcut which assumes that something is important only if it can be readily recalled. **Another cognitive bias affecting perceptions of existential risk is scope neglect.** In a seminal 1992 study, three groups were asked how much they would be willing to pay to save 2,000, 20,000 or 200,000 birds from drowning in uncovered oil ponds. The groups answered $80, $78, and $88, respectively.73 In this case, the size of the benefits had little effect on the scale of the preferred response. **People become numbed to the effect of saving lives when the numbers get too large.** 74 **Scope neglect is a particularly acute problem for existential risk because the numbers at stake are so large.** **Due to scope neglect, decision-makers are prone to treat existential risks in a similar way to problems which are less severe by many orders of magnitude.** A wide range of other cognitive biases are likely to affect the evaluation of existential risks.75

#### Extinction is a distinct phenomenon that requires prior consideration

**Burke et al 16** Associate Professor of International and Political Studies @ UNSW, Australia, 2016 (Anthony, Stefanie Fishel is Assistant Professor, Department of Gender and Race Studies at the University of Alabama, Audra Mitchell is CIGI Chair in Global Governance and Ethics at the Balsillie School of International Affairs, Simon Dalby is CIGI Chair in the Political Economy of Climate Change at the Balsillie School of International Affairs, and, Daniel J. Levine is Assistant Professor of Political Science at the University of Alabama, “Planet Politics: Manifesto from the End of IR,” Millennium: Journal of International Studies 1–25)

8. Global ethics must respond to mass extinction. In late 2014, the Worldwide Fund for Nature reported a startling statistic: according to their global study, 52% of species had gone extinct between 1970 and 2010.60 This is not news: for three decades, conservation biologists have been warning of a ‘sixth mass extinction’, which, by definition, could eliminate more than three quarters of currently existing life forms in just a few centuries.61 In other words, it could threaten the practical possibility of the survival of earthly life. Mass extinction is not simply extinction (or death) writ large: **it is a qualitatively different phenomena that demands its own ethical categories.** It cannot be grasped by aggregating species extinctions, let alone the deaths of individual organisms. Not only does it erase diverse, irreplaceable life forms, their **unique histories** and **open-ended possibilities**, but it **threatens the ontological conditions of Earthly life**.

IR is one of few disciplines that is explicitly devoted to the pursuit of survival, yet it has almost nothing to say in the face of a possible mass extinction event.62 It utterly lacks the conceptual and ethical frameworks necessary to foster diverse, meaningful responses to this phenomenon. As mentioned above, Cold-War era concepts such as ‘nuclear winter’ and ‘omnicide’ gesture towards harms massive in their scale and moral horror. However, they are asymptotic: they imagine nightmares of a severely denuded planet, yet they do not contemplate the **comprehensive negation** that a mass extinction event entails. In contemporary IR discourses, where it appears at all, extinction is treated as a problem of scientific management and biopolitical control aimed at securing existing human lifestyles.63 Once again, this approach fails to recognise the reality of extinction, which is a **matter of being and nonbeing**, not one of life and death processes.

Confronting the enormity of a possible mass extinction event requires a total overhaul of human perceptions of what is at stake in the disruption of the conditions of Earthly life. The question of what is ‘lost’ in extinction has, since the inception of the concept of ‘conservation’, been addressed in terms of financial cost and economic liabilities.64 Beyond reducing life to forms to capital, currencies and financial instruments, the dominant neoliberal political economy of conservation imposes a homogenising, Western secular worldview on a planetary phenomenon. Yet the **enormity, complexity, and scale** of mass extinction is so huge that humans need to **draw on every possible resource in order to find ways of responding**. This means that they need to mobilise multiple worldviews and lifeways – including those emerging from indigenous and marginalised cosmologies. Above all, it is crucial and urgent to realise that extinction is a **matter of global ethics**. It is not simply an issue of management or security, or even of particular visions of the good life. Instead, it is about staking a claim as to the goodness of life itself. If it does not fit within the existing parameters of global ethics, then it is these boundaries that need to change.

9. An Earth-worldly politics. Humans are worldly – that is, we are fundamentally worldforming and embedded in multiple worlds that traverse the Earth. However, the Earth is not ‘our’ world, as the grand theories of IR, and some accounts of the Anthropocene have it – an object and possession to be appropriated, circumnavigated, instrumentalised and englobed.65 Rather, it is a complex of worlds that we share, co-constitute, create, destroy and inhabit with countless other life forms and beings.

The formation of the Anthropocene reflects a particular type of worlding, one in which the Earth is treated as raw material for the creation of a world tailored to human needs. Heidegger famously framed ‘earth’ and ‘world’ as two countervailing, conflicting forces that constrain and shape one another. We contend that existing political, economic and social conditions have pushed human worlding so far to one extreme that it has become almost entirely detached from the conditions of the Earth. Planet Politics calls, instead, for a mode of worlding that is responsive to, and grounded in, the Earth. One of these ways of being Earth-worldly is to embrace the condition of being entangled. We can interpret this term in the way that Heidegger66 did, as the condition of being mired in everyday human concerns, worries, and anxiety, to prolong existence. But, in contrast, we can and should reframe it as authors like Karen Barad67 and Donna Haraway68 have done. To them and many others, ‘entanglement’ is a radical, indeed fundamental condition of being-with, or, as Jean-Luc Nancy puts it, ‘being singular plural’.69 This means that no being is truly autonomous or separate, whether at the scale of international politics or of quantum physics. World itself is singular plural: what humans tend to refer to as ‘the’ world is actually a multiplicity of worlds at various scales that intersect, overlap, conflict, emerge as they surge across the Earth. World emerges from the poetics of existence, the collision of energy and matter, the tumult of agencies, the fusion and diffusion of bonds.

Worlds erupt from, and consist in, the intersection of **diverse forms of being** – material and intangible, organic and inorganic, ‘living’ and ‘nonliving’. Because of the tumultuousness of the Earth with which they are entangled, ‘**worlds’ are not static, rigid or permanent. They are permeable and fluid**. They can be **created**, **modified** – and, of course, destroyed. Concepts of violence, harm and (in)security that focus only on humans ignore at their peril the destruction and severance of worlds,70 **which undermines the conditions of plurality that enables life on Earth to thrive.**

## Underview

#### 1AR theory – a) AFF gets it because otherwise the neg can engage in infinite abuse, making debate impossible, b) drop the debater – the 1AR is too short for theory and substance so ballot implications are key to check abuse, c) no RVIs – they can stick me with 6min of answers to a short arg and make the 2AR impossible, d) competing interps – 1AR interps aren’t bidirectional and the neg should have to defend their norm since they have more time. e) Fairness because debate’s a game that needs rules to evaluate it and education since it gives us portable skills for life like research and thinking. f) comes first – it’s a bigger percentage of the 1AR than 1NC which means there’s more abuse if I’m devoting a larger fraction of time and only the 2N has time to win multiple layers