## 1

#### Interp and violation: Affirmatives may not defend only specific instances of outer space appropriation by private entities as unjust.

#### "The" can either indicate a definite generic or definite description

Ojeda 91 [Almerindo E. Ojeda, PhD linguistics from UChicago, professor of linguistics at UC Davis. "Definite Descriptions and Definite Generics", Linguistics and Philosophy, Vol. 14, No. 4, pp. 367-397, Published August 1991, https://www.harvardlds.org/wp-content/uploads/2019/04/1-s2.0-S0010027718300313-main-3.pdf] HWIC

A definite noun phrase may be taken either as a definite description or as a definite generic. Thus, a noun phrase like the origin of the ballad may denote either the origin of an individual ballad we have been discussing, or else the origin of ballads in general as a literary species. In the first case, the ballad has been taken as a definite description; in the second, it has been taken as a definite generic.2 Notice that the ambiguity between definite descriptions and definite generics can be resolved in certain con texts. Thus, the definite noun phrase the computer is taken only as a definite description in (la), a statement about an individual computer; it is taken only as a definite generic in (lb), a statement about computers in general. Similarly, the definite noun phrase the dodo may be taken as a definite description in (2a) while it must be taken as a definite generic in (2b).3

(1)a. Turing repaired the computer.

b. Turing invented the computer.

(2)a. The dodo is dead.

b. The dodo is extinct.

#### Moral statements are generic normative principles – necessitates the generic interpretation

McDonald 09 [Hugh P. McDonald, professor of philosophy at the New York City College of Technology. "Principles: The Principles of Principles." The Pluralist, vol. 4, no. 3, [University of Illinois Press, Society for the Advancement of American Philosophy], 2009, pp. 98–126, https://www.jstor.org/stable/20708996] HWIC

"Principle" has a great many meanings: origin, beginning, cause, rule, axiom, and so on.5 However, we cannot assume any necessary relation of these meanings. They may be distinct meanings without relations. Neverthe less we can trace some common roots and thereby interconnections of the meanings. I will concentrate here on certain meanings relevant to the prin ciple of principles, that principles are actual. One meaning is that principles are the "ultimate source, origin, or cause of something" or the "originating or actuating agency or force." Principles are connected with the origin and cause of any "something." Moreover, principles may cause the actuality of the something. A second meaning of principles is that they regulate change, whether internally, as the "method of operation of a thing," or as an external cause. That is, principles are regulative, especially including rules for opera tions, involving changes. As rules, they are universal for a kind, although there may be exceptions to them in certain modes. A principle, then, is an originating rule that universally regulates the formation, operation, or other changes of any actuality, which as universal applies to that kind of thing. Machines may be built according to a principle and operate on the same or even a different principle. Ships presume the principle of floatation but may be built according to principles of woodworking or those of other materials. The principle can have different modes?whether necessary, as in logical inference; general, as in scientific laws; or actualization of possibilities, as in machines or as in moral principles that we follow, but could do otherwise.6 I will cover modes below.

Principles are also a cause as regulative, combining cause and rule. The principle can be external, as in a chemical catalyst; or internal, as in geneti cally caused changes.7 Both kinds of causes involve relations. Internal prin ciples exhibit "tendencies," to borrow the word used in the dictionary. They continue to operate across time. Actions that come under principles may be of kinds whose causes are separate in time, since we may cease an action for a time and then take it up again; while genetic characteristics are tenden cies whose causes are connected by reproduction. As causal, principles may be originary for a kind. Especially in new technologies, for example, flying machines, the principle that organisms could fly (birds, bats, and insects) preceded the invention of the technology, although the principles of aero dynamics were discovered later. However, flying utilized and actualized the latter principles. In this sense, principles can be constitutive rules as the origin of a kind, whether generic or specific.

External principles are regulative and not attributes. They regulate change, such that change is not chaotic. Principles are not bodies, objects, or entities but are the basis of the judgment or evaluation that the latter will persist, since they follow or are regulated by principles. Moreover, there is another sense in which principles are not attributes, since the relation of bodies, ob jects, or other terms for actualities implies a common principle, an identity that is regulated and constituted by the same actual principle. "Object" is a principle uniting instances normatively, for example, that solids persist unless acted upon by heat, etc.

Scientific, engineering, and practical laws are cases of principles. The "law of gravity" is the principle of gravity. Rules of "right conduct" also exhibit laws. Principles form an identity of different instances that fall under the law, whether generally or invariably. Laws and rules are regulative identities, applicable to different instances, and whether originary, constitutive, or ex ternally regulative. Voluntary adherence to a rule is bringing actions in line with a principle or enacting a principle.

Since principles are general, the statement of a principle includes an abstraction of some identity element of the instance. Principles, then, can constitute the elements in any instance insofar as there are identical ele ments, such as matter, species, and genera. This abstraction both identifies the instance as alike with other instances in some respect and differentiates it from those that do not exhibit the principle. The instance may contain several principles conjointly, matter, the state of the matter, function, aes thetic element, and many others. Thus principles connect like instances in a very complex set of relations. A diamond and a painting may share aesthetic qualities but their material, functional, and cultural principles may be quite different. Since identity and difference are correlative terms, every identity is also a difference and this principle applies to actual principles in the world, one principle of principles. To identify a rock of a certain type as consisting in certain chemical combinations connects it with that kind of mineral in general but also certain chemical elements in general, their physical proper ties (such as consisting of a certain atomic number of protons, electrons, and the like), and other principles. However, it also differentiates the rock from other types with their own specific principles, although some generic prin ciples may overlap, namely, the physical properties of all chemical elements as consisting in protons, electrons, and other principles of atoms. Principles then mark both a difference and an identity. The principles identify a distinc tion, but such identifications differentiate from other identifying principles. The wavelengths for green light are identical at different times of emission from the sun but are not identical with those for red.

#### Negate –

**1] Precision:**

**A] Topicality is a constitutive rule of the activity and a basic aff burden, they agreed to debate the topic when they came to the tournament**

**B] Jurisdiction -- you can’t vote affirmative if they haven’t affirmed**

**C] It’s the only stasis point we know before the round so it controls the internal link to engagement, and there’s no way to use ground if debaters aren’t prepared to defend it.**

**2] Limits: every specific instance or combination of instances of appropriation could be an aff like individual missions, programs or satellites, compounded by broad definitions of appropriation – unlimited topics incentivize obscure affs that negs won’t have prep on – limits are key to reciprocal prep burden. This topic already has very few neg generics and spec kills the innovation DA and space appropriation good – also means there is no universal DA to spec affs**

**Drop the debater – their abusive advocacy skewed our 1NC construction, allowing 1AR restart doesn't solve**

**Competing interps on T – topicality is a yes/no question, you can’t be reasonably topical, only competing interps create norms -- reasonability is arbitrary and invites judge intervention causing a race to the bottom of questionable argumentation**

## 2

#### CP: States ought to establish a treaty that:

* **Creates clear norms for retaliation for damages done to assets in space**
* **Bans tests and use of Anti-satellite weapons**
* **Imposes de-orbiting measures**

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The era of unconstrained American exploitation of space is passing, however, regardless of a potential treaty. There are new technological and developmental trends that will force a new American approach to space. The first trend ties into the increasing use of space and the inherent low level of survivability of space infra- structure. Shrapnel fields, for example, prove incredibly disruptive to space operations. In 2007, China demonstrated its capability to destroy space infrastructure in a test that generated thousands of highly dangerous shrapnel fragments.[8](https://www.potomacinstitute.org/steps/views-in-brief/46-space-to-breathe-the-argument-for-a-new-outer-space-treaty" \l "bottom1) The anti-satellite test demonstrated that potential challengers to the global order are pursuing means to deny American space services[9](https://www.potomacinstitute.org/steps/views-in-brief/46-space-to-breathe-the-argument-for-a-new-outer-space-treaty" \l "bottom1) through asymmetric exploitation of American vulnerabilities in space.[10](https://www.potomacinstitute.org/steps/views-in-brief/46-space-to-breathe-the-argument-for-a-new-outer-space-treaty" \l "bottom1) The United States recognizes that space infrastructure will likely be a future target. War games organized by the US Army have demonstrated American vulnerability and dependency on space.[11](https://www.potomacinstitute.org/steps/views-in-brief/46-space-to-breathe-the-argument-for-a-new-outer-space-treaty" \l "bottom1) Yet deterring an attack against its space infrastructure is difficult. Few comparative threats can be leveled against a non-space-integrated military when American space infrastructure is threatened. American allies have also pursued a greater space presence, increasing the complexity of the space environment.[12](https://www.potomacinstitute.org/steps/views-in-brief/46-space-to-breathe-the-argument-for-a-new-outer-space-treaty" \l "bottom1) An equally demanding problem is the growing crowdedness of space as private enterprise enters the space arena. In all, it is becoming difficult for any single power to keep track of what exactly is up there. The shift in the international environment of space – growth of rival powers, asymmetric balancing, and the growing complexity of maneuvering within space itself – must lead to a shift in the American approach to international space policy. When international involvement was limited it was easier to reject draft treaties, but as exploitation of space has progressed, the lack of a comprehensive structure could prove dangerous. There are, however, steps that could be taken. The United States should pursue a treaty on our own terms. First, the treaty should seek operational coordination. Space is getting crowded, and the growing number of satellites and pieces of junk in orbit will threaten military, economic, and scientific use of space. The inter- national community needs to create a framework for public and private sector use of space and much clearer measures of liability for incidents in space. Built-in de-orbiting measures should also be an international norm. Second, The United States should lead a discussion on space code of conduct. It has been American policy to avoid altering the 1967 Space Treaty, but the usefulness of that treaty has long since expired. The international community needs to ban ASAT tests, even with claims that it is an unenforceable ban. The lack of testing would constrain ASAT utility during times of conflict. A ban would help protect American space assets and provide a moral argument for moving aggressively if space assets are attacked. The treaty could codify an international response to violations. The sabotage of another country’s space assets could, for example, lead to a ban from using international space constellations. The response could also incorporate economic sanctions. In this regard, the 1967 Space Treaty is too vague, and allows different space-faring countries to interpret the terms with great fluidity. For example, it explicitly forbids weapons of mass destruction in space, but little else. If damaging space assets results in coordinated punishment, The United States will be able to more confidently rely on its space assets to support power projection and deterrence. The United States currently relies on its own military and scientific prowess to prevent damage to its space assets. That might not be enough in the future, and so The United States should establish space norms while it is still the dominant actor. Creating an international regime that would ease concerns about the safety of space infrastructure would allow The United States to more confidently use its military power for terrestrial deterrence.

#### The constellations are k2 to crisis response, crop monitoring, and innovation.

Hampson 17 (Joshua. Security Studies Fellow The Niskanen Center. “The Future of Space Commercialization.” Niskanen Center. 1/25/2017. https://republicans-science.house.gov/sites/republicans.science.house.gov/files/documents/TheFutureofSpaceCommercializationFinal.pdf)

The size of the space economy is far larger than many may think. In 2015 alone, the global market amounted to $323 billion. Commercial infrastructure and systems accounted for 76 percent of that 9 total, with satellite television the largest subsection at $95 billion. The global space launch market’s 10 11 share of that total came in at $6 billion dollars. It can be hard to disaggregate how space benefits 12 particular national economies, but in 2009 (the last available report), the Federal Aviation Administration (FAA) estimated that commercial space transportation and enabled industries generated $208.3 billion in economic activity in the United States alone. Space is not just about 13 satellite television and global transportation; while not commercial, GPS satellites also underpin personal navigation, such as smartphone GPS use, and timing data used for Internet coordination.14 Without that data, there could be problems for a range of Internet and cloud-based services.15 There is also room for growth. The FAA has noted that while the commercial launch sector has not grown dramatically in the last decade, there are indications that there is latent demand. This 16 demand may catalyze an increase in launches and growth of the wider space economy in the next decade. The Satellite Industry Association’s 2015 report highlighted that their section of the space economy outgrew both the American and global economies. The FAA anticipates that growth to 17 continue, with expectations that small payload launch will be a particular industry driver.18 In the future, emerging space industries may contribute even more the American economy. Space tourism and resource recovery—e.g., mining on planets, moons , and asteroids—in particular may become large parts of that industry. Of course, their viability rests on a range of factors, including costs, future regulation, international problems, and assumptions about technological development. However, there is increasing optimism in these areas of economic production. But the space economy is not just about what happens in orbit, or how that alters life on the ground. The growth of this economy can also contribute to new innovations across all walks of life.

Technological Innovation

Innovation is generally hard to predict; some new technologies seem to come out of nowhere and others only take off when paired with a new application. It is difficult to predict the future, but it is reasonable to expect that a growing space economy would open opportunities for technological and organizational innovation. In terms of technology, the difficult environment of outer space helps incentivize progress along the margins. Because each object launched into orbit costs a significant amount of money—at the moment between $27,000 and $43,000 per pound, though that will likely drop in the future —each 19 reduction in payload size saves money or means more can be launched. At the same time, the ability to fit more capability into a smaller satellite opens outer space to actors that previously were priced out of the market. This is one of the reasons why small, affordable satellites are increasingly pursued by companies or organizations that cannot afford to launch larger traditional satellites. These small 20 satellites also provide non-traditional launchers, such as engineering students or prototypers, the opportunity to learn about satellite production and test new technologies before working on a full-sized satellite. That expansion of developers, experimenters, and testers cannot but help increase innovation opportunities. Technological developments from outer space have been applied to terrestrial life since the earliest days of space exploration. The National Aeronautics and Space Administration (NASA) maintains a website that lists technologies that have spun off from such research projects. Lightweight 21 nanotubes, useful in protecting astronauts during space exploration, are now being tested for applications in emergency response gear and electrical insulation. The need for certainty about the resiliency of materials used in space led to the development of an analytics tool useful across a range of industries. Temper foam, the material used in memory-foam pillows, was developed for NASA for seat covers. As more companies pursue their own space goals, more innovations will likely come from the commercial sector. Outer space is not just a catalyst for technological development. Satellite constellations and their unique line-of-sight vantage point can provide new perspectives to old industries. Deploying satellites into low-Earth orbit, as Facebook wants to do, can connect large, previously-unreached swathes of 22 humanity to the Internet. Remote sensing technology could change how whole industries operate, such as crop monitoring, herd management, crisis response, and land evaluation, among others. 23 While satellites cannot provide all essential information for some of these industries, they can fill in some useful gaps and work as part of a wider system of tools. Space infrastructure, in helping to change how people connect and perceive Earth, could help spark innovations on the ground as well. These innovations, changes to global networks, and new opportunities could lead to wider economic growth.

## 3

#### 1] American space innovation is high and on the rise- but innovation could tank in the absence of private companies

Peterson 21 Bob Peterson is based out of Colorado Springs, Colorado, United States and works at Lockheed Martin as VP Space Systems. Peterson, Bob. “Commercializing the Race to Space - Insigniam.” Insigniam, August 9, 2021. https://insigniam.com/private-space-exploration-innovating-future-space/.//WL

After publicly stalling out due to cost concerns circa 2011, America’s space race is quickly heating up again. Only instead of NASA, this time it’s being spearheaded through private space exploration by three billionaire investors and the companies that mirror these entrepreneurs’ out-of-this-world ambitions: Richard Branson (Virgin Galactic), Elon Musk (SpaceX) and Jeff Bezos (Blue Origin). Expected to be a $1.4 trillion market by 2030, according to analysts at Bank of America, private space exploration and tourism are already ushering in a host of new innovations outside of traditional aerospace and defense realms. For example: Morgan Stanley suggests that the business world’s growing rush to reach orbit may also help sate the world’s ever-growing appetite for high-speed satellite broadband technology and data, kick-start rocket-fueled delivery services and even enable asteroid mining in years to come. Here, we take a closer look at the field’s three front-runners, how each is pioneering new scientific advancements, and various trickle-down innovations that private space exploration may soon bring back to dozens of industries on planet Earth. Virgin Galactic On July 11—just 17 years after announcing the company—Virgin Group founder Richard Branson took his inaugural trip 53 miles above the Earth’s surface in Virgin Galactic’s suborbital, rocket-powered space plane VSS Unity. Capable of holding six passengers and two pilots, the craft isn’t likely to be earthbound for very long; the company has already sold around 600 tickets for flights at the princely sum of $200,000 to $250,000 apiece. As of early August, more tickets were available starting at $450,000 each. The increasing desire for private space exploration points to companies’ growing desire to more cost-efficiently use resources, leverage emerging or preexisting technology in new ways, optimize processes and workflows, and pioneer new markets by democratizing access to resources and equipment. The first of the billionaire space company founders to reach the edge of space (depending on the definition), Branson did so thanks to myriad scientific and business innovations made by his firm. Advancements not only include a new high-speed aircraft design that leverages modular technology to improve flight rate and maintenance access. They also incorporate a livery design built from a mirrorlike material that provides heightened thermal protection and color-changing potential, a spectacular display of the plane’s advanced capabilities in keeping with Branson’s notoriously flashy brand of showmanship. These upgrades have helped power Virgin Galactic’s ongoing push to capture public and media attention, enticing armchair astronauts to fulfill childhood dreams and fueling a booming business in space tourism. Moreover, unlike traditional crewed rockets, which launch from ground-based locales, Virgin’s ships lift off from bigger planes that drop them off in midair. It’s a highly efficient technique that consumes less fuel and reduces the need for custom launch pad infrastructure. Passengers, who can enjoy three to five minutes of weightlessness, will soon include scientists who can run experiments midflight, as opposed to primarily using traditional suborbital space testing methods—i.e., spacecraft without a crew. SpaceX Tesla founder Elon Musk’s SpaceX is an all-purpose space technology firm that designs and manufactures myriad cutting-edge rockets and spacecraft. Case in point: Its Dragon capsule has already proved it can cost-efficiently carry crew and cargo to the International Space Station. The company’s Starship large-scale rocket and spacecraft system is also designed to carry massive payloads into orbit—and, thanks to NASA’s support, is expected soon to land the first astronauts on the moon since the Apollo program. Not yet 20 years old, SpaceX is additionally focused on introducing more dependable equipment at a fraction of standard production and operating costs. Other innovations include the Falcon 9, a reusable two-stage rocket for repeatedly transporting people and equipment into space, and Falcon Heavy, the world’s most powerful rocket today, which can carry twice as much weight as its closest competitor. SpaceX’s ambitions even extend to commercial space flight and ride-sharing if you or your company’s inventory need to catch a quick lift into the atmosphere. Almost as curious as the company’s public-facing creations are those powering its operations behind the scenes, including a fleet of autonomous drone ships that catch rockets as they hurtle back to earth, landing in the ocean. SpaceX is also heavily investing in building out Starlink, a broadband internet service powered by thousands of satellites that has the potential to bring high-speed connectivity to remote and rural areas around the globe. In short, by leveraging a host of leading-edge technical advancements to power practical innovations in communications, transport and aerospace operations, SpaceX aims to privatize the field of space flight as a whole. No wonder NASA ranks among the company’s biggest customers. Blue Origin The brainchild of Amazon founder Jeff Bezos, Blue Origin was founded in 2000 with the mission of expanding humanity’s reach into space, fueling interstellar exploration, and powering the search for new material and energy resources. It hopes to do so by delivering low-cost, fully or partly reusable orbital launch vehicles that can serve the needs of businesses and individuals alike. One person recently paid an astounding $28 million for a ticket. Unlike Virgin Galactic, Blue Origin makes spacecraft that are able to cross the Kármán line—the 62-mile-high measurement that most countries consider to be the boundary of outer space. (The U.S. uses 50 miles as a benchmark instead.) The company’s mantra is “Launch, Land, Repeat,” a testimonial to its commitment to drastically lower expenses associated with space travel, and to the built-in vertical takeoff and landing technology that allows used vehicles to be quickly refurbished and once again take flight. Note that Blue Origin is also experimenting with oversized lunar landers designed to ferry astronauts and equipment affordably to and from the moon. Investment Opportunities and New Innovations The increasing desire for private space exploration points to companies’ growing desire to more cost-efficiently use resources, leverage emerging or preexisting technology in new ways, optimize processes and workflows, and pioneer new markets by democratizing access to resources and equipment. Each of the big three players has sought to tap into a mix of proprietary and community knowledge bases, leverage new high-tech and engineering advancements to lower overhead and operating costs, and boost the accessibility of space travel. Likewise, all have looked to raise public awareness, amortize their investments in new innovations and extend potential revenue streams by finding new business applications for their proprietary solutions at every turn. To read more about the commercialization of space, read “Commercial Space Is Becoming Big Business.” Virgin Galactic is publicly traded, Blue Origin and SpaceX are not. However, more than 10,000 companies (42% of which are American), worth upward of $4 trillion in total, are now pioneering space-based business solutions. In addition, many of these firms—which are looking to make plays in many fields, like telecom, tourism, artificial intelligence and robotics—are investor-friendly startups helping to further capitalize or expand upon the innovations that the big three players are ushering in. Key areas of growth going forward for space-based business are expected to include navigation and mapping, satellite communications, cloud-based applications, manufacturing, and health care/medicine. And that’s before you factor in potential research and scientific applications. Example: the University of Florida researching plants’ changing gene activity in weightless environments via experiments conducted in partnership with Virgin Galactic. It’s yet to be determined whether billionaire-funded private space exploration spaceflight firms will successfully deliver on their aim to democratize space travel, or such trips will remain a prohibitively pricey luxury for most aspiring voyagers. Regardless of whether casual flights into space and stargazing business or research contracts become more commonplace, it’s clear that this nascent field has a promising future. While a Jetsons-style culture of weekend jaunts into orbit is still the stuff of science fiction for now, don’t forget: Succeed or fail, to their credit, all of these firms are helping expand businesses’ ambitions to the stars and beyond and helping illustrate a multitude of potential new uses for aerospace solutions.

#### 2] US space firms are competitive and key to drive innovation

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On 11 July UK billionaire businessman Richard Branson travelled to the edge of space in a spaceplane developed by his company, Virgin Galactic. On Tuesday this week, the billionaire founder of Amazon, Jeff Bezos, will take a similar trip to space aboard the New Shepherd rocket built by his Blue Origin company. Elon Musk’s SpaceX will soon begin sending paying civilians into Earth orbit with the company’s Falcon 9 rocket. The ability of such billionaires to afford private spaceflight trips or invest in heavy-lift rockets, while paying a smaller fraction of income in tax than the average American, reflects inequality in America. This inequality has been made especially stark during the COVID-19 pandemic with billionaires’ wealth increasing while many others experienced financial hardships. Increasing wealth and reaching for space has not purchased popularity for these billionaires. Ahead of Bezos’ upcoming suborbital flight, a petition to “not allow Bezos to return to Earth” gained more than 160,000 signatures. Richard Branson has been criticized for using his wealth to go to space rather than addressing more terrestrial problems like climate change. But after half a century of government-led exploration beyond earth, why are billionaires now at the forefront of our minds when we think about space travel, and what do they mean for how we go to space? The private sector has always had a close involvement with space Billionaire interest in space is not new. Historically, science research funding for observatories in the 19th and 20th centuries was typically provided through endowments from wealthy individuals. Institutions such as the Smithsonian and the Guggenheim family were the early donors of Robert Goddard’s ambitious projects to develop rockets and space technology. Following 1980s initiatives like MirCorp’s plan to provide privately owned space stations, the 1990s and 2000s saw commercial space efforts like Peter Diamandis’ introduction of the Ansari X Prize (1996), the US government’s Alternate Access to [the International Space] Station Program (2000-2002), and the founding of Mojave Aerospace Ventures (2004). Between 2001 and 2009 seven wealthy people went to space as paying customers on Russian Soyuz rockets including Dennis Tito, Iranian American businesswoman Anousheh Ansari and Cirque du Soleil founder Guy Laliberte. More recently, aside from Jeff Bezos and Richard Branson, other billionaires have also planned trips to space, including Jared Isaacman and Yusaku Maezawa. The wave of billionaires now seemingly interested in space exploration is a return to a past trend. Space exploration is expensive Private actors and the government think differently when it comes to what type of space programs to prioritize. The government prioritizes aspects of a space program that are in the public-interest such as national security and Earth sciences, while wealthy individuals that enter the space sector are interested in personal and financial endeavors that involve space exploration, such as making life multiplanetary for Elon Musk and space tourism for Richard Branson and Dennis Tito. The Apollo program which ultimately sent astronauts to the moon in 1969 is thought of as the height of US government leadership in space. But the massive investment which made the first moon landing possible was an anomaly that had been driven by political necessity given the climate of the Cold War. As Figures 1 and 2 show, by 1965, the US government had begun to cut NASA’s budget to the point that by the 1970s it made up only about 0.5-1 percent of the total federal budget. According to Dr. John Logsdon of George Washington University’s Space Policy Institute: “From 1970 onward, NASA has not had a budget adequate to support a robust program of human exploration.” Figure 1 – NASA’s budget from 1959 – 2025 Source: The Space Report Figure 2 – NASA’ share of US federal Budget 1959-2018 Source: The Space Report The lackluster interest in space exploration by the US government since the 1970s sits alongside with a similar lack of enthusiasm by the American public. In a 2018 survey conducted by Pew Research Center, a majority of American adults believed that that monitoring Earth’s climate system should be the highest priority and sending astronauts to Mars and the Moon the lowest (Figure 3). Figure 3 – Americans’ views on policy priorities Source: Pew Research Center, 2018 Re-emergence of commercial space At the same time, many wealthy individuals have been dissatisfied with the lack of public enthusiasm and the lack of progress in recent years due to the government’s traditional view of space operations, and failures of the Space Shuttle. Wealthy individuals like Musk believed that they could spur a robust marketplace for providing access to space which could work alongside and provide services for government space agencies by leveraging reusable technologies, lean manufacturing, and vertically integrated production to enable cheap space access. Because typical debt and equity investors are unwilling to finance the risks of space exploration and the government is unable or uninterested in large up-front investments, it is natural for private space exploration to be funded out of billionaire’s own wealth initially, with government support through development contracts. Government support and US Commercial Space Policy Without the government, the private sector cannot thrive in space. The government supports the private sector by adopting regulatory reforms or creating contracts and awards. Early attempts to invigorate the commercial space industry include the 1984 Commercial Space Launch Act, which was unsuccessful as US launch firms were unable to compete against NASA’s Space Shuttle. President Reagan’s 1986 US Space Launch Strategy reduced NASA’s ability to provide commercial launches, which led to the re-emergence of commercial space activities. The limitations provided by the 1986 policy led to the first commercial space launch by Space Services, Inc. in 1989. The US government under the Obama administration made policy reforms such as introducing fixed price contracting to support development of commercial services. An example of this was a request for over $6 billion to subsidize commercial crew vehicles to visit the International Space Station for the Commercial Crew Resupply (CRS) program. Congressional appropriators in the Senate created a “Dual-track” approach, exemplified by the 2010 NASA Authorization Act, which calls for commercial cargo development. The bill shows that policymakers were willing to compromise on certain aspects of the space program such as CRS to support private space launch companies. By 2010, commercialization was well underway with Obama’s National Space Policy that emphasized supporting a “competitive US commercial space sector.” As of 2011, NASA had paid SpaceX $181 million for 14 Commercial Resupply Missions and $298 million under the Commercial Orbital Transportation Services Demonstration Agreement. The Trump Administration increased public investment in private space actors further and established a series of Space Policy Directives that were meant to bolster the commercial sector. Government support to the private sector further comes in the form of NASA- approved loans, loan guarantees, and tax credits. Firms can also receive tax exemptions through facility constructions, discounted loans, and environmental credits. It is estimated that all of Musk’s ventures, not limited to SpaceX, received at least $4.9 billion in government support through tax breaks, factory construction, discounted loans, environmental credits, facility loans, and rebates to product buyers. Photo by SpaceX on Unsplash How billionaires support the space industry Private investment in space has created competition and reduced space launch costs. New space actors began to challenge the government-created monopoly, United Launch Alliance (ULA), for contracts, creating competition and introducing a market for small-medium class reusable launch. SpaceX’s Falcon 9’s average cost is $62 million, while ULA’s Atlas V starts at $110 million per launch. Commercial actors enable the government to have multiple competitive proposals to select from during project development. NASA would pay less money upfront for a service, while private companies can operate and have autonomy over their final product. The government can act as a buyer of commercial services, which allows NASA to be more efficient and cost-effective, as the agency can cut costs by only developing projects it has expertise and funding for. Such competition has dramatically changed space technology. New players that enter the space industry are able to embark on ambitious projects at a greater scale and faster pace. Innovative concepts such as reusable rocket stages has shifted the launch industry into integrating reusability into vehicle design and the proliferation of ridesharing missions has decreased the costs of space launch. This has lowered barriers to enter the space industry, making small satellites rideshare as low as $1 million per mission. Innovations in space launch have further changed the policy environment and streamlined launch and reentry regulations. Billionaires in space are here to stay Investment from wealthy individuals in recent decades have stimulated private markets and paved the way for many startups to enter the industry. As more new players join the commercial space industry, access to space becomes cheaper, resulting in an explosion of proposed satellite constellations and small launch vehicle concepts. Wealthy entrepreneurs have seen an opportunity to take advantage of a lack of government interest in space exploration funding. The high-risk nature of space exploration requires substantial upfront investment that only wealthy individuals can provide before any pay-off. Private investments in space promote competition and innovation. Billionaires providing upfront investments has stimulated the space market and made space more accessible – and profitable.

#### 3] Innovation from commercial firms ensures economic dominance and US primacy

Beames 21 Charles Beames is executive chairman and chief strategy officer of Colorado-based York Space Systems and chairman of the SmallSat Alliance.“Opinion: The Innovation That Will Ensure U.S. Security in Space | Aviation Week Network.” Aviationweek.com, 1/28/2021. https://aviationweek.com/aerospace/commercial-space/opinion-innovation-will-ensure-us-security-space. //WL

During the Cold War, it was not the U.S.’ superior weapons or soldiers that ultimately led to the Soviet Union’s capitulation. Historians record that the relative economic might of the U.S. ultimately brought the Cold War to a peaceful and conclusive end. Three decades later, the U.S. again finds itself at the dawn of what many have dubbed the “Second Space Race,” for which the U.S. ought to remain mindful of this lesson, lest it be used against us. The West is once again threatened by a hegemonic national security rival. This time, America’s archnemesis is characterized by planning for a long contest that will feature fast-forward economics, global diplomacy, military muscle and information manipulation: China, it appears, is preparing to use its economic power to win. While maintaining its deep belief in Marx’s communist vision, the Chinese one-party government has fashioned a national economy that learned from the Soviet Union’s mistakes. Through friendly engagement with Western economies, China strengthens its own economy and weakens the West’s, nudging the world toward the worldview of the Chinese Communist Party. What then, are the best avenues for the U.S. to win this new near-peer space competition? They are the same ones that delivered victory in the last century: free markets, real economic growth and the productivity that often follows. This time, however, we must keep in mind that our rival is a keen student that has learned from our earlier successes—and Soviet failures. The American response must not repeat the Cold War strategy of outspending our rival in government programs. Instead, the U.S. long game must put the commercial industry first: deliberately buy goods and services from our commercial domestic market, only providing government solutions when the commercial market cannot meet requirements. Unlike other military services, there are no real “weapons” in space. Much of what the government is developing for civil and national security space needs also exists as products or services in the commercial market. By encouraging the commercial industry to grow and not competing against it, the U.S. will secure a long-term strategy leading to unrivaled space leadership. The U.S. economy has generated growth and prosperity unmatched in human history, with billions of dollars being invested every year into profitable commercial space companies. To outpace China militarily and economically, the new administration must double down on space privatization projects like NASA’s Commercial Crew and Commercial Resupply Programs started under the Obama administration. The Trump administration correctly reprioritized the importance of space for national security, but it directed too much government spending to legacy space projects and fell short in encouraging the next generation of commercial space companies. An American “commercial first” policy for space technologies can solve government needs at the federal and state levels, which account for about half of commercial space company revenue. By prioritizing the highly competitive commercial sector, the government will bolster U.S. competitiveness without illegally subsidizing it. More important, it would reinforce the American values of free markets and open competition. As the new administration settles in, national security political insiders are already hedging their bets on who and what will be the winners and losers of the new political cycle. This is especially true for the space sector, not only because it was an area of significant emphasis during the last administration but also because there continues to be significant private investment and anticipated growth in the area. The unrelenting march of the knowledge economy and remarkable utility of the commercial space industry is limited only to our imaginations. The new U.S. Space Force and other civil space agencies will be better positioned if they leverage the burgeoning industry and do not overshadow it with government alternatives. If, however, the government decides to compete against the private sector with its top-down directed design methods and protocols, our commercial industry will be lost to China, much like the drone market was just a decade ago. Economic dominance in the space industry, not space weapons, will ultimately decide which side defines the 21st-century space domain and the national security implications that come with it. America must strategically rethink policies that will take advantage of, rather than compete against, its blossoming commercial space industry. Getting space policy right—commercial industry first and using government solutions only when necessary—will lead to explosive growth. Getting policy wrong? Well, just ask the Soviets.

#### 4] Military primacy solves economic growth, prolif, and great-power war.

Brands & Edel, 19 — Hal Brands; PhD, Henry A. Kissinger Distinguished Professor of Global Affairs at the Johns Hopkins School of Advanced International Studies. Charles Edel; PhD, Senior Fellow and Visiting Scholar at the United States Studies Centre at the University of Sydney. (“The Lessons of Tragedy: Statecraft and World Order;” Ch. 5: The Contemporary Amnesia; Published by *Yale University Press*; //GrRv)

As William Wohlforth has noted, American primacy and activism acted as a powerful deterrent to great-power conflict by creating enormous disincentives for Russia, China, or other actors to incur the “focused enmity” of the United States.11 The persistence and even extension of the U.S. security blanket smothered potential instability in unsettled regions such as Eastern Europe, while removing any possibility of German or Japanese revanchism—a prospect much feared in the early 1990s—by keeping those countries tightly lashed to Washington. American intervention helped extinguish bloody conflicts in the Balkans before they could spread to neighboring countries; U.S. diplomatic and military pressure kept aggressive tyrannies such as Iraq, Iran, and North Korea bottled up and helped slow the spread of nuclear weapons. U.S. support helped democratic forces triumph in countries from Haiti to Poland, as the number of democracies rose from 76 in 1990 to 120 in 2000; America crucially assisted the advance of globalization and the broad prosperity that came with it by promoting pro-market policies and providing the necessary climate of reassurance and stability.12

## 4

#### Text: The United States Federal Government should fully fund a program to cover 4.8% of the surface of the Earth’s oceans in a monolayer of 0.1 micrometer-diameter latex particles, either hollow, or of core-shell morphology, bearing a conventional stabilization system that is inactivated in salt water.

#### Solves uv rays – returns the light to space – the counterplan’s reforms avoid any solvency deficit.

Morgan ‘11 (John Morgan, PhD in physical chemistry, runs R&D programmes at a Sydney startup company, research experience in chemical engineering in the US and at the Commonwealth Scientific and Industrial Research Organisation, Australia's national science agency, 10/8/11, “Low intensity geoengineering – microbubbles and microspheres,” <http://bravenewclimate.com/2011/10/08/low-intensity-geoengineering-microbubbles-and-microspheres/>; DS)

Is there another way to look at this? The Achilles heel of the hydrosol approach is the short bubble lifetime. But are there other ways to brighten water? Are there any other micron sized light scattering particles cheaply available in prodigious quantities, which float in water and don’t dissolve? It turns out the answer is yes. Synthetic latex is produced on a huge scale – 1010 kg in 2005. A latex is a dispersion of polymer microspheres in water (Figure 5). The particle size is typically around 0.1 – 0.5 μm. The polymer content is high – about 50% by weight. And its cheap – a bit over a dollar per kilo wet. It looks like a bright white opaque liquid, like wood glue, which is a polyvinylacetate latex. Its a bulk commodity used in adhesives, paper coatings, paint and many other applications. The common polymers are acrylates, polystyrene and its copolymers, PVA, and others. These polymers themselves are inert and non toxic. Whether they present any physical risk to the biota needs to be determined but given the small particle size and low concentration in a milieu already loaded with natural micro- and nanoparticles it seems low risk. The main safety concern in my opinion would be any residual monomers, which are toxic. But these can be eliminated, certainly to the point where these materials can be safely unleashed on the public as paints and glues. The chief virtues of latex particles over bubbles is **they don’t dissolve, they don’t coalesce, they are durable, and they can be made much smaller**. They have a density of just over 1 g cm-3 so they sink, but at 0.2 micron the sedimentation velocity is too slow to matter. This presents a different problem – the chief loss mechanism now is not dissolution but loss by convection to deeper waters. Is there some way to keep these particles afloat? I think there is. Most of these latex polymers, polystyrene, for example, are hydrophobic – they’re water repellent. To keep the particles in suspension requires added surfactants, or putting electrically charged groups on the surface. But when diluted with salt water, both these stabilization mechanisms fail. **Without stabilization a polystyrene sphere will attach to the water surface**. Breaking waves will drive them under, but rising bubbles will scavenge them back to the surface again. This mechanism is well known and extensively studied in the mineral separation process of flotation, where particles of mineral ores are recovered from slurries by attachment to rising bubbles. The natural bubble population from breaking waves could keep even submicron particles concentrated at and near the ocean surface (Figure 6). The use of latex technology opens other doors for engineering particle properties. For instance, rather than producing a particle composed of a single polymer, its possible to construct a particle with two different polymers in a core-shell morphology, or even hollow particles. Such particles can have much higher scattering power than simple spheres, and are also made in bulk at commodity prices. Indeed, they are used as opacifiers in paint. We could paint the oceans white. Lets run the numbers on this and ask, what would it take to reverse current warming? First we need to know how much light these particles scatter back to space. I used Mie theory to analyse scattering of 500 nm wavelength light (roughly the solar peak) from 0.1 μm diameter polystyrene spheres, as if the sun were overhead. The back scattering from these very small particles is intense – 42% of overhead light returns to space. And this is just direct scattering. Some of the light that scatters forward will scatter off a second particle, and a third. **Multiple scattering will see more than 42% of light returned to space.** Since these particles attach to the surface, lets consider, for the moment, a monolayer on the water surface. This requires 1014particles per square metre, with a volume of 5.2×10-8 m3 per m2(or 5 parts per billion of the top 10 m, for comparison with Seitz’ figures). Polystyrene has a density of 1050 kg m-3, so that’s a mass of 55 mg m-2. Over 3.16×1014 m2 of ocean that’s 1.7×1010 kg polymer. What would this do to the earth’s energy balance? Average insolation (accounting for cloud cover [Jin et al. 2002, cited by Seitz]) is 239 Wm-2. The monolayer cross sectional area fraction is pi/4. So the energy returned by direct overhead scattering is about 78 W. That’s huge compared to the current CO2 forcing of about 2.25 Wm-2. Modelling reported by Seitz indicates an increase of ocean albedo of 0.05 translates to an increase of planetary albedo by 0.031 [Seitz 2010; Figure 5]. So I’ll assume planetary albedo increase is 60% of the ocean albedo increase, which means we need ocean backscattering of 3.75 Wm-2. **We would only need 4.8% of a monolayer to offset current CO2 forcing** (ignoring the contribution from multiple scattering). 4.8% of a whole ocean monolayer is 8.3×108 kg of dry polymer, or about 1.7×109 kg wet latex. At say $1.20 per kg, this would cost $2.0 billion and account for 17% of 2005 global production capacity. This is, surprisingly, well within reach. $2.0b to reverse global warming is cheap. Restricting dispersal to the mid latitudes where the greatest effect is achieved, using core-shell latex technology, and properly accounting for multiple scattering would see this cost drop even further. Annual growth in latex production grew organically by 4.5% per annum between 2000-2005. Ramping production by 17% would be completely feasible. The ongoing cost depends on the residence time of the particles at the ocean surface. Equatorial currents run at about 1 ms-1, which would imply a traversal time of about 1 year for the Pacific ocean. Mid latitude the currents are much slower. The latex particles themselves will degrade in the environment, and there will be losses by association and entrainment in a complex marine environment. But let’s provisionally estimate a cost of $2b per year. This is significantly cheaper than, say, stratospheric sulfur aerosol injection which is estimated at $25-50b per year, let alone space sunshades. And it doesn’t require exotic engineering, enabling R&D, or orbital launches – it uses existing materials at a rate well inside existing production capacity. Conclusion So consider this final elaboration of Russell Seitz’ bright idea: 0.1 μm diameter latex particles, possibly hollow, or of core-shell morphology, bearing a conventional stabilization system that is inactivated in salt water ensuring that the particles are retained at and near the surface, are produced in bulk using about 17% of existing production capacity and using commercial recipes, and are sprayed onto the sea from tanks aboard ships or crop dusting aircraft, oil rigs, and other structures, in the mid latitudes. For a cost in the order of a mere $2b per year **we could offset current global warming**, subject to the many disclaimers and qualifications discussed above, and many others not mentioned. More limited, local applications, such as the direct cooling of coral reefs as envisaged by Seitz for the microbubble concept, are also possible.

## Case

### debris

#### Hacking happens to public too so give them 0 solvency – this is the 4th card on the collisions advantage

Over the years, the threat of cyberattacks on satellites has gotten more dire. In 2008, hackers, possibly from China, reportedly took full control of two NASA satellites, one for about two minutes and the other for about nine minutes. In 2018, another group of Chinese state-backed hackers reportedly launched a sophisticated hacking campaign aimed at satellite operators and defense contractors. Iranian hacking groups have also attempted similar attacks.

#### USFCC solves – Kessler is known and they stop potentially triggering launches

Dvorsky 18

George Dvorsky (senior staff reporter specializing in astromony and advanced tech), 3-9-2018, "California Startup Accused of Launching Unauthorized Satellites Into Orbit: Report [Updated]," https://gizmodo.com/california-startup-accused-of-launching-unauthorized-sa-1823657316, // HW AW

The US Federal Communications Commission says [Swarm Technologies](http://www.swarm-technologies.com/)—a [communications startup](https://www.sbir.gov/node/1155335) run by Silicon Valley expats—launched four tiny internet satellites into space back in January. That’s a problem because the FCC never greenlighted the project, saying the experimental satellites are dangerous. If confirmed, it would mark the first known time in history that unauthorized satellites have been placed in space. The launch happened on what was otherwise a historic day. On January 12, 2018, [the state-owned Indian Space Agency (ISRO) launched its 100th satellite](https://www.thehindubusinessline.com/news/science/isro-to-launch-its-100th-satellite-on-january-12/article10022149.ece), along with 30 others. But as Mark Harris [reports](https://spectrum.ieee.org/tech-talk/aerospace/satellites/fcc-accuses-stealthy-startup-of-launching-rogue-satellites) at IEEE Spectrum, four of these 31 satellites probably shouldn’t have been packed to the cargo hold of the Polar Satellite Launch Vehicle (PSLV). Prior to the launch, ISRO described the quartet as American owned “two way satellite communications and data relay” devices, but with no operator identified. Spectrum has since learned that the four so-called SpaceBees are the property of Swarm Technologies, a company founded two years ago by Canadian aerospace engineer Sara Spangelo, a former Google employee, and Benjamin Longmier, a developer who sold his previous company to Apple. This five-employee startup (currently in stealth mode) is currently working on a system that will enable a space-based Internet of Things communication network, with the potential to hookup ships, trucks, cars, agricultural equipment and anything else equipped with an IP address. **The four SpaceBees currently in orbit represent the first of what the company hopes will be a larger constellation of tiny satellites, which together will be capable of delivering low cost internet to virtually any part of the globe. “The only problem is, the Federal Communications Commission (FCC) had dismissed Swarm’s application for its experimental satellites a month earlier, on safety grounds,**” writes Harris at Spectrum. “It feared that **the four SpaceBees now orbiting the Earth would pose an unacceptable collision risk** for other spacecraft. If confirmed, this would be the first ever unauthorized launch of commercial satellites.” The FCC regulates commercial satellites in the US, and under some interpretations of existing laws, it has purview over American-owed satellites launched from other countries.What Swarm has done is actually quite upsetting. That unscrupulous startups are tossing unsanctioned—and potentially dangerous—objects into space is so not cool. And it appears the FCC agrees. Earlier this week, the communications commission withdrew its approval for a follow-up mission that was supposed to go up in April with an additional four satellites. Another application involving two undisclosed Fortune 100 companies is now also in doubt. Furthermore, the FCC is now investigating the incident, and Swarm could very well lose its launch privileges. As Harris put it, “If Swarm cannot convince the FCC [on its qualifications to be a Commission licensee], the startup could lose permission to build its revolutionary network before the wider world even knows the company exists.” The satellites are considered unsafe because of their diminutive size. Each SpaceBee measures a mere 10 cm x 10 cm x 2.8 cm, which is about the size of a hardcover book, or one-quarter the size of a standard CubeSat.

#### Even a worst-case Kessler syndrome would have little effect—the math checks out.

Fange 17

Daniel Von Fange, senior enginneer @ Origin Protocol, 5-21-2017, "Kessler Syndrome is Over Hyped," Braino.org, <http://braino.org/essays/kessler_syndrome_is_over_hyped/> //MLT

Let’s imagine a worst case scenario. An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space? I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000. So even in the worst case, we don’t lose access to space. Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits. In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment. Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely. Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner. Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided. The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler. Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting) So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect. I’m removing Kessler Syndrome from my list of things to worry about.

### militarization

#### Non-state actors in space are conflict dampeners – they avoid geopolitical tension and have financial incentives to keep conflict low

Frankowski 17 (Pawel, Assistant Professor at the Faculty of National Security. His current research interests include space policy, labour standards in free trade agreements, and theories of international relations, Jagiellonian University in Kakow, “OUTER SPACE AND PRIVATE COMPANIES CONSEQUENCES FOR GLOBAL SECURITY”, <https://doi.org/10.12797/Politeja.14.2017.50.06>)

In the terms of privatization and space security, space remains relatively untapped, but commercial and military benefits from space exploration/exploitation could even lead to ‘privatization of space’. Such privatization will result from growing pressure on spacefaring countries to defect from cooperation, since is less viable with good number of multiple actors who entered the space.36 However, space policy and space research are characterized by very high costs, which are rather impossible to bear by private companies, limited by economic calculation. As pointed out earlier, under-investment in technological development by private companies it is related to the fact that these actors are not focused on profits of a social nature, such as improving the quality of life of the recipient of the product.37 This makes some technology, potentially beneficial to society, not developed or introduced into use, because the profit margin is too small to make this viable for commercial players. To conclude, privatization of space security can develop in unexpected ways, but in today’s space environment private actors would rather play the role of security regulators than security providers. When investment in space technologies is less profitable than other areas of economy, private actors would focus on soft law and conflict prevention in space, and new private initiatives will appear. For example, apart from important space companies, as SpaceX or Blue Origin active in outer space, other private actors as Secure World Foundation (SWF), who focus on space sustainability, will play more important role in crafting international guidelines for space activities.38 This path the way for future solutions and projects, as cleaning the space debris, extracting resources from asteroids and planetoids, refuelling satellites, providing payload capabilities for governmental entities on market-based logic, will be based on activity non-state actors, providing soft law and regulatory solutions, where space faring states are unable to find any compromise. Therefore private companies will be in fact global (or space) regulators, as part of UNCOPUS, being involved in space activities.39 The last argument for private involvement in space security comes from an approach based on common good and resilience of space assets, emphasized by the Project Ploughshares, as an important part of space security. As of 2017 there are more than 700,000 man-made objects on the Earth’s orbit bigger than 1 cm, while 17,000 of them are bigger than 10 cm.40 Some of them are traced by SSA systems, both American and European, but these systems are public-military owned, and private operators are not granted any access to this data. Any collision of space object with space debris, even with small particles, might result in a chain reaction, called Kessler’s syndrome, and not only private but public, and military assets will be destroyed or impaired. In such conditions, a reluctant cooperation between the public and private sector, and unwillingness to share vulnerable data by public actors seem to confirm that private space activity is more than necessary. This is an apparent case when logic of mistrust between state powers must be overcome by private actors, perhaps by suggesting common preferences for debris mitigation, and space situational awareness. In the case of space debris, Space Data Association, an initiative supported by private sector, with its main aim to enhance data sharing between commercial satellite operators, could be an example of nascent public good provided by private actors for the sake of global security.

**Co-orbital ASATs fail**

**Doboš and Pražák 19** (Bohumil, Institute of Political Studies, Faculty of Social Sciences, Charles University, and Jakub, Institute of Political Studies, Faculty of Social Sciences, Charles University, “To Clear or to Eliminate? Active Debris Removal Systems as Antisatellite Weapons”, Vol. 47, February) DB

The article aimed to assess **the utility of the ADR systems as ASAT weapons**. While looking at the limitations of the currently operational ASAT weapons, we can identify many advantages that the ADR system would hold if used in a harmful manner. **It does not produce additional clouds of orbital debris and is not a military-only technology**. Nevertheless, **ADR systems carry their own set of restrictions if used as an ASAT weapon, namely limited reach and easy destructibility by kinetic ASAT weapons**. This leads us to the consideration that **the technology of the ADR system is probably not practical for the conduct of massive ASAT attacks if developed in a scope proposed by the supporters of active debris mitigation**. As a dual-use technology, its primary function is, nevertheless, determined by the intent of the owner. If the ADR systems are to be effectively utilized in the civil sector, the actor operating them must be perceived as reliable by the vast majority of the international space community. We think that this will be best done by commercialization of the effort in the context of cooperation with state space agencies operating in the sphere—especially civilian ESA—that might help with the technological development. This support should be done under the coordination by the UN as to decrease the negative perception of the operation of such systems.

**Stalkers are peaceful – their author**

Brian G. **Chow**, summer 20**17** (independent policy analyst with over 25 years as a senior physical scientist specializing in space and national security. He holds a PhD in physics from Case Western Reserve University and an MBA with distinction and PhD in finance from the University of Michigan) Stalkers in Space: Defeating the Threat, Strategic Studies Quarterly, https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-11\_Issue-2/Chow.pdf

China’s ASAT developments are comprehensive. In addition to the emerging space stalkers, it continues to develop jammers against communications satellites; powerful lasers to dazzle, blind, or damage space sensors; and cyber capabilities to hack or spoof the control and functioning of satellites. China has also been expanding its space diplomacy. Its space programs have included international cooperation with countries other than Russia. China and the European Space Agency (ESA) are cooperating on a space-weather observatory. ESA personnel have visited Chinese human spaceflight training facilities, with the longterm goal of flying a European astronaut aboard a Shenzhou spacecraft to a Chinese space station.20 These activities help project China as a peaceful and friendly space power. Thus, under the current ambiguity about whether configuring multiple space stalkers or exercising preemptive self-defense is the first act of aggression, the international community might well be on China’s side in a conflict

### Ozone

#### Space exploration is k2 ending climate change

**Derr 21** (Digital Communications Manager at Nuclear Energy Institute creative communicator, eagle-eyed researcher, and content strategist with a passion for community-building and human rights. Has experience developing communications campaigns, editing and writing short and long-form content, and leading social media published scholarly writer in the fields of art history and public policy deeply invested in social justice and devotes her free time to causes working towards alleviating hunger and povertyhttps://www.nei.org/news/2021/space-is-crucial-to-understanding-climate-change)//HWLND

Space developments in the last two decades have greatly contributed to our understanding of our planet’s climate. Satellite imaging, space exploration, and new technologies give us an idea of the big picture and how we can adapt to address climate change. For example, satellites in space have played a critical role in our understanding of the causes of global warming by providing us with a large body of data to examine the variations in the Earth’s orbit. Data from these capabilities were essential inputs into the Intergovernmental Panel on Climate Change’s (IPCC) recent report that focused on how the physical science of climate change informs likely impacts under five different emissions scenarios. The report also found that climate change is happening quicker than we thought, making the need to reduce emissions imminent. To address this, space infrastructure such as positioning, navigation, and timing (PNT) can help identify efficient transportation routes and sources of emissions, ultimately aiding mitigation efforts.