### JANFEB 1AC

#### The standard is maximizing expected well-being.

#### It’s good for debate---allows us to become better advocates by testing the costs and benefits of hypothetical policy actions

#### And it’s a pre-requisite to action---threats of bodily harm throw prior constraints out the window and mean we always act to save lives

#### Util must be used to make decisions about space --- prefer our topic-specific analysis Baum 16 Seth Baum, The Ethics of Space Exploration, ed. James S.J. Schwartz & Tony Milligan, Springer, 2016, pages 109-123. <https://sethbaum.com/ac/2016_SpaceEthics.pdf> //AHS

**Outer space is** of major interest to **consequentialist** ethics **for two basic reasons**. First, the vast expanses of outer space offer **opportunities for achieving vastly more good or bad consequences than** can be achieved **on Earth** alone. If consequences are valued equally regardless of where they occur then achieving **good consequences in space is of paramount importance**. For human civilization, this can mean the building of space colonies or even the macroengineering of structures like Dyson swarms. However, as a practical matter for contemporary decision making, there should be less effort towards space colonization and more effort towards **preventing** civilization-ending **catastrophes**. Preventing the latter **will ensure** that **future generations** of humans will then **have the opportunity** to colonize space. The second reason why space should be seen as having a major importance for consequentialist ethics is the possibility that humanity may encounter an intelligent extraterrestrial civilization. This possibility poses difficult questions concerning which consequences should be pursued, given that any extraterrestrials who are in a position to make contact with us are also likely to be significantly more advanced than humanity. If they are indeed more advanced, then better consequences might accrue if humanity defers or even commits some form of civilizational suicide in order to make more space for their expansion. This possibility may also lead humans to rethink our own relation to less advanced other species on Earth. Keywords: consequentialism; ethics; extraterrestrials; outer space; space colonization 1. Introduction Consequentialism maintains that individuals should act so as to achieve good consequences. It is typically, but not necessarily, structured as an exercise in optimization: individuals should act so as to achieve the best consequences that they are able to bring about. Consequentialism is one of the most prominent and widely supported forms of ethics, though it is also often criticized (e.g., Scheffler 1982; 1988; Glover 1990). In this paper I will discuss the significance of outer space for a range of consequentialist views. **Most** treatments of consequentialism focus on consequences located on Earth. When people ask, “What are the consequences of my actions?”, they usually do not consider the consequences for other planets or faraway stars or galaxies. **Research** using consequentialist frameworks **has** a similar **terrestrial focus**. This holds **even for** **big-picture** consequentialist research like cost-benefit analyses of **climate** change **actions, which consider consequences for the entirety of Earth and many years into the future but nothing beyond Earth** (e.g., Stern 2006; Nordhaus 2007). **This** terrestrial focus may seem reasonable, but it **is a mistake**. Outer space is important for consequentialism for at least two reasons. First, the vast expanses of **outer space** offer opportunities for **achieving** vastly more good or bad **consequences** than can be achieved on Earth alone. Actions that bring good consequences to some significant portion of the universe **are of exceptionally high value** in many consequentialist frameworks. The second reason why outer space is important for consequentialism is the possibility that humanity may encounter an intelligent extraterrestrial civilization (abbreviated ETI for extraterrestrial intelligence). Conspiracy theories aside, no such civilization has yet been detected. It is possible that none exist. However, the search for extraterrestrial intelligence (SETI) remains a young endeavor. As it proceeds, and as humanity progresses and expands as a civilization, the odds of an encounter increase. ETI encounter poses certain challenges for consequentialism and can also yield some dramatic consequences.

#### And stopping extinction comes first under any framework

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

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

### Inherency

#### Space privatization is increasing in the squo at record levels and it’s bringing corporate monopoly with it---history repeats itself as we move into the final frontier

**Thompson 20** Clive Thompson, December 3, 2020, The New Republic. Monetizing the Final Frontier. <https://newrepublic.com/article/160303/monetizing-final-frontier> //AHS

**Private-sector activity in space travel is accelerating dramatically**—rocketing, one might say. For decades, ever since people first headed for orbit in the 1960s, spaceflight had been mostly the preserve of governments. States were the only actors with the money and technical acumen to blast things into the vacuum and get them safely down again. The private sector didn’t have NASA’s know-how, nor—more important—a business plan that could rationalize the massive outlay of capital required to operate in space. In the last few years, that calculus has changed dramatically. A generation of “New Space” **entrepreneurs has begun launching rockets and satellites**. Some **seek to flood the planet with fast, cheap mobile-phone signals**; others want to **manufacture new products** in zero gravity, harnessing the novel physics of such conditions to engineer substances that can’t be made in Earth’s gravity. Further afield, they’re aiming to **harvest water** on the moon **and** even **mine asteroids**. Backing this burst of entrepreneurial fervor are many billionaires who made their money in the early Wild West of the internet, including Amazon’s Jeff Bezos, with dreams of building space colonies, and Musk, the former PayPal titan who hopes to personally make it to Mars. Barack Obama’s administration made the first major overtures to the space privatizers, signing legislation that paved the way for today’s space boom. But the real land rush has occurred under Trump, via a flurry of **executive orders** designed to **give private firms greater access** to “low-Earth orbit.” Trump officials have even touted the idea of privatizing the $100 billion space station itself—the last signature NASA-sponsored human spacecraft project still aloft. When Trump’s transition team in 2017 pondered the handoff of low-Earth orbit to the private sector, it concluded: “This may be **the biggest and most public privatization effort America has ever conducted**.” Or as Texas GOP Senator Ted Cruz—at the time the chairman of the Space, Science, and Competitiveness Subcommittee—put it in 2018: “I predict the first trillionaire will be made in space.” The burst of activity and high-tech acumen thrills many space fans. But it is making many others quite nervous. Opening up **space** to a frenzy of private actors could, they agree, produce measurable benefits back on planet Earth—making crucial scientific research, environmental monitoring, and everyday communication cheaper. But the critics are quick to note as well that the history of **privatization is** spotty at best, with plenty of civically brutal knock-on effects: concentrations of **monopolistic power, enfeebled democratic control, and widespread environmental degradation**. We’ve seen **all those problems appear** on Earth **as** all manner of traditional **social goods**, from education and housing to pension plans and mass transit, **have been targeted for private-sector control**. **Next up**, it seems, **is the great beyond**.

### Advantage 1 is Debris

**Privatization is driving an explosion in space debris, pun intended Daehnick and Harrington 10/1** Chris Daehnick and Jess Harrington, October 1st, 2021, McKinsey. Look out below: What will happen to the space debris in orbit?<https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/look-out-below-what-will-happen-to-the-space-debris-in-orbit> //AHS

Space is having a moment. China launched the initial Tianhe module for its Tiangong space station this spring, and SpaceX followed shortly after with the first crewed mission from US soil since 2011. In July, Virgin Galactic and Blue Origin inaugurated suborbital tourist flights with their company leaders on board. Almost every week, it seems, more **private companies** and governments announce new concepts, flights, and projects. The **recent activity**, although exciting, **raises some concerns**. **The** amount **of space debris** is growing, despite requirements for satellite deorbit and disposal, and the **problem will** soon **escalate**. About 11,000 satellites have been launched in the 64 years since Sputnik 1 in 1957 (Exhibit 1). Now we’re at the point where about **70,000 satellites could enter orbit** if proposed plans come to fruition—**an explosion** of interest **based on** potential new **markets**, innovative architectures, and more sophisticated technologies (Exhibit 2). Even if all the proposed constellations fail to deploy, many more satellites will be in space. Unless actively deorbited, they will remain there for months to hundreds of years, depending on the altitude. We looked at space debris—what’s been done so far, the growing risk, and the government response—to find some solutions. Exactly what is space debris? Many people think this phrase refers to a gigantic hunk of metal about to crash into a major city, but only some of the millions of objects in orbit are as large as old upper-stage rockets and space stations. Much of the rest consists of tiny particles, such as paint flecks. The US Space Surveillance Network was tracking about 20,000 pieces of debris in orbit in 2019 (Exhibit 3).1 **Today, there are** about **27,000 pieces of debris**,2 most of which are over ten centimeters in diameter. The trajectories of the rest—and what they might hit and when—are uncertain. Given the speed at which orbital objects move, **even a collision between small debris and another object** on a crossing trajectory **can be catastrophic**. The International Space Station (ISS), which is designed to survive impacts by debris up to one centimeter in diameter, was damaged in May 2021 when an object about five millimeters in size punched a hole in the thermal covering of its robotic arm. The ISS, which has had to maneuver repeatedly to avoid larger debris, didn’t suffer functional damage, but the incident reminded us that even major space systems are vulnerable to hits from tiny objects. Don’t be surprised if reports of collisions increase over the next few years. There is only about one tracked object for every 18 million cubic kilometers in low-Earth orbit, but this number doesn’t include potentially lethal smaller debris, nor does it account for the relatively greater density of objects in certain orbits and the distance each object moves over any given time. Both of those factors increase the chances of collision, even in a largely empty environment. Space debris cannot be controlled and may be in the skies for centuries, depending on the orbits and collision dynamics, so the problem will remain Experts have been discussing the space junk problem since the 1960s, leading NASA’s Donald Kessler to author a groundbreaking 1978 report on the chain of reactions that could occur once debris reached a certain level—an effect now referred to as the Kessler syndrome. A few high-profile collisions have also focused attention on the problem. In 2007, China tested an antisatellite (ASAT) weapon by intercepting a nonoperational weather satellite (an FY-1C polar-orbit satellite of the Fengyun series). The resulting explosion created a cloud of space debris with more than 3,000 objects—the largest ever tracked.4 Similarly, a 2009 collision between the defunct Russian satellite Kosmos 2251 and an Iridium commercial communications satellite produced more than 2,000 pieces of debris.5 Exhibit 4 shows the amount of debris created after some of the largest collisions. Governments and other agencies have proposed some remedies to reduce space debris. The United States, for instance, issued a 2011 report on debris mitigation, and the United Nations recently created guidelines on the long-term sustainability of space activities.6 Even more unusual, the G-7 forum of developed economies published a statement in June 2021 that highlighted the increasing danger of space debris and encouraged international cooperation to address the problem. Overall, however, **not much has changed in the past decade when it comes to taking concrete action**.8 Extraterrestrial **collisions** can have heavy economic consequences, and increased use of space will take those costs even higher. Many new satellites are in huge “megaconstellations” that dwarf previous systems, and their number **could grow tenfold over the next five to ten years.**

#### And the ensuing debris belt ensures collisions that cut off human access to space and fuels multiple existential threats but there’s still time for the plan to solve

**Dvorsky 11/17** George Dvorsky November 17, 2021 What to know about Kessler Syndrome, the ultimate space disaster https://gizmodo.com/what-to-know-about-kessler-syndrome-the-ultimate-space-1848073998

**The world** got a stark reminder this week that Earth’s orbit **is** increasingly a crowded and potentially dangerous place. After the Russian military destroyed one of its defunct satellites in a weapons test early Monday morning, the crew of the International Space Station was forced to take shelter as high-speed debris passed uncomfortably close to the outpost. For now, satellites and space stations can simply maneuver away from threatening space junk, but we may be **approaching a scenario in which** snowballing **collisions in orbit actually cut us off from space**. Disturbingly, we may already be in the early stages of this process, known as Kessler Syndrome. In 2015, the now-defunct foresight publication MISC Magazine reached out to me for its crisis issue. They asked me a simple question: “What looming potential crisis is nobody talking about?” Without hesitation, I replied Kessler Syndrome, and I said so because I found it weird that such an important issue—the loss of access to Earth orbit—was barely scratching the zeitgeist. As I reflect on this answer some six years later, and given the appalling news that Russia just blew up one of its own satellites, I firmly stand by that answer. But while “nobody” was talking about the Kessler Syndrome back then, it’s certainly not the case now. Indeed, awareness is steadily growing about the sorry state of low Earth orbit and the quantity of junk zipping around up there. An estimated 330 million bits of debris currently exist in space, in what is an absolutely eye-watering figure. Now, we obviously didn’t launch 330 million individual pieces of debris to orbit, but that’s exactly the issue: **Objects in space** can **breakup** into many smaller pieces, which can then smash into other objects, and so on and so on, **resulting in** the **exponential** creation of **debris** over time. Donald Kessler saw this coming. In 1978, the NASA scientist warned that, **as “the number of** artificial **satellites** in earth orbit **increases, the probability of collisions** between satellites also **increases**. Satellite collisions would produce orbiting fragments, each of which would increase the probability of further collisions, **leading to** the growth of **a belt of debris around the earth**.” Because the belt would get increasingly dense over time, Kessler worried about it becoming “a significant problem during the next century.” This “run-away, self-sustained, cascading collision process,” as the European Space Agency describes Kessler Syndrome, is likely to boost the pace at which satellites get destroyed by fragmentary debris and other satellites, but also the pace at which debris begets more debris. (Only once has a satellite smashed into another satellite, and that happened in 2009 when the functioning Iridium 33 smashed into the defunct Kosmos-2251.) Large swaths of low Earth orbit, particularly the highly useful band between 560 miles and 870 miles (900-1,400 km), would eventually be made inaccessible for protracted periods of time, possibly for decades. As early as 1991, Kessler said that “it is now necessary to begin limiting the number of expended rocket bodies and payloads in orbit.” Twenty years later, that’s an almost laughable proposition, given the frenetic tempo at which rockets are now being launched to space. Moreover, attempts to thwart the process may already be futile, as the rate at which space debris is being created is now higher than the rate at which debris is falling back into Earth’s atmosphere. Kessler was already aware of this in 2009. “Modeling results supported by data from [U.S. Air Force] tests, as well as by a number of independent scientists, have concluded that **the current debris environment is ‘unstable**’, or above a critical threshold, such that any attempt to achieve a growth-free small debris environment by eliminating sources of past debris will likely fail because fragments from future collisions will be generated faster than atmospheric drag will remove them,” as he wrote. The European Space Agency concurs, saying “generated collision fragments will start to dominate” in useful portions of low Earth orbit, and this “will be true even if all launch activities were to be discontinued now, which is an extremely unlikely development.” As an aside, geosynchronous orbit, which rises about 22,000 miles (36,000 km) above Earth and hosts hundreds of satellites, is likewise not immune to Kessler Syndrome. The phrase “Kessler Syndrome” was coined by John Gabbard, who tracked major satellite breakup events for NORAD, and it came into use without having a strict definition. Kessler would go on to clarify the term, saying it was “meant to describe the phenomenon that random collisions between objects large enough to catalogue would produce a hazard to spacecraft from small debris that is greater than the natural meteoroid environment.” He added that the “phenomenon will eventually become the most important long-term source of debris” unless we finally do something about it. Kessler never claimed that a destructive cascade would appear over a short time frame, such as a few days or months, or that a cascade could be sparked by a single trigger event (the 2013 film Gravity portrayed such a scenario, in which the destruction of a Russian satellite led to a cascading ball of space junk that eventually destroyed the International Space Station). Indeed, a single trigger event is unlikely to wipe out satellites en masse, but collisions that create large volumes of debris can speed the process along. Russia, having shot down its Kosmos-1408 satellite earlier this week, has directly contributed to the process; its anti-satellite (ASAT) test produced thousands of new pieces of debris which will threaten spacecraft for years to come. The U.S., India, and China have performed similar tests, so there’s plenty of blame to go around. Concerns exist that Envisat—a retired, 18,000-pound Earth observation satellite—could also trigger a catastrophic cascade should it somehow be destroyed, but as Kessler himself told Space Safety Magazine in 2012, that’s not likely. But it would accelerate the process by an order of magnitude, Kessler explained: “The cascade process can be more accurately thought of as continuous and as already started, where each collision or explosion in orbit slowly results in an increase in the frequency of future collisions. But since Envisat is so massive, if the collision had occurred it would instantly [produce] a debris environment that, under the most optimistic conditions, we would not expect to have for at least 100 years. That is close to what most might call a ‘trigger’ event.” Trends suggest we’ll continue to fuel Kessler Syndrome. Rocket launches are now cheaper than they’ve ever been, making space an increasingly viable place for conducting **business activities**. Miniaturization is allowing for the creation of smaller and cheaper satellites, but that means we can **pump more satellites into space** with each launch. **And** then there’s the **trend towards satellite megaconstellations**, in which fleets of orbiting spacecraft work in tandem to provide services such as broadband internet access. **SpaceX**, having launched over 1,700 Starlink satellites to orbit, is leading the megaconstellation charge, but other companies, such as **OneWeb and Amazon, intend to send up** similar **systems**. Around 7,630 satellites are currently orbiting Earth, of which roughly 4,700 are functioning, according to ESA. **Each object** added to orbit results in an increased collision risk, and each collision in turn **boosts the chance of future collisions**. This “could make prospects for long-term viability of satellites in [low Earth orbit] extremely low,” as Louis de Gouyon Matignon, an expert in space law, writes in Space Legal Issues. Indeed, the situation could get very grim. The unacceptably high density of debris **would make** Earth **orbit** an **unsuitable** place **for satellites, space stations, and astronauts**. In a kind of worst-case scenario, a cascading debris field would wipe out swaths of satellites **and render** portions of Earth orbit **unusable** to human activities, at least for a while. The debris cloud below 310 miles (500 km) would eventually fall back to Earth, but that would take a decade or more. As for the area above 372 miles (600 km), that could potentially remain off limits indefinitely, unless we find a way to manually clean things up. I’ve previously detailed the implications of losing our satellites, but the Coles Notes version is that **our ability to communicate would be severely hampered, GPS would be non-existent** (along with those systems dependent upon it), space-based synchronization for **timekeeping and navigation** would grind to a halt, our **financial systems would crash, we’d lose** significant **military capabilities**, **and** we’d be deprived of our **weather satellites**, among many other things. Very serious stuff. Most of us would prefer that we not return to the mid-20th century, and thankfully **there are ways** for us **to reduce the volume of space debris**. These include limiting the amount of space debris caused by routine space operations (such as the maintenance and repair of satellites in orbit), preventing in-space collisions (for example, by making all satellites maneuverable and prohibiting anti-satellite weapons tests), making satellites more resistant to impacts (such as through shielding), and by responsibly disposing of retired satellites (designing satellites that can deorbit themselves, for example). Finding new and effective ways to remove space junk is also critical. **We** also **need** sensible **constraints on** the volume and types of **objects** that can be **sent into space**. **Getting everyone on board, including** public and **private sectors**, won’t be easy, but **it’s necessary** to maintain a healthy orbital ecology. Earth orbit is a very special place, and it’d be a shame to lose it.

#### It's terminal --- privatization leads to a chain reaction of collisions that destroys all ability to launch satellites \*forever\* Thompson 20 Clive Thompson, December 3, 2020, The New Republic. Monetizing the Final Frontier. <https://newrepublic.com/article/160303/monetizing-final-frontier> //AHS

This **commercial boom** may be heretofore unseen, but it’s rapidly leaving its imprint across the heavens. What, exactly, does an **outer-space land rush** look like? Moriba Jah got a sobering glimpse of this last year, when he watched SpaceX launch 60 satellites on a single rocket. Jah **is** an astrodynamicist, devoted to the study of how objects move in space, and when his colleagues trained their telescopes on the SpaceX rocket releasing the satellites into orbit, they fixed on a colossal stream of bright points of light. It was pretty, in an abstract sort of way. But for Jah, it was **deeply worrying**—because SpaceX was only getting started. Those satellites were part of Starlink, a new product that SpaceX launched this year. It be an array of satellites that provide fast internet access anywhere on the planet, letting subscribers “watch high-def movies, play video games and do all the things they want to do without noticing speed,” as Musk promised. But to blanket the planet in bandwidth, SpaceX needs a lot of satellites. **Musk** shot another 60 up in January 2020, and another 120 in March and April. He **aims to have** **almost 12,000 circling Earth by 2027, and 30,000 more after that.** Prior to the SpaceX launch-binge, by contrast, there were only about 2,000 satellites in orbit. “Elon has a green light to just put a dump truck of satellites in Earth orbit,” Jah told me. What worries him is **congestion, and**—in a weird, futuristic way—**environmental devastation**. Jah is an expert on the problem **of space debris**, the littering of space. If companies keep tossing up satellites this rapidly, he fears, we could **soon create an irrecoverable mess**. Having blighted the Earth’s environment, **commercial** activity seems poised to wreck the next frontier: low-Earth orbit. Low-Earth orbit—roughly, anything that’s whizzing around the planet no more than 1,200 miles high—is the zone where SpaceX and many other New Space firms seek to operate. And **simple math**—together with the history of virtually all new forms of transportation—**tells us** that the more things go up there, and without a clear fix on where **objects** are in space, the greater the odds are that those things **are going to start slamming into one another** by accident. “Physics tells us that two things can’t occupy the same space at the same time or else bad things happen,” Jah said dryly. Indeed, there’s already been one collision that produced sprawling orbital pollution. In 2009, a satellite owned by the U.S. firm Iridium slammed into a decommissioned Russian government satellite at more than 26,000 mph. The crash produced 2,300 pieces of debris, spraying off in all directions. And debris is a particularly gnarly problem in space, because when it’s traveling at thousands of miles an hour, even a marble-size chunk is like a bullet, capable of rendering a damaged satellite inoperable and unsteerable—the owner can no longer fire its boosters to guide it into a higher or lower orbit. There are currently an estimated 500,000 marble-size chunks up there. Decades of space travel by governments left plenty of refuse, ranging from parts of rocket boosters to stray bits of scientific experiments. One particularly grim vision of the future that haunts astronomers is the “Kessler syndrome,” proposed by the astrophysicist Donald Kessler in 1978. Kessler hypothesized that space clutter could reach a tipping point: **One** really bad **collision could** produce so much junk that it would **trigger a chain reaction** of collisions. This disaster scenario would leave hundreds of satellites eventually destroyed, **and create a ring of debris that would make launching any new satellites impossible, forever**.

#### Multiple scenarios --- first is miscalculated nuclear war.

Johnson 14 – **(**Les Johnson is a Baen science fiction author, popular science writer, and NASA technologist. 2014, “Living without satellites” <https://www.baen.com/living_without_satellites>)

Satellite imagery is used by the military and our political leaders to maintain the peace. When your potential adversaries can’t hide what they’re doing, where their armies are moving and what they are doing with their civilian and military infrastructure, then the danger of surprise attack is diminished. In our nuclear age with instant death only minutes away by missile attack, the doctrine of Mutual Assured Destruction (MAD) only works if both sides know whether or not they are being attacked. The launch of missiles or a bomber fleet can easily be seen from space far in advance of either reaching their potential targets halfway around the globe. The danger of surprise attack is therefore small, making an accidental war far less likely. So what does all this mean? And what do we do about it? First of all, it means that the advocates of space development, exploration and commercialization have succeeded far beyond their initial expectations and dreams. The economies and security of countries in the developed world are now dependent on space satellites. We space advocates should celebrate our success and be terrified of it at the same time. Should we lose these fragile assets in space, our economy would experience a disruption like no other: ship, air and train travel would stop and only restart/operate in a much-reduced capacity for years (GPS loss). Many banking and retail transactions would cease (VSAT loss). Distribution of news and vital national information would be crippled (communications satellite loss). Lives would be put at risk and the productivity of our farming would dramatically decrease (weather satellite loss). The risk of war, including nuclear war, would increase (loss of spy satellites) and our military’s ability to react to crises would be significantly reduced (loss of military logistics and intelligence gathering satellites).

#### Second is the grid---it relies on satellites to keep it running Bell 19 Robert Bell, March 4, 2019, Space News. https://spacenews.com/satellites-keep-the-lights-on/

Flip a switch and amazing things happen. Dark to light. Cold to warm. Things open and things close. Yet no one thinks twice. **Each flip of the switch is** a small miracle, **brought to you by** billions in investment and the hard work of millions. Brought to you, too, by **satellites circling the earth** far out of sight, helping to make life electric. Keeping the Balance . . . and the Lights On Electricity is the only product we buy that must be used instantly. **The electric grid works because** the power going in balances the power being used. When supply and demand go out of balance, so do our lives. Gadgets burn out, neighborhoods black out, cities go dark. Keeping the lights on is like walking a high wire. The balance changes every second. To keep the balance, **utilities** synchronize all the equipment across the grid. They **use GPS,** the **satellite technology** that puts maps on your phone. GPS satellites are clocks with radios that send signals with the exact time everywhere. **Turn off GPS**, **and power grids** start to **fail**.

#### The grid literally keeps us alive---it goes down, we’re done

Greene 19 [Sherrell R. Greene Mr. Greene received his B.S. and M.S. degrees in Nuclear Engineering from the University of Tennessee. He is a recognized subject matter expert in nuclear reactor safety, nuclear fuel cycle technologies, and advanced reactor concept development. Mr. Greene is widely acclaimed for his systems analysis, team building, innovation, knowledge organization, presentation, and technical communication skills. Mr. Greene worked at the Oak Ridge National Laboratory (ORNL) for over three decades. During his career at ORNL, he served as Director of Research Reactor Development Programs and Director of Nuclear Technology Programs. . "Enhancing Electric Grid, Critical Infrastructure, and Societal Resilience with Resilient Nuclear Power Plants (rNPPs)." <https://ans.tandfonline.com/doi/pdf/10.1080/00295450.2018.1505357?needAccess=true>] //recut AHS

Societies and nations are examples of large-scale, complex social-physical systems. Thus, societal resilience can be defined as the ability of a nation, population, or society to anticipate and prepare for major stressors or calamities and then to absorb, adapt to, recover from, and restore normal functions in the wake of such events when they occur. A nation’s dependence on its Critical Infrastructure systems, and the resilience of those systems, are therefore major components of national and societal resilience. There are a variety of events that could deal crippling [devastating] blows to a nation’s Grid, Critical Infrastructure, and social fabric. The types of catastrophes under consideration here are “very bad day” scenarios that might result from severe GMDs induced by solar CMEs, HEMP attacks, cyber attacks, etc.5 As briefly discussed in Sec. III.C, the probability of a GMD of the magnitude of the 1859 Carrington Event is now believed to be on the order of 1%/year. The Earth narrowly missed (by only several days) intercepting a CME stream in July 2012 that would have created a GMD equal to or larger than the Carrington Event.41 Lloyd’s, in its 2013 report, “Solar Storm Risk to the North American Electric Grid,” 42 stated the following: “A Carrington-level, extreme geomagnetic storm is almost inevitable in the future…The total U.S. population at risk of extended power outage from a Carrington-level storm is between 20-40 million, with durations of 16 days to 1-2 years…The total economic cost for such a scenario is estimated at $0.6-2.6 trillion USD.” Analyses conducted subsequent to the Lloyd’s assessment indicated the geographical area impacted by the CME would be larger than that estimated in Lloyd’s analysis (extending farther northward along the New England coast of the United States and in the state of Minnesota),43 and that the actual consequences of such an event could actually be greater than estimated by Lloyd’s. Based on “Report of the Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack: Critical National Infrastructures” to Congress in 2008 (Ref. 39), a HEMP attack over the Central U.S. could impact virtually the entire North American continent. The consequences of such an event are difficult to quantify with confidence. Experts affiliated with the aforementioned Commission and others familiar with the details of the Commission’s work have stated in Congressional testimony that such an event could “kill up to 90 percent of the national population through starvation, disease, and societal collapse.” 44,45 Most of these consequences are either direct or indirect impacts of the predicted collapse of virtually the entire U.S. Critical Infrastructure system in the wake of the attack. Last, recent analyses by both the U.S. Department of Energy46 and the U.S. National Academies of Sciences, Engineering, and Medicine47 have concluded that cyber threats to the U.S. Grid from both state-level and substatelevel entities are likely to grow in number and sophistication in the coming years, posing a growing threat to the U.S. Grid. These three “very bad day” scenarios are not creations of overzealous science fiction writers. A variety of mitigating actions to reduce both the vulnerability and the consequences of these events has been identified, and some are being implemented. However, the fact remains that events such as those described here have the potential to change life as we know it in the United States and other developed nations in the 21st century, whether the events occur individually, or simultaneously, and with or without coordinated physical attacks on Critical Infrastructure assets.

#### And space observations are critical to mitigating the effects of climate change through monitoring and data collection---climate change IS inevitable, and sats are the difference between extinction and sustainable management

Salazar 18 – (Doris Elin Salazar January 06, 2018 Science & Astronomy, 1-6-2018, "Solving Earth's Climate Challenges Requires More Satellite Vision: Report," Space, https://www.space.com/39306-earth-climate-science-satellites-future.html)

Space observations are crucial to solving the challenges presented by Earth's complex climate, which will play a pivotal role in humanity's success or demise, argued an extensive report by the U.S. National Academies. The new, 700-page report released today (Jan. 5) is titled "Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space." In it, the National Academies of Sciences, Engineering and Medicine (NASEM) announced their recommendations for what federal research agencies — such as NASA, the National Oceanic and Atmospheric Administration (NOAA), and the United States Geological Survey (USGS) — should do over the next 10 years. This was the second decadal survey for Earth science and applications from space; the first was published in 2007. The report's co-chairs — Waleed Abdalati, the director of Cooperative Institute of Research in Environmental Sciences at the [University of Colorado Boulder](https://www.space.com/39306-earth-climate-science-satellites-future.html), and Bill Gail, chief technology officer at the Global Weather Corporation — addressed the survey's recommendations during a press conference at the National Academies' Keck Center in Washington, D.C. [[See the Effects of Climate Change Across Earth (Video)](https://www.space.com/37169-climate-change-effects-earth.html)] "There is a perspective from space that cannot be gained any other way," Abdalati said early in the press conference. Understanding the ways in which [human activity](https://www.space.com/23508-humanity-impact-outer-space.html) and non-anthropogenic changes are shaping societies across the world ought to be considered like an extension of infrastructure, he added. Gauging weather systems and predicting sea-level rise, for example, are as vital to a "thriving" society as fixing highways and maintaining railroads. "If you go back 10-12 years, we were in a different place when it came to Earth information from space" Abdalati said. "We were not using weather apps on our phones and planning our days' activities around them. We were not using online mapping applications to get to and from where we're going in the most efficient way. The [military](https://www.space.com/39306-earth-climate-science-satellites-future.html) [also] relies heavily on information from NASA, NOAA and USGS." Space observations are crucial for society in a myriad of ways across the commercial, public [health](https://www.space.com/39306-earth-climate-science-satellites-future.html) and national safety sectors, the co-chairs said. [The report](https://www.nap.edu/catalog/24938/thriving-on-our-changing-planet-a-decadal-strategy-for-earth) is the product of 290 suggestions of the most important issues to tackle in the near future, contributed by the scientific community. From those suggestions, the report's compilers extracted 103 objectives and then synthesized them into 35 final goals. The report calls for prioritizing advances in, for example, forecasting air quality and weather so that predictions provide a lead time of up to two months. In addition, the report calls for knowing how biodiversity changes over time, predicting future geological hazards within a more accurate time frame and understanding more precisely how the ocean stores heat, among many other goals. The co-chairs said that the report focuses on recommendations that are achievable within budget constraints and prioritizes the suggestions the committee believed were most important for the next decade. The report invites the scientific community at NASA, NOAA and USGS to focus first on achieving ambitious solutions to climate challenges and then following up with ways to accelerate technology to meet those ends, rather than the other way around. The report recommends that NASA cap the budget for its current projects —both flying and soon-to-be-flying missions —at $3.6 billion, to leave room in the agency's funding to serve the report's 35 objectives over the next decade. Abdalati stressed, however, that it was important to fly the missions already in development. NASA should also continue studying how small particles of material, known as aerosols, can affect air quality and should learn more about the traits of vegetation on Earth's surface, the co-chairs said. The report additionally suggests that NASA start a competitive new [Explorer program](https://www.space.com/37802-nasa-chooses-six-explorers-missions.html) for medium-size agile instruments and missions (with a budget of $500 million or lower), in which participants would take a shot at addressing one of seven identified topics from the [survey](https://www.space.com/39306-earth-climate-science-satellites-future.html). Those topics include mapping ocean-surface winds and developing 3D models of the terrestrial ecosystem. The competition may also reveal what objectives will be more easily achieved in the next decade, Gail said. Gail concluded his presentation by addressing the report's title. "It really is about this tension between our ability to thrive over the next decade and longer, and the fact that as the planet is changing around us, the information we need to acquire about our planet is changing as rapidly as we try to acquire it," he said. "So this will be a decade in which we will find growing community and public reckoning between two things: broad reliance on Earth information ... and this growing challenge of obtaining that information."

### Advantage 2 is Microgravity

#### Privatization replaces the public ISS and kills microgravity research for at least the next decade---multiple warrants

Foust 18 Jeff Foust, Ph.D. in planetary sciences from the Massachusetts Institute of Technology and a bachelor’s degree with honors in geophysics and planetary science from the California Institute of Technology. “Commercial Space Stations Face Economic and Regulatory Challenges.” <https://spacenews.com/commercial-space-stations-face-economic-and-regulatory-challenges/> //recut AHS

WASHINGTON — Proposals to develop **commercial space stations** in low Earth orbit that could serve **as successors to the I**nternational **S**pace **S**tation **face** both an uncertain regulatory environment and questions about their economic viability, according to both those planning such stations and those who might regulate them. At a panel discussion on commercial space stations held here Sept. 22 by the Secure World Foundation, government and industry officials noted that such facilities fall into a regulatory gray area, with **no** U.S. government agency having clear **oversight** of them as required by international treaty.“I’m not a fan of regulation, but I do think this **could create problems** when you ask for a launch license or payload review,” said Mike Gold, director of Washington operations and business growth for Bigelow Aerospace, a North Las Vegas, Nevada-based company planning commercial stations. Gold noted that Article 6 of the Outer Space Treaty of 1967 requires governments to perform “continuing supervision” of space activities of entities under its jurisdiction, like companies. That supervision is carried out for some other space activities, like licensing of commercial remote sensing satellites by the National Oceanic and Atmospheric Administration and of communications satellites by the Federal Communications Commission. Some in industry have proposed that the Federal Aviation Administration, which licenses commercial launches and reentries, take on that oversight role for other commercial space activities. Gold said he envisioned a relatively simple system where companies registered their spacecraft with the FAA and informed them of any significant changes. “I think that would meet the Outer Space Treaty’s obligations and create the environment of certainty and predictability that industry and investors need,” he said. The FAA is interested in taking on that responsibility. “We’re going to continue to work within government to put together the right oversight framework,” said Steph Earle of the FAA’s Office of Commercial Space Transportation (AST). That would, he noted, ultimately require congressional action to give the FAA that authority. Earle added that he believed the FAA would be a better fit for regulating commercial space stations than other agencies, like the FCC and NOAA. “It doesn’t seem that the other agencies are well suited to this, and the FAA thinks that it is,” he said. Not everyone in industry agrees, however. “I’m not convinced FAA/AST is the right long-term choice to be the orbital space regulating agency,” said Charles Miller, president of NexGen Space. “It’s more than transportation, and I’m not sure in the long term that transportation is the right place for all these functions.” Miller said he thinks the Commerce Department might be a better fit for on-orbit regulation, since it is charged with broadly supporting commerce, not just transportation, and has some regulatory capability today with NOAA. Regulatory uncertainty, though, may not be **the biggest challenge** facing commercial stations. “The barriers to the development of the low Earth orbit economy are economic barriers far more than they are regulatory barriers at the moment,” said Carissa Christensen, managing partner of the Tauri Group,an Alexandria, Virginia-based consultancy. NASA, in its efforts to stimulate commercial use of the ISS, has played up the potential benefits **of** performing **research in microgravity**. However, panelists were skeptical that research could become a viable commercial market for the foreseeable future. “You won’t find bigger believers in the revolutionary capabilities that **microgravity R&D** can bring,” Gold said. “However, that market is very immature right now, and it **is going to take a** long time **to grow**. I don’t think we’re going to see it in the next 10 years.” Miller said **microgravity research** was one of four applications he identified **for commercial stations**. “To me, **it’s** kind of **speculative**,” he said, noting that **more research on the ISS is needed** to see what could be commercially viable. Markets he thought could be more feasible for commercial stations were serving as “transfer nodes” for spacecraft bound for other orbits, propellant depots, and on-orbit assembly of satellites.

#### And Microgravity research on the ISS is key to pandemic response

Pearlman 15 Alex Pearlman, July 16, 2015. Bioethicist at Agence France-Presse. “NASA prioritizing global health research on the International Space Station.” <https://www.pri.org/stories/2015-07-16/nasa-prioritizing-global-health-research-international-space-station> //recut AHS

**The ISS** circles Earth at a height of 250 miles in a state known as Low Earth Orbit, that **allows for** a unique weightless quality called “microgravity.” This environment is one that scientists can’t easily replicate on Earth, and in this way, the US area of the ISS is the perfect place to house a national laboratory to study human health, among other things. Multinational pharmaceutical companies and small start-ups alike have sent health experiments to space, mostly through CASIS, the non-profit arm of NASA that forms public-private partnerships between ISS and the business sector. Charged with finding the right scientists and research studies that would have the largest impact, CASIS has a large part in deciding what gets to spend some time “up there.” “We work across the life sciences spectrum,” said CASIS Director of Business Development Cynthia Bouthot. “We like that broad mix of big companies that are working on **these** big **projects,** as well as these small companies that are totally innovative and doing things in a different way.” Anita Goel’s work is part of this fusion of emerging science and commerce, and CASIS believes her device, Gene-Radar, could have a huge effect on real-time diagnostics for infectious disease. The iPad-sized tool takes human DNA samples and uses the device’s mobile apps to determine the nature of a disease by its genetic fingerprint, or biomarker, on the spot. **By removing** the need to send samples to a physical lab, Gene-Radar could be a crucial, **life-saving innovation**, especially in remote places where infectious diseases like Ebola and HIV can go undiagnosed for days or weeks. Via the microgravity environment on ISS, Goel can find ways to make her apps faster, and smarter. “[Low Earth Orbit] acts as an incubator **to accelerate** the **mutations** that happen with some bacteria and viruses,” explained Goel. “We **can** use that to **anticipate how**, for example, some drugs might become drug-resistant, and then build apps on Gene-Radar that could not only diagnose the main bug, but also how it might mutate over a period of time… and anticipate what kind of therapeutics or vaccines that **could** be used to **beat the virus** before it mutates.” At a gathering of space scientists last week at the annual ISS Research and Development Conference in Boston, Goel received a Galactic Grant in a recent funding contest through which CASIS and the Massachusetts Life Sciences Center will send worthy experiments to space. Global health is a priority for CASIS and NASA, and with their support, experiments like Goel’s **and** others could **transform** the next generation of **healthcare technology to address** everything from infectious disease pandemics to non-communicable diseases like cancer.

#### We outweigh on timeframe---the next pandemic is around the corner, threatens all of humanity, and the public sector is key Chan and Salzman 20 Dr. Jonathan Chan and Sony Salzman September 3, 2020 As COVID-19 continues, experts warn of next pandemic likely to come from animals <https://abcnews.go.com/Health/covid-19-continues-experts-warn-pandemic-animals/story?id=72755696>

Even as the COVID-19 pandemic rages on, experts are warning that **the next pandemic could arrive at any moment**, and again, it could come from animals. **To prevent history from repeating itself**, experts say **governments need to** start **invest**ing heavily in pandemic prevention efforts. That means deploying teams of biologists, zoologists and veterinarians to begin monitoring animals and the people who interact with them -- an army of scientists tasked with stamping out the next deadly virus before an animal disease balloons into a global pandemic. According to the World Health Organization, approximately 1 billion cases and millions of deaths each year can be traced back to diseases originating from animal populations. In the past three decades, researchers have found more than 30 bacteria or viruses that are capable of infecting humans. Over three quarters of those are believed to have come from animal populations. And while the current pandemic may feel like a very rare happening, scientists say **the pace** of these pandemics **is accelerating** dramatically **thanks to humans**' ever-**encroaching** **proximity** to **wildlife**. Beginning with SARS almost two decades ago and followed by West Nile, Ebola, Zika and currently, COVID-19, many of these pandemics originated with species of bats, and can be spread between people through coughing and sneezing or through insects such as mosquitoes. "The **time between** these **outbreaks is getting shorter** and shorter," said Dr. Tracey McNamara, a professor of pathology at Western University of Health Sciences College of Veterinary Medicine. And it's becoming increasingly clear that these viruses aren't just a threat to our health -- they're also a threat to the global economy. "We are only able to sustain an outbreak maybe once every decade," said Dr. Peter Daszak, president of EcoHealth Alliance. "The rate we are going is not sustainable." The COVID-19 pandemic did not surprise McNamara and Daszak. For decades, they, and other scientists, have been warning politicians and the public that wild and domestic animals -- and **the viruses** they carry -- **pose a threat to humanity**. Without proper monitoring and surveillance of these creatures, they warned, **we would be ill-prepared to stop a virus from spreading across the globe**. McNamara was part of the "Red Dawn" group, a now-infamous email chain of top scientists that asked powerful U.S. government officials to mount a more vigorous domestic defense back when coronavirus was still considered a problem confined to China's borders. And Daszak, who has spent much of his career hunting for the next pandemic-causing virus in bat caves in Asia, saw U.S. government funding for his science slashed back in April. Perhaps most ominously, a U.S.-funded early-warning system called PREDICT, which was launched in 2009 in response to the H5N1 bird flu outbreak, saw its funding quietly lapse in late 2019. Daszak, whose group EcoHealth Alliance received some funding from PREDICT, lamented its loss at the time, arguing it's much cheaper for governments to stamp out small outbreaks than try to control a massive pandemic. But there are some signs now, with the coronavirus pandemic in full swing, that funding to these crucial programs is coming back. PREDICT was granted an emergency six-month extension, and a new program, called Stop Spillover, is slated to launch in October. And while it may be too late to stop this coronavirus in its tracks, scientists say **the threat** of the spillover event **grows more imminent each year**. As our population continues to expand, the interactions between humans and wildlife grow closer and closer. Cutting down forests and altering habitats push animals out of their own homes and deeper into human communities. Poorly developed hygiene and sanitation systems can make it more likely for germs to build up. With humans and animals living in such close proximity, bacteria and viruses can easily jump from one species to another. **Once people become infected, the increasing interconnectedness of our world makes the spread of the disease easier.** People and domestic animals are able to traverse the globe in a matter of hours. Illegal trade of exotic animals can move across borders undetected, carrying with them deadly bacteria and viruses. "Several epidemiological drivers have been identified that make bacteria and viruses from animal populations suitable to emerge in a susceptible population. These drivers include climate change, industrial development, ecosystem change and social inequality," said Dr. John Brownstein, an epidemiologist, chief innovation officer at Boston Children's Hospital and contributor to ABC News.

#### Pandemics keep getting worse, COVID proves it, and the next one could wipe out everyone.

Bar-Yam 16 Yaneer Bar-Yam, July 3, 2016. Professor and President, New England Complex System Institute; PhD in Physics, MIT. “Transition to extinction: Pandemics in a connected world.” July 3. <http://necsi.edu/research/social/pandemics/transition>. //recut AHS

Watch as one of the more aggressive—brighter red — strains rapidly expands. After a time it goes extinct leaving a black region. Why does it go extinct? The answer is that it spreads so rapidly that it kills the hosts around it. Without new hosts to infect it then dies out itself. That the rapidly spreading pathogens die out has important implications for evolutionary research which we have talked about elsewhere [1–7]. In the research I want to discuss here, what we were interested in is the effect of adding long range transportation [8]. This includes natural means of dispersal as well as unintentional dispersal by humans, like adding airplane routes, which is being done by real world airlines (Figure 2). When we introduce long range transportation into the model, the success of more **aggressive strains** changes. They can use the long range transportation to **find new hosts and** escape local extinction. Figure 3 shows that the more transportation routes introduced into the model, the more higher aggressive pathogens are able to survive and spread. As we add more long range transportation, **there is a** critical **point at which** pathogens become so aggressive that the entire host population dies. The pathogens die at the same time, but that is not exactly a consolation to the hosts. We call this the phase transition to extinction (Figure 4). **With increasing** levels of **global transportation,** human civilization may be **approach**ing such a critical threshold. In the paper we wrote in 2006 about the dangers of global transportation for pathogen evolution and pandemics [8], we mentioned the risk from Ebola. Ebola is a horrendous disease that was present only in isolated villages in Africa. It was far away from the rest of the world only because of that isolation. Since Africa was developing, it was only a matter of time before it reached population centers and airports. While the model is about evolution, it is really about which pathogens will be found in a system that is highly connected, and Ebola can spread in a highly connected world. The traditional approach to public health uses historical evidence analyzed statistically to assess the potential impacts of a disease. As a result, many were surprised by the spread of Ebola through West Africa in 2014. As the connectivity of the world increases, past experience is not a good guide to future events. **A key point about** the phase transition to **extinction is its** suddenness. Even a system that seems stable, can be destabilized by a few more long-range connections, and connectivity is continuing to increase. So how close are we to the tipping point? We don’t know but it would be good to find out before it happens. While Ebola ravaged three countries in West Africa, it only resulted in a handful of cases outside that region. One possible reason is that many of the airlines that fly to west Africa stopped or reduced flights during the epidemic [9]. In the absence of a clear connection, public health authorities who downplayed the dangers of the epidemic spreading to the West might seem to be vindicated. As with the choice of airlines to stop flying to west Africa, our analysis didn’t take into consideration how people respond to epidemics. It does tell us what the outcome will be unless we respond fast enough and well enough to stop the spread of future diseases, which may not be the same as the ones we saw in the past. As the world becomes more connected, the dangers increase. Are people in western countries safe because of higher quality health systems? Countries like the U.S. have highly skewed networks of social interactions **with** some very highly connected individuals that can be “superspreaders.” The chances of such an individual becoming infected may be low but events like a mass outbreak pose a much greater risk if they do happen. If a sick food service worker in an airport infects 100 passengers, or a contagion event happens in mass transportation, an outbreak could very well prove unstoppable.

### Thus, the advocacy:

#### We affirm that the appropriation of outer space by private entities is unjust. To test the resolution, we will defend a ban on nongovernmental space activity, or any activity in space without the active participation of one or more governments as a clarification of Article 6 of the Outer Space Treaty. CX checks all theory violations --- ask us to specify something and we will. Listner 17 Michael J. Listner, June 6, 2017, Space News. A reality check on Article VI and private space activities <https://spacenews.com/a-reality-check-on-article-vi-and-private-space-activities/> .

The following summation will attempt to clarify the legal nature of private space activities and their relationship to international law. 1. Outer space activities by non-governmental entities is not a right, fundamental or otherwise. **Non-governmental space activities** (activities performed by private citizens) is not a right, but **it is a private interest**. A “private interest” is, in effect, a privilege granted by an executive authority. A private interest is sometimes granted ancillary to a “right” with the caveat the private interest is subject to oversight of the authority granting it. For example, there is a fundamental right to free movement and, ancillary to that right, the individual states through their 10th Amendment rights and their executive agents grant the private interest of operating motor vehicles on state roads and highways. However, if you break the traffic laws, and/or get a certain number of points on your license, a state can revoke the privilege of operating a motor vehicle. A private interest cannot be deprived without due process, and the same is true for the private interest of performing private space activities. 2. **Article VI creates a right in the State to allow non-governmental entities to perform space activities subject to authorization** and continuing supervision. Article VI of the Outer Space Treaty reads in part: “The activities of non-governmental entities in outer space, including the Moon **and** other celestial bodies, shall require authorization and continuing supervision by the appropriate **State** Party to the Treaty.” Article VI gives or otherwise permits a State to allow private space activities subject to **their discretion**, and obligates the State to authorize and supervise those activities not through a fundamental right but through a private interest subject to government supervision. The operative legal term in Article VI is “shall,” which creates a legal duty when used in a legal document like a treaty. Specifically, the term “shall” in Article VI creates a mandatory legal duty for the State to authorize and continually supervise private space activities. **This does not mean a State** like the United States **is compelled to authorize a private space activity** but rather permits a State to allow non-government entities to perform space activities. Article VI does not create the authorization as a matter of right to non-governmental entities nor does it prohibit private/commercial space activities. Additionally, the phrase “…by the appropriate State Party…” creates the obligation in the State to grant the authorization should it choose to permit non-governmental entities to perform space activities. 3. The duty to “authorize” and “supervise” is a power delegated to the federal government by the Constitution. The rights and duties created in Article VI are imputed to the federal government of the United States via Article VI of the United State Constitution: “This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; [emphasis added] and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.” As the United States ratified the Outer Space Treaty, **the provisions of that treaty, including Article VI, have the same legal effect as a** federal **statute** passed by Congress. The legal duties within the Outer Space Treaty are for the State, in this case the United States. The effect of a ratified Outer Space Treaty and Article VI of the United States Constitution creates the duties to “authorize” and “supervise” in Article VI of the Outer Space Treaty, which makes it a power delegated to the federal government by the Constitution. This means the federal government has a right, and a duty subject to that right, to approve non-governmental outer space activities through a licensing process or other means 4. The legal duties to “authorize” and “supervise” the outer space activities of non-governmental entities are duly executed by the National Space Policy and the United States Code. The federal government is **empowered by international law** through Article VI and the United States Constitution to “authorize” and “supervise” the activities of nongovernmental entities. The legal duties in Article VI have been duly executed through both the National Space Policy starting with National Security Decision Directive Number 42 (July 4, 1982 National Space Policy) and the Commercial Space Launch Act of 1984 (Public Law 98-575, enacted October 30, 1984). Subsequent national space policies and legislation have amended the original domestic execution of duties in Article VI and can be found in the United States Code via Title 51, Chapter 509, 513 and the Code of Federal Regulations 14 C.F.R. ch. III, parts 415, 420, 431 and 435

#### The plan solves and a regulatory framework is uniquely key Skibba 21 Ramin Skibba, July 26, 2021, Salon. It’s time for a new international space treaty. <https://www.salon.com/2021/07/26/its-time-for-a-new-international-space-treaty_partner/> //AHS

All that is to say, things have changed considerably in the more than half century since international space diplomats hammered out the Outer Space Treaty, the agreement that continues to serve as the world's basic framework on international space law. **Before** space **conflicts erupt or collisions** in the atmosphere **make space travel unsustainable** — and before pollution irreversibly tarnishes our atmosphere or other worlds — **we need a** new international rulebook. It's time for the Biden administration to work with other space powers and negotiate an ambitious new space treaty for the new century. **The Outer Space Treaty** was deliberately written ambiguously. It outlaws nukes and other weapons of mass destruction being deployed in space, but makes no mention of lasers, missiles, and cyber weapons. The accord appears **to ban private property in space** and states that no nation can claim a piece of space or lunar territory as their own, but it does not explicitly restrict the extraction of resources like water and minerals. **The Moon Agreement**, which went into force in 1984, **went further**. It states that countries are required to inform others if they have spacecraft entering the same orbit. It declares that the exploration and use of the moon must be done for the benefit of everyone. Under the agreement, Moon explorers have to take care of the lunar environment as well. And importantly, it forbids the claiming of extraterrestrial resources as property. **However, only 18 countries are party to the sweeping treaty, none of them space-faring nations.** In recent years, policies on space law have taken an industry-friendly turn, particularly in the U.S. The Obama administration signed the U.S. Commercial Space Launch Competitiveness Act of 2015, also known as the Space Act, which, in theory, allows American companies to mine the moon and other celestial bodies however they wish and to keep the resources. Other countries, like Luxembourg, have followed suit. In 2020, the Trump administration went further, proposing the industry-friendly Artemis Accords, an attempt to further push the case for granting companies property rights in space. The accords comprised bilateral agreements with just 12 countries — notably without Russia and China, and without the involvement of the United Nations or any other international institution — putting them outside international space law. More than half a century after humans first set foot on the moon, there remains no **clearly established**, agreed-upon **rules governing space activity**. **In the absence of such a framework**, the U.S. has embraced a de facto "launch first and ask questions later" strategy. The lack of international cooperation is one reason engineers were so caught off guard in 2019, when satellites launched by SpaceX and the European Space Agency nearly crashed into one another. **Experts** in space law **can't even agree on** major questions such as **what kind of responsibility space actors have to keep space** clean and **uncontaminated with debris**, as there's really no framework in place. The Biden administration has so far focused its space policy not on treaties but on "norms," non-legally binding principles that they hope will evolve into international agreements with teeth. But it's hard to imagine that enforceable international space policies will be adopted unless Biden explicitly and enthusiastically calls for them, while urging Russian and Chinese leaders to do the same. More likely, whatever endeavors the space industry and military decide to pursue will retroactively become policy. This is already playing out in debates about the private harvesting of resources from the moon and asteroids, the types of spacecraft companies can put in orbit, and the kinds of space and anti-satellite weapons militaries can develop. **If we** were to design a new space treaty that would **preserve space** primarily **as a place for exploration and collaboration rather than** for war and **commercial gain**, what would it look like? **It would coordinate travel** and limit traffic in busy orbits in the atmosphere while also taking steps to **limit the creation of space debris**. (Cleaning up the mess already clogging low-Earth orbit is another story entirely.) It would also build on the Moon Agreement, prohibiting the deployment and testing of weapons — including electronic weapons — in the atmosphere. And it would prohibit deploying and testing any weapons in space, not just on the moon or other celestial bodies. It would create an independent, international organization to review proposals for mining resources and establishing colonies on the moon, Mars, and beyond. This sounds ambitious — and it is — but **it's achievable**. The Antarctic Treaty of 1961 enshrines many of the same principles for activity on Antarctica, and it still works six decades later. Public opinion on space seems to be shifting, too, **with growing calls to jettison colonialist views of space exploration in favor of** more **egalitarian approaches**. If scientists, non-governmental groups, space environmentalists, and other stakeholders put pressure on the Biden administration, it could become politically feasible for the president to take a stand and jumpstart space diplomacy with the U.S.'s rivals. To the extent that **it would help make space exploration sustainable, peaceful, and beneficial to all humanity, it would be worth the cost** in political capital. We only have one atmosphere, one moon, and one night sky to cherish.