## 1AC – KCI – Round 4

### Overview

#### 50 years after the space race between the USSR and US, Earth is once again looking to the starts. However, the competition is no longer spearheaded by Khrushchev and Kennedy, but rather, Musk and Bezos, and the goal is no longer to get to space and back – it’s to stay there. In response to the private sectors fixation on taking Maifest Destiny beyond the atmosphere, I affirm **Resolved: The appropriation of outer space by private entities is unjust**

### Definitions

#### To understand what this truly means, I need to define some key words in the resolution.

#### First, “appropriation” in the context of space means claim of sovereignty, use, or occupation

**UN Outer Space Treaty ’67** (United Nation Outer Space Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies of 1967, Article II. [https://www.unoosa.org/pdf/publications/STSPACE11E.pdf Signed 27 January 1967](https://www.unoosa.org/pdf/publications/STSPACE11E.pdf%20Signed%2027%20January%201967)) // ELog

Article II Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

#### I’ll defend that colonization of space would be an appropriation – colonizing would probably require a claim of sovereignty, and definitely require use and occupation

#### Second, private entities include individuals and all types of private groups, but excludes governments

**US Code ‘47** (US Code, Title 6, Chapter 6, Subchapter I, Section 1501. Definitions <https://www.law.cornell.edu/uscode/text/6/1501#15_A> Enacted by Congress 1947) // ELog

(15)Private entity (A)In general Except as otherwise provided in this paragraph, the term “[private entity](https://www.law.cornell.edu/definitions/uscode.php?width=840&height=800&iframe=true&def_id=6-USC-625312480-168358316&term_occur=1&term_src=title:6:chapter:6:subchapter:I:section:1501)” means any [person](https://www.law.cornell.edu/definitions/uscode.php?width=840&height=800&iframe=true&def_id=6-USC-991716523-125484930&term_occur=169&term_src=title:6:chapter:6:subchapter:I:section:1501) or private group, organization, proprietorship, partnership, trust, cooperative, corporation, or other commercial or nonprofit entity, including an officer, employee, or agent thereof. (B)Inclusion The term “[private entity](https://www.law.cornell.edu/definitions/uscode.php?width=840&height=800&iframe=true&def_id=6-USC-625312480-168358317&term_occur=4&term_src=title:6:chapter:6:subchapter:I:section:1501)” includes a [State,](https://www.law.cornell.edu/definitions/uscode.php?width=840&height=800&iframe=true&def_id=6-USC-80204913-794772950&term_occur=193&term_src=title:6:chapter:6:subchapter:I:section:1501) [tribal,](https://www.law.cornell.edu/definitions/uscode.php?width=840&height=800&iframe=true&def_id=6-USC-865479038-2019934296&term_occur=3&term_src=title:6:chapter:6:subchapter:I:section:1501) or [local government](https://www.law.cornell.edu/definitions/uscode.php?width=840&height=800&iframe=true&def_id=6-USC-801009210-2019934304&term_occur=3&term_src=title:6:chapter:6:subchapter:I:section:1501) performing utility services, such as electric, natural gas, or water services. (C)Exclusion The term “[private entity](https://www.law.cornell.edu/definitions/uscode.php?width=840&height=800&iframe=true&def_id=6-USC-625312480-168358317&term_occur=5&term_src=title:6:chapter:6:subchapter:I:section:1501)” does not include a [foreign](https://www.law.cornell.edu/definitions/uscode.php?width=840&height=800&iframe=true&def_id=6-USC-677674796-125484930&term_occur=133&term_src=title:6:chapter:6:subchapter:I:section:1501) power as defined in [section 1801 of title 50](https://www.law.cornell.edu/uscode/text/50/1801).

#### This means what governments can and cannot do in space is irrelevant to this debate – it is a question only of what private entities can do and how just it is

#### The resolution asks whether appropriation is unjust – that’s defined by Oxford Languages as “not based on or behaving according to what is morally right and fair.” (<https://www.google.com/search?q=unjust+definition&oq=unjust+definition&aqs=chrome..69i57j0i512l4j0i22i30l5.4449j1j4&sourceid=chrome&ie=UTF-8>)

#### This means it is not the Affirmative’s burden to prove that a world where private entities do not appropriate space is achievable, but rather, the such a world would be preferable to one where they did appropriate space

### Value/Value Criterion

#### However, deciding what is morally right or fair is seems so subjective. How are we meant to evaluate it? That’s where the value and value criterion come in.

#### The value, or way to decide what is morally right, is life – the biological state of being alive. Staying alive is intrinsically good, materially quantifiable, and a precondition to all other moral questions, so it should be how you evaluate the round.

#### The value criterion, or how you evaluate how best achieves the value of life, is reverse utilitarianism – attempting to achieve the minimum amount of suffering. This is measurable and prioritizes the greatest good, but also ensures that nobody is left behind.

#### Combined, my value and value criterion means you’ll evaluate the round based on who can avoid the most death

### Advantage: Anticolonization

#### This means you will affirm the resolution – private corporation are determined to set up colonies in space, which creates a multidate of adverse impacts that ultimately lead to unnecessary and preventable death. Let’s look at each part in more detail.

#### First, private space colonization coming now – Musk has feasible plans for Mars missions by 2024 and colonies by 2050

**Cosmical ’21** (The Cosmical; Blog specializing in and sharing information about extraterrestrial topics. “This is How Elon Musk Plans to Colonize Mars” <https://thecosmical.com/this-is-how-elon-musk-plans-to-colonize-mars/> 14 November 2021) // ELog

The power of ‘why’ and the power of serving a strong purpose has always made it possible for mankind to achieve the improbable. This reason for being must not be underestimated as it lends way to innovating the ‘how’. Unmistakingly, Elon Musk knows his why. So, how does he plan to colonize Mars? Would it even be possible? Farfetched as it may seem – after all, humans are still clueless about roughly 65% of the Earth’s surface underwater – how are we to know the rule book for surviving on Mars? Well, look no further. Musk has on several occasions proposed possible scenarios for the colonization of Mars. I have compiled a list of these occasions to make a one-stop-shop for everything you need to know about surviving on the Red Planet. 1. Transportation Self-evident as it may be, transportation is the lifeline of any project to transform Mars into our second home. It literally makes or breaks the plausibility of colonizing Mars. As mentioned previously, Musk plans to drastically reduce the cost for launching rockets down to US$10 per kilogram of weight, which is essential to making the trip to Mars possible. So, what does it exactly take for us to reach that level of cost-efficiency? The answer is reusable rockets. Unlike NASA’s old inefficient single-use rockets, SpaceX stresses the importance of reusability. Not only will this be more environmentally friendly, cause you know, we aren’t throwing around space debris and all, but it enables SpaceX rockets to become more efficient in terms of cost and time. Elon Musk aims to launch at least three reusable Starship space shuttles per day, with each shuttle carrying at least 100 tons of payload each flight. This establishes an estimate of transporting 100,000 tons of cargo with the help of 1000 Starships on a yearly basis. Elon Musk has also noted that 1000 Starships will allow for the transport of approximately 100,000 people every 26 months. 26 months serves as the length of the Earth-Mars orbital sync, which suggests the amount of time it takes for the Earth and Martian orbits to align best for transportation. (1) But why exactly does a fleet of starships need to carry at least 100,000 people every 26 months? These numbers seem a little too specific to be a coincidence. As it turns out, Musk has formulated that in order for the Mars Colony to be self-sustainable, there must at least be one million people present. The number one million exists as the population wherein people can build, manufacture, and produce anything to survive without the reliance on supplies from Earth. (4) Currently, SpaceX is developing the BFR, also known as the Big Falcon Rocket(or the Big F\*\*king Rocket, as per the internet), which is a 25-story monster that can support loads up to 1000 tons. The Raptor engine has been developed and manufactured by SpaceX to power the BFR. While one Raptor is already capable of lifting 172 cars, which equates to an entire Boeing 747, one can only imagine the amount of thrust from the BFR that houses 42 powerful Raptors. This design has been brought to life the BFR is expected to house not only the crew and life support, but also theatres, restaurants, lecture halls, and zero gravity game centers. (4) Payload is one thing, but without fuel or energy, the BFR isn’t going anywhere. Elon Musk and SpaceX have collectively presented their support for utilizing the frozen polar ice caps on Mars to refuel the Starships, which enables them to travel to the Red Planet without carrying the fuel required for the trip back to Earth. This would be made possible by converting water and carbon dioxide in the polar ice caps to liquid methane and liquid oxygen, which act as proponents of fuel for the Starship’s engines. (7) Although promising, it has been noted that the aforementioned are only sketches of the future for now. In the present, SpaceX has only been focused on developing interplanetary transportation that is both safe and cost-efficient. Projects for creating human habitats on Mars have been given lower precedence. However, SpaceX has confirmed they are without a doubt on the right trajectory towards that inevitable possibility. 2. Supplies All things considered, humans will not be the only passengers of the starships. Cargo is also an integral part of any mission. From the bare necessities to the movie theatres, and let’s not forget Vitamin C… which is all considered to require additional space and money for transport! Vitamin C was provided by Musk as a stark example for what might not be as significant when compared to necessities like food, water, oxygen, and shelter, but is still essential nonetheless. As a resource that’s not readily available, Vitamin C is required if the inhabitants of Mars do not want to die a sailor’s death (scurvy). Elon Musk has more than once emphasized that one of the keys to unlocking the colonization of Mars is the ability for the colony to achieve self-sustainability. The reason behind this obsession lies in the eventuality that if supply ships were not able to reach Mars due to unforeseen circumstances, the colony must be able to provide enough sustenance for its citizens. How much time it will take a colony to achieve full self-sustainability is still very much up in the wind. As such, it’s of utmost importance to map out what resources are needed before every expedition. In terms of Vitamin C, Musk estimates that it will take a thousand starships to transport approximately one million tons of Vitamin C to ensure that no one dies a slow, painful death. (1) For the first few runs, SpaceX has planned two uncrewed missions to send cargo such as life-support systems and power generators, which are essential for human habitation. After the initial missions, SpaceX plans to send two additional cargo ships to set up a propellant production plant, but this time with a crew. This propellant production plant will ultimately be used to transform water and carbon dioxide into rocket fuel, which maximizes cargo space by reducing the amount of fuel each starship has to carry for the return trip. 3. Terraforming Mars, as we know it, is a planet with harsh and uninhabitable terrain. There is barely any oxygen or water, and did I mention the crazy dust storms? Mars may be uninhabitable for now, but scientists, and yes, Elon Musk, believes that through the process of terraforming, humanity just might have a second home in space. Musk has formulated many methods for terraforming Mars, but there was one that unfortunately stood out from the rest. If you haven’t guessed it, this boisterous plan of his was to NUKE Mars. Now, comical as it seems, it does hold its own water in the scientific domain. Before you complain about my wonderful sense of humour, hear me out first. ‘Water’ was not a typo. Musk hopes the nuking of Mars’ polar caps would release both water vapour and carbon dioxide into the Martian atmosphere, which by emulating a greenhouse-like effect that would slowly increase Mars’ surface temperature. (5) Nonetheless, scientists considered this plan to be quite infeasible. As, for one, the number of nukes needed would exhaust all nuclear warheads on Earth today. Another issue was the concern of there not being sufficient carbon dioxide present in the Martian atmosphere, even after the polar ice caps get absolutely obliterated to emulate a greenhouse-like effect effectively. Many brains later, a conclusion was reached that terraforming Mars was just not possible with the technology of today. (8) But with everything considered, this has not stopped SpaceX from attempting to formulate new ideas on terraforming Mars. For example, one possible solution that has been very popular even beyond niche groups is the implementation of glass domes on the surface of Mars. Glass domes are the supposed self-sustaining domes with their own source of water, oxygen, and food. These domes were also expected to act as neighbourhoods and contain centres for leisure and work. And to quote Musk, the domes would “have an outdoorsy, fun atmosphere,” having the perks of not requiring space suits. Food in this habitat would also be grown on solar-powered hydroponic farms located underground or within enclosed spaces. (1) However, like most things relating to Mars, experts believe that this is hardly possible with our current technology. Ultimately, Elon Musk has acknowledged the impossibility that we would be able to experience the terraforming of Mars in our lifetime. However, Musk has assured the public that even without terraforming, human colonies on Mars can and will be established within this generation, which is also his current and final goal. (8) 4. The Legal Side of Things Like all things, the very concept of colonizing Mars does not escape the normality of ethics. Given the establishment of space law concerning the [Agreement Governing the Activities of States on the Moon and Other Celestial Bodies](https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/intromoon-agreement.html), SpaceX Mars has also deemed Mars a free planet and, therefore, has rules and legislations of its own, disparate from Earth. Elon Musk has openly proposed that there will be no Earth-based government asserting its authority and sovereignty of Martian activities. However, he has also stated that the government on Mars would be a “direct democracy” and would have less complex laws than Earth. Beyond Imagination: Is It Profitable? Beyond the lack thereof technology and volunteer participants, there will always be one thing at the back of our human brains: Is the colonization of Mars profitable? No matter how self-sustaining the Martian colonies will be, as long as it requires more money than it will make us, the whole idea is inevitably moot without investors. Arguments have been made that not only is Mars distant, has a hostile environment, and is difficult to access, but it also has no apparent valuable export, thus making it highly unprofitable. Elon Musk has also confirmed that trading mined minerals to Earth is not profitable enough to justify the transportation costs. (6) On the flip side, Musk has also made efforts to propose intellectual property as Mars’ primary export. But even still, without having total cost estimates for the process of colonization, this would mean that we and any investors could only hope for the best: a profitable and sustainable Martian colony. Unless a Martian colony can create its own value, governments and enthusiasts would need to pay out of pocket for this advancement in human civilization. The Internal Monologue: Why Do We Need To Go? Why do we need to go to Mars? Why can’t we stay on Earth and live our lifetimes to the fullest? Why must we seek a challenging, dreary, and frankly very costly path? In an interview with The Guardian, Elon Musk has revealed some of his reasons for showing such a deep interest in colonizing Mars; one of which is the preservation of the human species. (9) With ever-present nuclear tensions, Musk explained that due to distance, in the event of a third world war or nuclear warfare, humans on Mars can continue to live and reproduce, even without help from Earthlings. (9) Musk has also been alarmed by the lack of regulations regarding artificial intelligence, which can lead to a possible war between and within the superpowers of the world. Morbid situations aside, the increasing interest of rich Earthern populations for interstellar tourism, especially with the advances made by SpaceX to the Starship’s cost-efficiency, the creation of a Mars colony becomes a lot more attractive. Curiosity for Innovation: Three Frequently Asked Questions about the Colonization of Mars 1. When can we expect missions to Mars by SpaceX? Elon Musk and SpaceX have revealed their rough timeline with plans for a cargo-only mission in 2022, a cargo and crew mission in 2024, and then a million people to Mars by 2050. However, doubts cast upon these plans as SpaceX has yet to prove that it can land and launch Starship missions to Mars safely. (1, 7)

#### Second, the 1967 Outer Space Treaty restricts lunar development for states, but doesn’t apply to corporations – this means private entities are the only route to space colonization, and if they don’t do it, nobody will

**Stockwell ’20** (Samuel Stockwell; Research assistant at RAND Europe working in defense, security and infrastructure. “Legal ‘Black Holes’ in Outer Space: the Regulation of Private Space Companies” <https://www.e-ir.info/2020/07/20/legal-black-holes-in-outer-space-the-regulation-of-private-space-companies/> 20 July 2020) // ELog

On 30th April 2020, NASA – the US government’s space agency – awarded three private space companies a jointcontract worth $967m to complete a lunar mission by 2024, in what was celebrated as “the last piece that [America] need[s] in order to get to the moon” by NASA administrator Jim Brindestine (The Telegraph, 2020). Yet, whilst this development was widely covered in the media, less coverage has focused on the extent to which existing international legislation surrounding outer space endeavours appropriately applies to private entities. Indeed, the prospect of a corporate foothold within the extra-terrestrial domain has thrown up both a mixture of optimism and concern regarding the potential benefits of expanding capital projects into space (Adolph, 2006; Dickens & Ormrod, 2007). By adopting the 1967 UN Outer Space Treaty (OST) as an analytical framework in relation to the rise of the so-called US ‘NewSpace’ actors, this essay argues that there are significant legal ambiguities regarding the status of private space companies in orbital space. Such loopholes allow the US government to circumvent its own obligations to the OST, whilst simultaneously undermining the notion of space as a ‘global commons’ through a commodification process. The lack of specificity within the OST surrounding private property rights over extra-terrestrial resources risks the prospect of reinforcing Earth-bound wealth inequalities and US dominance in space, by restricting the potential economic benefits for the broader global citizenry in favour of a narrow class of wealthy American investors. Moreover, the OST’s weak clause regarding the regulation of space surveillance risks the incentivisation of a ‘global panopticon’ network of US satellites. The rise of dual-use technology is blurring the boundaries between military and civilian observations, raising serious ethical concerns over the nature of US space-based data collection. Finally, the increasing number of private satellite constellations is facilitating the possibility of cataclysmic space debris collisions which could exacerbate geopolitical tensions. Such developments are also contributing towards the contamination of the broader space environment in ways that the OST had never envisioned. The UN Outer Space Treaty and Rise of the ‘NewSpace’ Actors Although ratified into international law in 1967, the UN Outer Space Treaty (OST) is perhaps still the most relevant piece of legislation for analysing state and non-state entity activity in outer space. Designed to prevent both the militarisation of space and national appropriation of celestial bodies at the height of Cold War tensions, the UN OST holds significant influence as a form of customary international law (Hebert, 2014: 6). Ratified by over 100 nations – including major spacefaring nations such as the United States, Russia and China – the treaty is widely accepted as an authoritative document and has formed the basis for all other space treaties that have succeeded it (Kramer, 2017: 129). This is in contrast to more recent legislation such as the 1972 Moon Treaty designed to promote cooperation in Moon exploration and development, which the US and other major space superpowers have refrained from signing (Adolph, 2006: 968-969). The type of American actors becoming involved in the realm of outer space has undergone significant diversification. Despite working alongside NASA since the 1950s, commercial enterprises were largely confined to the manufacturing of parts utilised in rockets and other equipment for space activities (Lal, 2016: 63-66). However, the continuous sharp decline in NASA’s overall budget that has occurred since the Apollo 11 moon landing, and the increasing trends towards the privatisation of government functions has drastically altered both the capabilities and the outlooks of private space companies. Indeed, although the space economy is growing overall, global government spending decreased by 1.3% between 2012 and 2013 while commercial-sector growth increased by roughly 7% (Conklin, 2017: 33). Central to the impetus behind this private sector space boom has been the emergence of the socalled ‘NewSpace’ actors – “a broad range of primarily US-based entrepreneurs… who, for more than 30 years, have aimed to commercialise space” (Valentine, 2012: 1046). Driven by a libertarian outlook of economics, and critical of NASA’s historical grip on space exploration, these individuals portray themselves as the pioneers of the ‘final frontier’ who will save humanity from extinction through privately-funded extra-terrestrial missions (Kearnes & van Dooren, 2017: 182). Near-Earth Object and Lunar Resource Mining: US Private Property in Space Lunar rock samples from the Apollo missions containing rare Earth resources, such as Helium-3 which produces more power and less waste than traditional nuclear reactors on Earth, have since fuelled incentives for extraterrestrial resource mining (Brearley, 2006: 44-46). This was further facilitated by suggestions that near-earth objects (NEOs) like the so-called ‘Anteros asteroid’ could comprise of over five trillion dollars’ worth of magnesium silicate and aluminium (Kramer, 2017: 131). Envisaging appropriation concerns that might arise from the future extraction of space assets by spacefaring nations, Article II of the UN OST declared that: “Outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means” (UN, 1967). The emphasis on claims of national sovereignty were intimately tied to the Cold War context at the time, where space activities were under the exclusive monopoly of governmental agencies and initiated for goals of military dominance or national prestige (Sachdeva, 2017: 210). However, the privatisation of the space industry that has occurred since the 1980s has meant that the legislation leaves an enormous amount of legal ambiguity and interpretation regarding the regulation of private resource mining in space. As Shaer (2016) demonstrates, the Article II provision fails to address either the exploitation of space for financial gain or the property claims of commercial enterprises (Shaer, 2016: 47). Nevertheless, Article VI of the UN OST asserts that: “States shall be responsible for national space activities whether carried out by governmental or non-governmental entities” (UN, 1967; own emphasis). Some scholars have suggested that this clause significantly restrains the activities of private space corporations by incentivising states to regulate their domestic organisations for fear of liability concerns (Abeyratne, 1998: 168). However, the US government recently enacted a piece of legislation which exploited this clause, in order to circumvent its own restrictions and strengthen US economic influence in space. The passage of the 2015 SPACE Act enabled US citizens to privately “possess, own, transport, use, and sell the resources” they obtain in outer space, whilst making careful consideration to deny national sovereign claims over such materials (Leon, 2018: 500). Yet, regardless of whether it is an American private company or public venture, the US is still satisfying its geopolitical interests; by exclusively siphoning off extra-terrestrial resources for American gain, the nation’s soft power is thereby extended at the expense of spacefaring adversaries such as China (Basu & Kurlekar, 2016: 65). Indeed NewSpace actors cleverly played on these strategic concerns prior to the bill’s passage, with billionaire space entrepreneur Robert Bigelow asserting that the biggest danger wasn’t private enterprises on the Moon, but that “America is asleep and does nothing, while China comes along… surveying and laying claim [to the Moon]” (Klinger, 2017: 222). The US government’s support for private space companies is also likely to lead to the reinforcement of Earth-bound wealth inequalities in space. Many NewSpace actors frame their long-term ambitions in space with strong anthropogenic undertones, by offering the salvation of the human race from impending extinction through off-world colonial developments (Kearnes & Dooren: 2017: 182). Yet, this type of discourse disguises the highly exclusive nature of these missions. Whilst they seem to suggest that there is a stake for ordinary citizens in the vast space frontier, the reality is that these self-described space pioneers are a member of a narrow ‘cosmic elite’ – “founders of Amazon.com, Microsoft, Pay Pal… and a smattering of games designers and hotel magnates” (Parker, 2009: 91). Indeed, private space enterprises have themselves suggested that they have no obligation to share mineral resources extracted in space with the global community (Klinger, 2017: 208). This is reflected in the speeches of individuals such as Nathan Ingraham, a senior editor at the tech site EngadAsteroid mining, who claimed that asteroid mining was “how [America is] going to move into space and develop the next Vegas Strip” (Shaer, 2016: 50). Such comments highlight a form of what Beery (2016) defines as ‘scalar politics’. In similar ways to the ‘scaling’ of unequal international relations that has constituted our relationship with outer space under the guise of the ‘global commons’ (Beery, 2016: 99), private companies – through their anthropogenic discourse – are scaling existing Earthbound wealth inequalities and social relations into space by siphoning off extra-terrestrial resources. By constructing their endeavours in ways that appeal to the common good, NewSpace actors are therefore concealing the reality of how commercial resource extraction serves the exclusive interests of their private shareholders at the expense of the vast majority of the global population.

#### Third, space colonization, especially by private entities, is bad for two main reasons:

#### The first reason is disease:

#### Space creates stronger diseases, weaker immune systems, and doesn’t have medical support – disease is a guarantee

Maynard ‘20 (James Maynard, is the editor of 2 publications, Cosmic Companion and Alexandria Science, March 20 2020, “Disease in Space — What Will We Do?”, Medium, <https://medium.com/the-cosmic-companion/disease-in-space-what-will-we-do-830639acfffd>, accessed 7/17/2021) TK

Influenzaandmicrobes like coronavirus couldquickly work their way throughacrew isolated together in the depths of space. “The absence of gravity precludes particles settling down, so they stay suspended in the air, and could be more easily transmitted. To prevent this, compartments are ventilated and the air HEPA filters would remove particles,” Jonathan Clark, a former six-time crew surgeon for NASA’s Space Shuttle program, stated. A 2012 study examining health records of 742 astronauts who flew on 106 flights revealed 29 cases of disease transmission, including fungal, urinary tract, and skin infections, as well as the flu. “For reasons scientists have not quite figured out, the immune system can go on the fritz in space: wounds heal more slowly; infection-fighting T-cells send signals less efficiently; bone marrow replenishes itself less effectively; killer cells — another key immune system player — fight less energetically. At the same time, the pathogens grow stronger, developing thicker cell walls, greater resistance to antimicrobial agents and a greater ability to form so-called biofilms that cling to surfaces,” Jeffrey Kluger reported in Time Magazine. Physical changes caused by radiation may present problems keeping astronauts and space colonists healthy. Another challenge for space travelers is that dormant viruses, like herpes simplex, can reawaken during space travel. Visitors have spent a year or more aboard the International Space Station. Colonists on the Moon or Mars would stay even longer, increasing health issues including sleep deprivation, even without an epidemic. Without proper sleep, and suffering from high stress levels, space travelers could be even more susceptible to infections their bodies may have fought off at home. “The types of problems you may encounter are a decline in mood, cognition, morale, or interpersonal interaction. You could also develop a sleep disorder because your circadian rhythm might be thrown off due to the 38 extra minutes each day on Mars, or by a small, noisy environment, or the stress of prolonged isolation and confinement,” NASA’s Human Research Program suggests.

Just as on Earth, isolation and containment of those potentially infected by a disease. The International Space Station is equipped with high-efficiency particulate air (HEPA) filters, and containment masks are available for infected residents of the ISS. Following any sort of infection, space travelers could be quarantined after returning to Earth, as they were in the early days of human space travel. Future colonies on the Moon or Mars will, almost certainly, have similar facilities for lessening the reach of outbreaks like the one currently engulfing our planet. Answers to the challenges of epidemics on Earth — much less on lunar or Martian colonies — remains unanswered. And, viruses are more likely to spread, and be harder to treat, in space than they are on Earth. But, many of the same treatments and procedures that we employ on Earth to limit the spread of disease and to flatten the curve of infections would also likely play significant roles in protecting colonists exploring the Solar System. As we expand out into the solar system, epidemics are bound to follow us. But, even today, we are already protecting the explorers who are pioneering our quest to reach beyond the confines of our planet.

#### The second reason is debris:

#### Private space ventures lead to tons of new debris

**McCoustra ’20** (Martin McCoustra; Chair in Chemical Physics at Heriot-Watt University. “Space junk: Astronomers worry as private companies push ahead with satellite launches” [https://theconversation.com/space-junk-astronomers-worry-as-private-companies-push-ahead-with-satellite-launches-137572 13 May 2020](https://theconversation.com/space-junk-astronomers-worry-as-private-companies-push-ahead-with-satellite-launches-137572%2013%20May%202020)) // ELog

Since the launch of Sputnik 1 in 1957, the lower orbit around the Earth has become an increasingly congested environment with more than 2,200 satellite launches to date. Those satellites – along with launch vehicle components and debris from mechanical disintegration, collisions and explosions – now fill this region with a “fog” of space debris. And it’s getting busier. In the last few weeks, SpaceX [has launched 60 new satellites](https://www.space.com/space-starlink-satellites-launch-rocket-landing-success-april-2020.html) as part of its Starlink programme. This brings the total to currently around 400 Starlink satellites in low Earth orbit as part of a programme that aims to bring cheap, satellite-based internet access to everyone. Eventually, this programme could place nearly 12,000 satellites in orbit around the Earth. With Amazon, Canada’s [Telesat](https://www.telesat.com/services/leo/phase-1) and others [planning satellite constellations](https://www.cnbc.com/2019/12/14/spacex-oneweb-and-amazon-to-launch-thousands-more-satellites-in-2020s.html) of similar scale, low Earth orbit is becoming ever more crowded. The debris ranges in size from a few microns to many metres. [Stuart Grey](https://www.stugrey.com/), an aerospace engineer at the University of Strathclyde, has produced a stunning visualisation that highlights the more than 20,000 objects over 10cm in size now orbiting the Earth (see video above). But there are many millions of particles 1mm in size and smaller. Closing our window on the universe? Amateur astronomers are [already expressing concern](https://edition.cnn.com/2020/04/21/tech/starlink-satellites-stargazers-complaints-scli-intl-gbr/index.html) over the increasing number of bright, moving objects in the night sky. But the worry is perhaps much greater for the professionals. Crowding in low Earth orbit has inevitable consequences for ground-based astronomers. Bright surfaces on satellites can reflect rays from the sun – giving rise to a burst of sunlight directed towards the surface of the Earth. Such intense bursts of light are much stronger than the weak light sources typically being observed by astronomers and will impede observations of distant objects in space. Billions have already been spent on existing optical telescopes, and many more billions will be poured into new platforms in the next decade, such as the [European Extremely Large Telescope](https://www.eso.org/sci/facilities/eelt/) being built on the Atacama plateau in Chile. There is intense competition for observing time on such resources, so any potential threat from satellite reflections must be taken seriously as they may make some of the observations driving our understanding of the evolution of the universe impossible. SpaceX has assured the public that Starlink will not contribute to this problem and says it [has been taking steps](https://time.com/5225670/spacex-space-junk-cleaner-launch/) to mitigate the impacts of its satellites on observational astronomy – even to the extent of testing whether a black coating on its satellites can reduce visibility, and adjusting some of the satellites’ orbits if necessary. With some 3% of its planned constellation launched, SpaceX is at least responding to the concerns raised by astronomers. Hopefully other agencies planning satellite constellation launches will also be upfront with their plans to reduce this serious problem to astronomical observation. But crowding in low Earth orbit also has consequences for satellites and other space vehicles, including those designed to carry humans. To achieve orbit, satellites seek a balance between their speed and the effect of Earth’s gravity on them. The speed with which a satellite must travel to achieve this balance depends on its altitude above Earth. The nearer to Earth, then the faster the required orbital speed. At an altitude of 124 miles (200km), the required orbital velocity is a little more than 17,000 miles per hour (about 7.4 km/s). Any object shed by a satellite or other vehicle in orbit will maintain the same orbital speed. Collisions between such objects can therefore occur at combined speeds of potentially up to 34,000 mph at 124 miles (if it is head-on). The effects of such impacts can be serious for astronauts and space stations – as the dramatic opening scenes of the 2013 movie Gravity depict. There is impact shielding on satellites and space vehicles which is designed to stop objects smaller than 1cm crashing into them. At best, the shielding will do so – though the electromagnetic impulse created may interfere with electronic systems. At worst, larger pieces of space junk could penetrate the vehicles. This could result in internal damage and disintegration that threaten the safety of the mission. Space agencies such as NASA and ESA have therefore established [orbital debris research programmes](https://www.orbitaldebris.jsc.nasa.gov/) to observe such debris and develop strategies to control its effects. There is little doubt that, with the increasing use and commercialisation of space, we boost the risk of catastrophic events associated with orbital debris. Agencies, both state and commercial, must recognise this and support efforts to reduce the likelihood of such events by taking steps to remove existing debris and reduce the potential for further debris by removing redundant satellites and other space vehicles. For example the [RemoveDEBRIS satellite](https://www.surrey.ac.uk/news/harpoon-successfully-captures-space-debris) uses an on-board harpoon to capture junk. Only when we resolve the problem of space junk will our window on, and pathway to, space be truly fully open.

#### Debris turns space travel, causes radioactivity on Earth, and risks extinction

**Kaineg ’20** (Sophie Kaineg; J.D Candidate at the UC Hastings College of Law and Executive Production Editor for the Hastings Environmental Law Journal. “The Growing Problem of Space Debris” <https://repository.uchastings.edu/cgi/viewcontent.cgi?article=1588&context=hastings_environmental_law_journal> Published Summer 2020) // ELog

Now that we have a better picture of what creates the problem of space junk, we can examine the consequences. For one, collisions are more likely as more objects accumulate in space.53 These collisions create more debris, meaning operational satellites are in a more dangerous environment, putting valuable property at greater risk of destruction.54 Space debris may also interfere with signals coming from satellites.55 These collisions create more debris, which further increases the likelihood of more collisions.56 As the cycle continues, it becomes “self-generating and thus uncontrollable.”57 Ultimately, if the debris around Earth continues to grow, humans may limit our ability to use outer space for satellites or space travel in the future.58 This situation is known as the Cascade Effect or the Kessler Effect.59 The Cascade Effect is one of the most dangerous threats posed by orbital debris because it represents an existential threat to space travel and utilization of satellites and space in general.60 The fear of the cascade effect results from its conclusion: “collisions will eventually produce an impenetrable debris that will encase Earth.”61 Even small fragments in space can cause substantial damage due to the high speeds of orbit.62 Hugh Lewis, a space debris researcher at the University of Southampton’s School of Engineering Science, noted “you only need something the size of a marble to completely destroy a spacecraft.”63 Because of the long lifespan of space fragments, the Cascade Effect would result in centuries of uninhabitable space.64 Today, space is a rich platform for a plethora of technologies from cell phones, GPS, and weather monitoring, including tracking greenhouse gases, to military strategy and scientific studies, like the ISS.65 If collisions result in an impenetrable debris cloud, these activities and space exploration of any form would be shut down.66 In addition to collisions and the Cascade Effect, space debris may also reenter Earth’s atmosphere and cause damage.67 Debris will eventually return to Earth, usually breaking up into harmlessly miniscule pieces during reentry.68 As larger pieces of debris return to Earth however, there’s a greater danger factor.69 In November 2018, two large objects dropped onto a Myanmar mining facility and destroyed a home.70 One object was barrel-like and about fifteen feet long.71 This incident is a reminder that what goes into space does not just disappear. However, some debris is inherently dangerous regardless of size because it contains radioactive material.72 During the Cold War era, many satellites were built with radioactive components.73 Today, there is an estimated 1,500 kilograms of radioactive material in orbit, which mostly rests in LEO.74 As these materials make their way back onto Earth, the impact sites are at risk for radioactive contamination.75 In fact, this scenario occurred in 1978, when a Soviet satellite reentering Earth’s atmosphere dispersed radioactive debris across Canada’s Northwest Territory.76 Luckily, specialists detected no radioactivity in the surrounding area.77 However, the risk increases as the Cold War era satellites continue to age and reentry to Earth becomes more likely.78

#### To conclude, private entities current goal is to set up colonies in space. This colonization will only bring about devastating space-borne diseases and create tons of new and deadly space debris. However, international legislation makes it so only these private companies can colonize, so in the hypothetical world of the affirmative where private companies stay grounded on Earth, space colonization is impossible, and we are free to thrive on this planet. With that, I open myself up to cross-examination and any points of further clarification