#### I Negate. We offer the following counterplan.

#### States ought to charge private companies orbital use fees for each satellite put into orbit. This alternative solves the problem better than a blanket ban. Use fees force companies to internalize the externalities they generate, which limits the overuse of space while also ensuring that society shares in the wealth generated by space enterprises. CIRES-NOAA Science Write Karin Vergoth writes in 2020:

Karin Vergoth {CIRES-NOAA Science Writer}, 20 - ("Solving the space junk problem," CU Boulder Today, 5-26-2020, https://www.colorado.edu/today/2020/05/26/solving-space-junk-problem)//marlborough-wr/

Space is getting crowded. Aging satellites and space debris crowd low-Earth orbit, and launching new satellites adds to the collision risk. The most effective way to solve the space junk problem, according to a new study, is not to capture debris or deorbit old satellites: it’s an international agreement to charge operators “orbital-use fees” for every satellite put into orbit. Orbital use fees would also increase the long-run value of the space industry, said economist Matthew Burgess, a [CIRES Fellow and co-author of the new paper](https://cires.colorado.edu/news/solving-space-junk-problem). By reducing future satellite and debris collision risk, an annual fee rising to about $235,000 per satellite would quadruple the value of the satellite industry by 2040, he and his colleagues concluded in a paper published today in the [Proceedings of the National Academy of Sciences](https://www.pnas.org/content/early/2020/05/20/1921260117). “Space is a common resource, but companies aren’t accounting for the cost their satellites impose on other operators when they decide whether or not to launch,” said Burgess, who is also an assistant professor in environmental studies and an affiliated faculty member in economics at CU Boulder. “We need a policy that lets satellite operators directly factor in the costs their launches impose on other operators.” Currently, an estimated 20,000 objects—including satellites and space debris—are crowding low-Earth orbit. It’s the latest tragedy of the commons, the researchers said: Each operator launches more and more satellites until their private collision risk equals the value of the orbiting satellite. So far, proposed solutions have been primarily technological or managerial, said Akhil Rao, assistant professor of economics at Middlebury College and the paper’s lead author. Technological fixes include removing space debris from orbit with nets, harpoons, or lasers. Deorbiting a satellite at the end of its life is a managerial fix. Ultimately, engineering or managerial solutions like these won’t solve the debris problem because they don’t change the incentives for operators. For example, removing space debris might motivate operators to launch more satellites—further crowding low-Earth orbit, increasing collision risk, and raising costs. “This is an incentive problem more than an engineering problem. What’s key is getting the incentives right,” Rao said. A better approach to the space debris problem, Rao and his colleagues found, is to implement an orbital-use fee—a tax on orbiting satellites. “That’s not the same as a launch fee,” Rao said, “Launch fees by themselves can’t induce operators to deorbit their satellites when necessary, and it's not the launch but the orbiting satellite that causes the damage.” Orbital-use fees could be straight-up fees or tradeable permits, and they could also be orbit-specific, since satellites in different orbits produce varying collision risks. Most important, the fee for each satellite would be calculated to reflect the cost to the industry of putting another satellite into orbit, including projected current and future costs of additional collision risk and space debris production—costs operators don’t currently factor into their launches. “In our model, what matters is that satellite operators are paying the cost of the collision risk imposed on other operators,” said Daniel Kaffine, professor of economics and RASEI Fellow at CU Boulder and co-author on the paper. And those fees would increase over time, to account for the rising value of cleaner orbits. In the researchers’ model, the optimal fee would rise at a rate of 14 percent per year, reaching roughly $235,000 per satellite-year by 2040. For an orbital-use fee approach to work, the researchers found, all countries launching satellites would need to participate—that's about a dozen that launch satellites on their own launch vehicles and more than 30 that own satellites. In addition, each country would need to charge the same fee per unit of collision risk for each satellite that goes into orbit, although each country could collect revenue separately. Countries use similar approaches already in carbon taxes and fisheries management. In this study, Rao and his colleagues compared orbital-use fees to business as usual (that is, open access to space) and to technological fixes such as removing space debris. They found that orbital use fees forced operators to directly weigh the expected lifetime value of their satellites against the cost to industry of putting another satellite into orbit and creating additional risk. In other scenarios, operators still had incentive to race into space, hoping to extract some value before it got too crowded. With orbital-use fees, the long-run value of the satellite industry would increase from around $600 billion under the business-as-usual scenario to around $3 trillion, researchers found. The increase in value comes from reducing collisions and collision-related costs, such as launching replacement satellites. Orbital-use fees could also help satellite operators get ahead of the space junk problem. “In other sectors, addressing the tragedy of the commons has often been a game of catch-up with substantial social costs. But the relatively young space industry can avoid these costs before they escalate,” Burgess said.

### Contention 1: Cybersecurity

#### Cyberattacks are a growing threat to global infrastructure. Adversaries are increasingly able to disrupt communication, transportation, energy, and access to clean water without firing a shot. Megaconstellations function as critical infrastructure that increase resiliency and protect against cyberattacks. Institute for Defense Analysis researchers Matthew Hallex and Travis Cottom write in 2020:

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

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

### Contention 2: Space-Based Solar Power

#### Megaconstellations solve warming. In the short term, they provide cheap, renewable, and flexible baseload power for on and off-world applications.

Daniel Oberhaus writes in 2021 [DANIEL OBERHAUS, “Space Solar Power: An Extraterrestrial Energy Resource For The U.S.,” Innovation Frontier Project, August 18, 2021. <https://innovationfrontier.org/space-solar-power-an-extraterrestrial-energy-resource-for-the-u-s/>] CT

EXECUTIVE SUMMARY

What is often left unsaid in discussions about extraterrestrial industrialization and deep space settlement is how to supply the energy needed for large scale infrastructure projects. Nuclear energy has long been the power source of choice for deep space missions.2 This is largely because nuclear power systems can operate for decades without intervention and in locations where there is limited or non-existent sunlight. But nuclear energy is limited in its ability to scale and also creates serious health hazards for near-Earth operation.3 In this paper, we make the case for space-based solar power (SSP) megaprojects as relatively low-cost, scalable, renewable, and always-on power source for on-and-off world applications. Although SSP is a space-based energy asset, it has the potential to rapidly accelerate decarbonization on Earth while also fulfilling space exploration priorities. SSP is a decades-old idea that has only recently become economically viable due to the rapidly falling costs of space access and technological advancements such as higher efficiency electronics, low-cost mass-production of modular space systems like satellites, robotic in-space construction, and wireless power transmission. NASA, the Department of Energy, and several other research agencies have conducted in-depth studies and limited experiments on SSP, but the development of this energy resource was hindered by unfavorable economics. Things have changed and it is time to reconsider SSP as a valuable tool in the nation’s decarbonization strategy. This paper shows how the development of SSP can serve several national imperatives at once. In space, it can provide a renewable and cost-effective source of energy for moon bases and deep space missions. SSP can also provide a valuable source of energy — both electric and thermal — for industrial processes in cislunar space. This will facilitate the transition of heavy industry from Earth to space, which will mitigate carbon emissions in the medium-to-long term on Earth. Critically, SSP will have a massive impact on terrestrial greenhouse gas (GHG) emissions in the near term through wireless energy transfer from space to Earth. This is SSP’s original “killer app,” and multiple studies have shown that SSP can meet a substantial portion of Earth’s energy needs. Unlike terrestrial solar power, SSP is always on. It can provide solar power rain or shine, day or night. It is also flexible and can be quickly redirected to ground stations in geographically distant locations to meet rapidly changing energy needs. The dream for SSP is to have a source of clean baseload energy that’s available regardless of weather, location, or time of day. The baseload is the minimum electrical energy demand on a grid, which has historically been provided by power stations that are able to generate large and relatively constant amounts of energy. But as more renewables penetrate the grid and create fluctuations in electric supply, the base load power stations of the future must be flexible enough to rapidly ramp up and down to meet the evolving supply and demand dynamics of the grid. Much like the advent of GPS, a robust SSP capacity would have profound geopolitical implications. China is investing heavily in SSP and plans to have the first operating SSP plant in orbit by the end of the decade.4 The Department of Defense (DOD) is also pursuing SSP research for military applications. Notably, the Air Force Research Laboratory recently created a $100 million program to advance key SSP technologies.5 This paper concludes that the U.S. must allocate substantially more human and financial capital to SSP as part of its national security, domestic energy, and space exploration strategies.

#### Global warming is an imminent threat to human civilization. Failure to address it will result in catastrophic ecosystem loss, sea level rise, natural disasters, draught and famine, and even threatens human survival. The magnitude of the threat means that we need to pursue all viable technological and regulatory solutions, and SSP is one such technology. This proves that a blanket ban on megaconstellations throws out the baby with the bathwater, and instead we should use smart regulation that weighs the costs on a case by case basis.

### Contention 3: Democracy

#### Megaconstellations are critical for global internet access. Journalist John Koetsier writes in 2020:

John Koetsier {journalist, analyst, author, and speaker}, 20 - ("Elon Musk’s 42,000 StarLink Satellites Could Just Save The World," Forbes, 1-9-2020, https://www.forbes.com/sites/johnkoetsier/2020/01/09/elon-musks-42000-starlink-satellites-could-just-save-the-world/?sh=85866264c2cd)//marlborough-wr/

Elon Musk’s other company, SpaceX, is building Starlink, a global communications constellation that could approach a [staggering 42,000 satellites](https://www.forbes.com/sites/johnkoetsier/2019/12/20/apple-building-satellite-to-iphone-tech-spacex-launching-42000-satellites-2--2--/#5d1ee85668a7). And it could be all that stands between us and a fragmented world living in virtually — and actually — different realities. How? World War II can tell us the answer. In the early 1940s a tyrannical power using fake news, hate speech, military might and hegemonic power controlled most of Europe: the Nazis. They controlled public life, news and local economies. Resistance groups dotted the European mainland, with one lifeline for non-official communication from free countries: radio. As such, radios were [contraband](https://www.theholocaustexplained.org/life-in-nazi-occupied-europe/occupation-case-studies/) and confiscated. One of the activities the allies undertook to support resistance fighters was shipping in radios for communication and outside news. Today, radios aren’t at risk of being confiscated. And as a cloud-delivered service, hijacking the internet happens largely out of public sight, in servers and routers that enable services like Netflix and the BBC and Facebook and Google. It’s called [splinternet](https://en.wikipedia.org/wiki/Splinternet), and it’s the ongoing division of a worldwide interconnected internet into separate and isolatable fiefdoms, each of which can be controlled and managed so that governing powers can control what their populations see. The Great Firewall of China is the most well-known example, but Iran, Syria and Vietnam also control significant portions of the internet for their populations. Russia just [completed technology](https://www.pcmag.com/news/371347/russia-is-about-to-disconnect-from-the-internet-what-that-m) to wall off its internal networks, servers and internet users from the wider internet. And India, in its attempt to control unrest following its anti-Muslim citizenship law, has employed a particularly heavy-handed approach: simply [blocking](https://www.tellerreport.com/news/2019-12-27---india--new-internet-outages--protesters-back-on-the-street-.ryrh4IhQyI.html) the internet entirely. (One unintended result: contractors in India can’t reach their employers in the U.S.) Another country, United Arab Emirates, took a different approach: outlawing all messengers [except one that it built a digital backdoor into: Totok](https://www.forbes.com/sites/johnkoetsier/2019/12/23/top-50-social-app-in-usa-outed-as-spying-tool-for-united-arab-emirates-apple-and-google-delete-it/#5790934b7291). However it happens, it allows governments to control what people see, read and hear from outside sources — and censor what their own people say. Starlink can change all of that. Elon Musk recently revealed [details](https://twitter.com/elonmusk/status/1214548764054216704?ref_src=twsrc%5Etfw%7Ctwcamp%5Etweetembed%7Ctwterm%5E1214548764054216704&ref_url=https%3A%2F%2Fwww.digitaltrends.com%2Fcool-tech%2Felon-musk-reveals-what-youll-need-to-connect-to-his-internet-satellites%2F) about how people will access StarLink. It will be incredibly simple, and it will enable access to the relatively free global internet from anywhere on the planet. What that means is that anyone can access the internet from anywhere. Chinese citizens will be able to access Google and information about Tiananmen Square. Russian citizens will be able to see external analysis of Putin’s financial dealings if even Russia blocks outside sources. Indian protesters can’t be cut off from the internet. Of course, governments will make the Starlink Terminal illegal. But that in itself will be a victory. Censorship works best when it is invisible: when people don’t even know that there is alternate information, other understandings of reality. (Chinese teenage exchange students at a relative’s house last year, for example, had never heard of Tiananmen Square, and refused to believe stories that, they felt, painted China in a negative light.) But when a device to connect to the outside world becomes contraband, the glass walls become opaque. People realize that walls have been erected to prevent them from seeing other opinions. And that is at least one step to maintaining a free, open and accessible internet globally, which should help combat fake news, propaganda and information deprivation aimed at controlling populations. And it’s a step towards making the splinternet harder to achieve. 1,000 satellites will be enough to enable basic service, Musk has said. SpaceX just [launched](https://www.digitaltrends.com/cool-tech/spacex-launches-60-more-starlink-satellites-amid-astronomer-concerns/) a third batch of 60 satellites, and is expected to continue launching that many [every two weeks](https://www.spaceitbridge.com/spacex-starlink-launch-targeted-for-november-11-will-questions-be-answered.htm) through the rest of 2020.

#### Democracy helps to ensure effective governance that respects people’s human rights and makes the government responsive to their needs. It also makes countries less likely to go to war with each other. Authoritarians repress pro-democracy movements by shutting down or censoring the internet, tactics megaconstellations make impossible. This is a crucial moment to promote democracy, as authoritarianism is on the rise globally.

### ON HIS AFFIRMATIVE ARGUMENTS:

#### First, as an overview, Megaconstellations don’t constitute appropriation since they are respect free use, are not stationary, are consistent with existing precedent for non-appropriation under the OST, and do not reflect the intent to appropriate.

Christopher Johnson writes in 2020 [Christopher D. Johnson, “The Legal Status of MegaLEO Constellations and Concerns About Appropriation of Large Swaths of Earth Orbit,” Handbook of Small Satellites, 2020-09-13, p.1337-1358] CT

5.2 No, This Is Not Impermissible Appropriation

An opposite conclusion can also be reasonably arrived at when approached along the following lines. The counter argument would assert that the deployment and operation of these global constellations, such as SpaceX’s Starlink, OneWeb, Kepler, etc., are aligned with and in full conformity with the laws applicable to outer space. These constellations are merely the exercise and enjoyment of the freedom of exploration and use of outer space and do not constitute any impermissible appropriation of the orbits that they transit.

5.2.1 Freedom of Access and Use Permits Constellations

Rather than being a violation of other’s rights to access and explore outer space, the deployment of these constellations is more correctly viewed as the exercise and restrict or impinge on other users of the space domain. Because due regard is therefore displayed for the space domain, and to the interests of others, these constellations do not prejudice or infringe upon the freedoms of use and exploration of the space domain and are therefore not occupation, or possession, much less appropriation.

5.2.4 This Does Not Constitute Possession, or Ownership, or Occupation

The use of LEO by satellite constellations is substantially similar to the use of GSO, and therefore permissible. In each region, individual actors are given permission - either from a national administrator or from an international governing body (the ITU) via a national administer–to use precoordinated subsections of space. In a way that is overwhelmingly similar to the use of orbital slots in GSO, the placement of spacecraft into orbits in LEO or higher orbits does not constitute possession, ownership, or occupation of those orbits. This is because States (and their companies) have been occupying orbital slots in GSO for decades, and these uses of GSO have never been accused of “appropriating” GSO. The users have never claimed to be appropriating GSO, and their exercising of rights to use GSO is respected by other actors in the space domain. This is the same situation for other orbits, including LEO and other non-Geostationary orbits. And while GSO locations are relatively stable (subject to space weather and other perturbations, and require stationkeeping), spacecraft in LEO are actually moving through space and are not stationary, so it is even more difficult to see this use by constellations as occupation, much less appropriation. Moreover, Space Situational Awareness (SSA) and Space Traffic Management (STM) will allow other uses to use these orbits, and nothing about the use of any one user necessarily precludes others. Lastly, there is no intention by operators of constellations to exclusively occupy, must less possess or appropriate, these orbits. Would not the appropriation of outer space be an intentional, volutional act? No such intention can be found in the operators of global constellations.

The implication is that the affirmative does not uphold the resolution because megaconstellations are not an instance of private appropriation.

#### **The interpretation of appropriation in their** Takaya evidence is too broad, contrary to precedent, and would render all orbital use a violation of the OST.

**Second, The affirmative overstates the problem of space debris. The risk of the Kessler Syndrome is very low and it should not be a reason to completely ban constellations. The counterplan is sufficient to reduce the risk.**

**Mark** **Albrecht writes in 16**, Chairman of the board of USSpace LLC & fmr. head of the National Space Council, “Congested space is a serious problem solved by hard work, not hysteria, 5/9/16, https://spacenews.com/op-ed-congested-space-is-a-serious-problem-solved-by-hard-work-not-hysteria/

There are over a half million pieces of human-made material in orbit around our planet. Some are the size of school buses, some the size of BB gun pellets. They all had a function at some point, but now most are simply space debris littered from 100 to 22,000 miles above the Earth. Yet, all behave perfectly according to the laws of physics. Many in the space community have called the collision hazard caused by space debris a crisis.

Popular culture has embraced the risks of collisions in space in films like Gravity. Some participants have dramatized the issue by producing graphics of Earth and its satellites, which make our planet look like a fuzzy marble, almost obscured by a dense cloud of white pellets meant to conceptualize space congestion.

Unfortunately, for the sake of a good visual, satellites are depicted as if they were hundreds of miles wide, like the state of Pennsylvania (for the record, there are no space objects the size of Pennsylvania in orbit). Unfortunately, this is the rule, not the exception, and almost all of these articles, movies, graphics, and simulations are **exaggerated and misleading**. Space debris and collision risk is real, but it **certainly** is **not a crisis.**

So what are the facts?

On the positive side, space is **empty** and it is **vast**. At the altitude of the International Space Station, **one half a** degree of Earth longitude is almost **40 miles long**. That same one half a degree at geostationary orbit, some 22,000 miles up is over 230 miles long. Generally, we don’t intentionally put satellites closer together than one-half degree. That means at geostationary orbit, they are no closer than 11 times as far as the eye can see on flat ground or on the sea: That’s the horizon over the horizon 10 times over. In addition, other than minute forces like solar winds and sparse bits of atmosphere that still exist 500 miles up, nothing gets in the way of **orbiting objects** and they **behave quite predictably**. The location of the smallest spacecraft can be predicated within a 1,000 feet, 24 hours in advance.

Since we first started placing objects into space there have been 11 known low Earth orbit collisions, and three known collisions at geostationary orbit. Think of it: 135 space shuttle flights, all of the Apollo, Gemini and Mercury flights, **hundreds** of telecommunications satellites, **1,300 functioning satellites** on orbit today, **half a million** total objects in space larger than a marble, and **fewer than 15 known collisions**. **Why** do people **worry?**

#### Third, Asteroid collisions are not a reason to stop all private constellations ---the probability of one hitting earth is extremely slim and countries are developing prevention methods now

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

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

#### Additionally, space-based asteroid detection is already happening. NASA’s NEOWISE detector has been operating since 2009 and is better than ground-based options.