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# Resolution

Resolved: The appropriation of outer space by private entities is unjust.

-----Beginning of Framework-----

Value: Morality

Value Criterion: Utilitarianism

-----End of Framework-----

## Topicality

**In the context of space, “Appropriation” means to take as property. Leasing Does Not Count.**

**Leon 18** (Amanda M., Associate, Caplin & Drysdale, JD UVA Law) "Mining for Meaning: An Examination of the Legality of Property Rights in Space Resources." Virginia Law Review, vol. 104, no. 3, May 2018, p. 497-547. HeinOnline.

**Appropriation.** The term "appropriation" also remains ambiguous. Webster's defines the verb "appropriate" as **"to take to oneself in exclusion of others; to claim or use as by an exclusive or pre-eminent right"**; as, let no man appropriate a common benefit.<sup>165</sup> Similarly, Black's Law Dictionary describes "appropriate" as **an act "[t]o make a thing one's own; to make a thing the subject of property; to exercise dominion over an object to the extent, and for the purpose, of making it subserve one's own proper use or pleasure."**<sup>166</sup> Oftentimes, **appropriation refers to the setting aside of government funds, the taking of land for public purposes, or a tort of wrongfully taking another's property as one's own.** The term appropriation is often used not only with respect to real property but also with water. According to U.S. case law, a person completes an appropriation of water by diversion of the water and an application of the water to beneficial use.<sup>167</sup> This **common use** of the term "appropriation" with respect to water **illustrates** two key points: (1) **the term applies to natural resources-e.g., water or minerals-not just real property, and** (2) **mining space resources and putting them to beneficial use-e.g., selling or manufacturing the mined resources could reasonably be interpreted as an "appropriation" of outer space.** While **the ordinary meaning of "appropriation"** reasonably **includes the taking of natural resources as well as land**, whether the drafters and parties to the OST envisioned such a broad meaning of the term remains difficult to determine with any certainty. **The prohibition against appropriation "by any other means" supports such a reading, though, by expanding the prohibition to other types not explicitly described.**<sup>168</sup>

**Violation:** The Affirmative may not defend a plan that allows leasing since leasing is not considered as appropriation and private property ownership.

### **Standards:**

1. Kills Clash: I can't prep Affirmative cases that are non topical. Ruins debate as an activity because there is no critical discourse.
2. Grounds Skew: This is abusive use of AFF ground that allows them to gain access to a much larger array of arguments. This puts Neg in a corner and limits their access to argumentation.

### **Voters:**

Fairness. Unfair arguments arbitrarily skew your evaluation of the round.

Education's a voter—it's a core value of debate.

### **Drop the debater, because:**

A) Deterrence. Since theory is drop the debater, abuse has decreased

B) Round is skewed- I invested time and altered my strategy

## **1NC - PIC**

**CP: The appropriation of outer space by private companies is unjust with the exception of Copernicus Sentinel-1 and -2 Satellites + SBSP Satellites + Wifi LEOs + O'Neill Cylinders**

**That competes –**

**The resolution/plan is entirely of appropriation, but the PIC is mutually exclusive with the aff's plan because they get rid of ALL private space appropriation, but our counterplan does LESS than the affirmative.**

**We solve for the entirety of the affirmative's case.**

### **CASE 1: The Sentinels appropriate low earth orbit**

- LEO is 2k km or less

### **EO 21**

EO directory (essentially an encyclopedia of all recent satellite launches), Last Updated Oct. 4 2021,

"Copernicus: Sentinel-1," No Publication,

<https://directory.eoportal.org/web/eoportal/satellite-missions/c-missions/copernicus-sentinel-1>, // HW  
AW

As part of the Copernicus space component, the Sentinel-1 (S1) mission is implemented through a constellation of two satellites (A and B units) each carrying an imaging C-band SAR instrument (5.405 GHz) providing data continuity of ERS and Envisat SAR types

of mission. Each Sentinel-1 satellite is designed for an operations lifetime of 7 years with consumables for 12 years. The S-1 satellites will fly in a near polar, sun-synchronized (dawn-dusk) orbit at 693 km altitude. 14)

## **They save mangroves, which reduces tsunami impact by 90%**

### **ESA 21**

European Space Agency (euro intergovernmental org that documents space advancement 7-26-2021, "How satellites save mangroves from space," European Space Agency, [https://www.esa.int/Enabling\\_Support/Preparing\\_for\\_the\\_Future/Space\\_for\\_Earth/How\\_satellites\\_save\\_mangroves\\_from\\_space](https://www.esa.int/Enabling_Support/Preparing_for_the_Future/Space_for_Earth/How_satellites_save_mangroves_from_space), // HW AW

After the 2004 Indian Ocean tsunami, Wetlands International saw that many lives had been spared by something surprising – mangroves. In response the non-profit organisation scaled up its work on protecting and restoring these complex ecosystems. One important tool in their arsenal is images from the Copernicus Sentinel-1 and -2 satellites. Mangroves make up only a small proportion of the world's forest but are vital for humans and nature. They are home to fish, shellfish, birds and mammals. They store more carbon per hectare than rainforests. And they protect coastal communities from extreme weather. As Wetlands International discovered, they can reduce the destructive force of a tsunami by up to 90%. Lammert is an information manager at Wetlands International. He explains: "After the 2004 tsunami we saw that areas with intact mangroves suffered far fewer deaths and less damage than those with lost or damaged mangroves." The Irrawaddy Delta in Myanmar, imaged by the Copernicus Sentinel-2A satellite. Green areas show dense mangrove forest Between 1996 and 2016, around 6.6% of mangroves were lost worldwide. This was down from 1% per year in the 1980s. "Historically, the biggest risk that mangroves face is from conversion to agriculture on the land side, and to aquaculture on the sea side," says Lammert. "But there is also growing pressure from climate change, with rising sea levels starting to overwhelm mangroves and changing rainfall patterns causing some to die off because of a lack of fresh water." The good news is that most can be restored. An online platform called Global Mangrove Watch is providing remote sensing data and tools for coastal and park managers, conservationists, policymakers and practitioners to respond by pinpointing the causes of local mangrove loss and tracking restoration progress. Screenshot from Global Mangrove Watch, showing the location of mangroves Together with Aberystwyth University, soloEO and The Nature Conservancy, Wetlands International is a key partner in Global Mangrove Watch, so Lammert explains how the platform works: "We use satellite data to produce a map of all the mangroves around the world once a year. It currently goes to 2016 but later this year we will release maps up to 2020." But to detect destruction and stop it in time, park managers, conservationists and policymakers need information more immediately. "We also use data from the Sentinel-1 and -2 and Landsat 8 satellites to provide what we call 'change alerts' for Africa. The Sentinels reimage the same location every few days, so once a month we compare their new images with a baseline map. We send out alerts if we see a difference in mangrove cover." Change alerts in Guinea-Bissau The current baseline map was built using 2010 data from the US Landsat and Japanese ALOS satellites, but the team is currently updating it using 2021 data from the Copernicus Sentinels. This higher resolution data will give the new map a resolution of just 10 metres, compared to the current 25 metres resolution. Change alerts have already been used to catalyse action, including in Guinea-Bissau. In March 2019 a Sentinel-2 image showed that an area of mangrove in the country had been significantly destroyed. A closer look revealed that a new dam had been built and was blocking the tide from coming in and out. "We sent people on the ground to the site. They saw that the government had built the dam to turn the mangrove into rice fields. There was nothing that could be done to prevent the transformation, but often in these cases the rice fields are tended for a few years, then the mangroves grow back." Detected changes in the mangrove in Guinea-Bissau (inset: Global Mangrove Watch) overlaid on aerial photograph (Google Maps, 2019). Copernicus Sentinel-2 images showing the change in a mangrove in Guinea-Bissau between 21 March 2018 and 2 March 2021. On 21 March 2019, a dam is visible. Healthy mangrove is shown in orange. The mangrove area is getting steadily greener

between 2019 and 2021, showing that mangroves are dying off. "Our change alerts currently cover Africa, but we will soon be providing them for five of the most mangrove-rich countries, including Mexico and Indonesia. We hope that the alerts will be available for the whole world in the next couple of years." "I want to emphasise how happy we are with the Sentinel images." concludes Lammert. "They are free, high resolution, and available almost immediately after they are taken. This means that we can act quickly to protect and recover mangroves worldwide."

**Climate change induced tsunamis outweigh – coastal agriculture and populations are disrupted, nuclear power plants melt down, mass migration, infrastructure is destroyed**

**VT 18**

Virginia Tech article summarizing tsunami simulations done by Robert Weiss (director of the National Science Foundation-funded Disaster Resilience and Risk Management graduate education program), 8-15-2018, "Climate change sea level rises could increase risk for more devastating tsunamis worldwide: Even minor sea-level rise, by as much as a foot, poses greater risks," ScienceDaily, <https://www.sciencedaily.com/releases/2018/08/180815141444.htm>, // HW AW

As sea levels rise due to climate change, so do the global hazards and potential devastating damages from tsunamis, according to a new study by a partnership that included Virginia Tech. Even minor sea-level rise, by as much as a foot, poses greater risks of tsunamis for coastal communities worldwide. The threat of rising sea levels to coastal cities and communities throughout the world is well known, but new findings show the likely increase of flooding farther inland from tsunamis following earthquakes. Think of the tsunami that devastated a portion of northern Japan after the 2011 Tohoku-Oki earthquake, causing a nuclear plant to melt down and spread radioactive contamination. These findings are at the center of a new Science Advances study, headed by a multi-university team of scientists from the Earth Observatory of Singapore, the Asian School of the Environment at Nanyang Technological University, and National Taiwan University, with critical support from Virginia Tech's Robert Weiss, an associate professor in the Department of Geosciences, part of the College of Science. "Our research shows that sea-level rise can significantly increase the tsunami hazard, which means that smaller tsunamis in the future can have the same adverse impacts as big tsunamis would today." Weiss said, adding that smaller tsunamis generated by earthquakes with smaller magnitudes occur frequently and regularly around the world. For the study, Weiss was critical in helping create computational models and data analytics frameworks. At Virginia Tech, Weiss serves as director of the National Science Foundation-funded Disaster Resilience and Risk Management graduate education program and is co-lead of Coastal@VT, comprised of 45 Virginia Tech faculty from 13 departments focusing on contemporary and emerging coastal zone issues, such as disaster resilience, migration, sensitive ecosystems, hazard assessment, and natural infrastructure. For the study, Weiss and his partners, including Lin Lin Li, a senior research fellow, and Adam Switzer, an associate professor, at the Earth Observatory of Singapore, created computer-simulated tsunamis at current sea level and with sea-level increases of 1.5 feet and 3 feet in the Chinese territory of Macau. Macau is a densely populated coastal region located in South China that is generally safe from current tsunami risks. At current sea level, an earthquake would need to tip past a magnitude of 8.8 to cause widespread tsunami inundation in Macau. But with the simulated sea-level rises, the results surprised the team. The sea-level rise dramatically increased the frequency of tsunami-induced flooding by 1.2 to 2.4 times for the 1.5-foot increase and from 1.5 to 4.7 times for the 3-foot increase. "We found that the increased inundation frequency was contributed by earthquakes of smaller magnitudes, which posed no threat at current sea level, but could cause significant inundation at higher sea-level conditions," Li said. In the simulated study of Macau – population 613,000 – Switzer said, "We produced a series of tsunami inundation maps for Macau using more than 5,000 tsunami simulations generated from synthetic earthquakes prepared for the Manila Trench." It is estimated that sea levels in the Macau region will increase by 1.5 feet by 2060 and 3 feet by 2100, according to the team of U.S.-Chinese scientists. The hazard of large tsunamis in the South China Sea region primarily comes from the Manila Trench, a megathrust system that stretches from offshore Luzon in the Philippines to southern Taiwan. The Manila Trench megathrust has not experienced an

earthquake larger than a magnitude 7.8 since the 1560s. Yet, study co-author Wang Yu, from the National Taiwan University, cautioned that the region shares many of the characteristics of the source areas that resulted in the 2004 Sumatra-Andaman earthquake, as well as the 2011 earthquake in northern Japan, both causing massive loss of life. These increased dangers from tsunamis build on already known difficulties facing coastal communities worldwide: The gradual loss of land directly near coasts and increased chances of flooding even during high tides, as sea levels increase as the Earth warms. "The South China Sea is an excellent starting point for such a study because it is an ocean with rapid sea-level rise and also the location of many mega cities with significant worldwide consequences if impacted. The study is the first of its kind on the level of detail, and many will follow our example," Weiss said. Policymakers, town planners, emergency services, and insurance firms must work together to create or insure safer coastlines, Weiss added. "Sea-level rise needs to be taken into account for planning purposes, for example for reclamation efforts but also for designing protective measures, such as seawalls or green infrastructure." He added, "What we assumed to be the absolute worst case a few years ago now appears to be modest for what is predicted in some locations. We need to study local sea-level change more comprehensively in order to create better predictive models that help to make investments in infrastructure that are or near sustainable."

## CASE 2: Space Based Solar Power is necessary to reduce emissions and solve climate change

**Shtivelman 12** - J.D., Boston University School of Law [Aleksey, 2012, *B. U. J. SCI. & TECH. L. Vol. 18:435*, "SOLAR POWER SATELLITES: THE RIGHT TO A SPOT IN THE WORLD'S HIGHEST PARKING LOT", Hein Online]

\*\*\*edited for gendered language

Rather than spending millions on land-based solar power projects, it would be much more profitable if these nations invested in SBSP satellites for two reasons. First, although SBSP satellites are much more expensive at the outset, the cost of initial investment is returned in a period of time comparable to what it would take to recoup the investment cost of a land-based solar farm. 113 Second, SBSP satellites generate about eight to ten times as much power as land-based solar farms. 114 This means that after one and a half years, SBSP satellites would generate eight to ten times the revenue of a land-based solar farm. As a result, countries that currently rely on coal, nuclear or other types of non-clean, non-renewable energy may look to SBSP for their energy needs, and consequently generate a significant spike in demand for orbital locations on the GSO. This increased demand will raise two issues: (1) whether a GSO orbital slot can be owned and (2) if not, whether there is a way to allocate the right to access GSO orbital slots for a period of time. A viable legal framework could address both of these issues in a clear and precise manner. The ITU currently allocates slots for telecommunications satellites, but the increased demand for slots in GSO for SBSP satellites may force countries to reevaluate ITU's authority to regulate SBSP satellites.

A. An unsuccessful attempt to appropriate GSO slots

The ITU allocation is one way to solve the problem, but given the physical limitations of the GSO, there is an underlying conflict between the goals of fair and equitable access on one side and the GSO's efficient use on the other.<sup>5</sup> The conflict arises when developed countries receive priority to access the GSO because they have the demand, infrastructure, and funding to put satellites into orbit, while developing countries without viable satellites also want access to the GSO. 116 This a posteriori approach to GSO property rights favors those who are first to apply for frequency and orbital slots and protects those applicants from interference by later users.<sup>17</sup> At the same time, developing countries do not favor such a "free-market-approach" to GSO access; on the contrary, they would like a multilateral approach that distributes access to the GSO equitably among all nations. 118 "As feared by the developing States, this a posteriori system [has] provided a few industrialized and rich States with the opportunity of temporarily unlimited use of registered frequencies and orbit positions."<sup>19</sup> Developing countries feel that they should have equal access to these frequencies and orbital slots. 120

These countries have tried to gain leverage over the GSO resource by advocating for the creation of an administrative agency that would allocate a part of the GSO to each country. In 1976, eight developing countries above the equator claimed sovereign right over the parts of the GSO lying over their territories and called for the administration of the rest of the GSO. 121 The Declaration of the First Meeting of Equatorial Countries the "Bogota Declaration" asserted that these countries had the right to parts of the GSO because the orbit should be considered part of the earth and not outer space. 22 These countries argued that the gravitational force that produces the GSO was derived from their land.<sup>23</sup> Both developed and developing countries rejected the Bogota Declaration's arguments because its claims were weak: the gravity that produces the orbit (1) is produced by the entire earth, not just these eight nations and (2) produces all orbits, not just the GSO. 124

Another of the arguments in the Bogota Declaration was that there is no legally defined boundary as to where an atmosphere ends and space begins. 125 Furthermore, the Bogota Declaration declared that even the Outer Space Treaty, which provides the basic outline for the peaceful exploration and use of outer space, does not address the issue. 126 While there is no definition that all countries in the world accept regarding the boundary of space, the International Aeronautic Federation recognizes the Karman Line as the edge of the atmosphere and the beginning of space.<sup>27</sup> The International Aeronautic Federation is a non-governmental organization founded in 1905, for the purpose of

encouraging aeronautical and astronautical activities worldwide. 28 It has 100 member countries, including the United States, United Kingdom, Spain, Sweden, South Africa, Mongolia, Korea, Israel, Iran, as well as many others.<sup>1 29</sup> For the preceding reasons, the International Aeronautic Federation portrays a widely held view concerning the definition of space. The Karman line is one hundred kilometers above sea level, and that is where the atmosphere becomes so thin that an airplane cannot fly and a spaceship is needed for flight.<sup>30</sup> The GSO lies more than 35,000 kilometers above sea level, which is approximately 34,900 kilometers higher than the Karman line. Therefore, GSO is well above the demarcation of space that is internationally recognized. For this reason and others, most countries did not accept the Bogota Declaration. Accordingly, the Bogota Declaration was an unsuccessful attempt to appropriate GSO slots.

8. Space law must allow appropriation of space for the good of everyone

The Bogota Declaration was ultimately a failure because it violated internationally accepted principles. According to the Outer Space Treaty of 1967, GSO orbital positions and frequencies cannot be appropriated because no country can appropriate or own space.<sup>31</sup> **Ninety-one states have signed this treaty, including the United States, the United Kingdom, Ukraine, Japan, Greece, Denmark, Spain, Uganda, Afghanistan, Iraq and many others**

<sup>32</sup> The treaty specifies that outer space is the "province of mankind" and that all activity should be done for the benefit of all of humanity. <sup>133</sup> It would then seem that no country could have exclusive ownership over an orbital position in the GSO or any orbit. <sup>134</sup>

Even if the Outer Space Treaty of 1967 prohibits countries from owning orbital slots in the GSO, the slots should still be allocated to countries that will use them on a first-come, first-served basis. **SBSP has so much potential to benefit all of humankind that if even a single country uses a GSO slot to gather power, the advantage of developing the technology of SBSP may outweigh the argument that all nations should have equal access to space.**<sup>35</sup>

Countries like Tonga that have no capability of sending satellites into orbit should not be able to claim GSO slots because this would prohibit developed countries from placing satellites into orbit that can benefit the whole world.<sup>136</sup>

The Outer Space Treaty of 1967 likely permits the allocation of GSO slots to individual countries on the condition that the slots are used for SBSP satellites that benefit all mankind

Countries with orbiting SBSP satellites could meet such conditional requirements in three ways. First, they could be required to provide power to less developed countries. Second, launching countries can help decrease global warming because SBSP satellites provide clean energy. Third, launching countries can lower the cost of solar power systems as they become cheaper and more affordable with time so that many less developed countries around the world will be able to access solar power from space. By satisfying any of these conditions, deployment of SBSP satellites would qualify under the treaty as "use of outer space ... carried out for the benefit and in the

interests of all countries."<sup>137</sup> The universal benefits provided by SBSP satellites would therefore be consistent with the treaty's requirement that the use of outer space "shall be the province of all mankind."<sup>138</sup> Thus, while the Outer Space Treaty of 1967 may prohibit ownership of GSO slots, the temporary allocation of GSO slots for the use of SBSP satellites would be compatible with the goals of the treaty. "

As a result of the need to allow SBSP to have access to the GSO, there will need to be some sort of regulatory structure to GSO slot allocation. If a regulatory organization, such as the ITU, allows licensees to use a particular GSO position and microwave frequency, for a limited period of time, this would appear to satisfy the current international regime under the Outer Space Treaty of 1967. In order to comply with the treaty, countries would not have to surrender their slot or frequency, as they could simply allow other countries to lease the power satellites from them for a period of time. SBSP satellites in GSO would fall within the "province of mankind" requirement of the Outer Space Treaty of 1967 because **SBSP can decrease global warming and help less developed countries by providing them with electricity in areas lacking infrastructure.** Furthermore, SBSP satellites in GSO would satisfy the "peaceful purposes" requirement of the Outer Space Treaty of 1967 because the satellites are used for commercial power production and **cannot be converted into weapons.**<sup>139</sup>

## CASE 3: Wifi LEOs

### Low Earth Orbit Satellite constellations.

### Solves broadband internet access which is key for Native communities.

**Venkatesan et al 20** (Aparna Venkatesan is a Professor in the Department of Physics and Astronomy at the University of San Francisco. James Lowenthal is a professor of Astronomy at Smith College. Parvathy Prem is a Planetary Scientist specializing in Planetary research at Johns Hopkins University Applied Physics Laboratory. Monica Vidaurri works as a research scientist at NASA Goddard Space Flight Center, specializing in astrobiology, policy, and ethics. "The impact of satellite constellations on space as an ancestral global commons". November 06, 2020.)

**Satellite constellations could greatly improve** communications and ongoing **monitoring of Earth phenomena ranging from** weather and **climate to disaster management. Such large constellations also** have the potential to **offer global connectivity through** low-cost high-speed **broadband** internet. In principle, **this could be the critical leap needed to bridge the very real**



**digital divide**<sup>2</sup>, **especially for** the world's most minoritized populations, including **Indigenous communities**.

This divide has been exposed as a chasm during this pandemic year, affecting many millions of students and low-income workers.

**Broadband internet has become essential for daily life**, especially **during a pandemic** year when remote forms of learning, teaching, work and even health (for example, telemedicine) have become the norm. In 2019, the FCC offered US\$20 billion in subsidies over ten years to address the digital divide in rural communities in the United States, which was quickly followed by a number

of filings for LEOsats. **LEOsat broadband may benefit rural communities** more than urban areas—these 'last mile' connections are still challenging to complete relative to concentrated (urban) populations where ground-based cable/fibre internet infrastructure is cheaper. **Large satellite constellations thus have the potential to bridge the**

**digital chasm**, but time will tell whether the promise of low-cost high-speed internet worldwide is achieved, **and** what the financial costs to customers are. **This potential democratization of space is worth noting, even if it may**

**not lead to fair participation in space.**

## Case 4: O'Neill Cylinders

**O'Neill Cylinders are on the way, but funding and companies like SpaceX and Blue Origin are key because governments are insufficient.**

**Kanchwala 21**

Hussain Kanchwala (scholar at the indian institute of technology), 11-13-2021, "What is an O'Neill Cylinder?," Science ABC, <https://www.scienceabc.com/nature/universe/what-is-oneill-cylinder.html>, // HW AW

Many people believe that the Earth will soon be in danger and the sprawling nature of humanity is the undeniable cause. With the rapid technological progress and advancement of the past few centuries, we're quickly exhausting the resources from planet Earth in order to power our industrial needs and global commerce. Many futurists feel that we will be left with no option but to explore and colonize space if we intend to survive into a future when resources on Earth can no longer meet our requirements. Overpopulation is an imminent challenge that makes the need for interstellar travel and colonization even more urgent. That being said, building a space habitat is no easy pursuit and is loaded with daunting challenges, such as the need for construction facilities in space, the recreation of livable communities in space, the recycling and processing of waste, the simulation of artificial gravity, and most importantly—convincing governments and global organizations that this venture is worth pursuing. The prospect of space colonization paves the way for devising methods to extract energy from resources on other planets. On Earth, harnessing energy from the Sun using solar panels isn't particularly efficient, and faces inevitable barriers caused by the atmosphere and the daily occurrence of darkness (e.g., nighttime). However, in space, solar constructs can perpetually harness energy from the Sun without interruption. Utilizing this copious amount of energy would permit us to travel throughout our solar system without worrying about energy expenditure. Moreover, chemical resources would be in great supply in our solar system. To begin with, NASA has recently embarked on a project to generate fuel, water, and oxygen from resources present on the Moon. Given these foundations for why organizations should foray into developing a space habitat, allow me to introduce the O'Neill cylinder—a space settlement design consisting of two counter-rotating cylinders proposed by renowned physicist Gerard O'Neill a few decades ago. Aside from being a physicist, O'Neill was also a professor at Princeton University and a space enthusiast. Although he is most widely acclaimed for his work in physics, where he developed new concepts to explore particle physics at higher energies, his work on space colonization turned out to be his truly long-lasting legacy. Origin of the Idea for the O'Neill Cylinder While teaching physics to his students at Princeton University, O'Neill assigned them the task of designing a megastructure in space in order to demonstrate that living and surviving in space is actually a possibility. His students came up with numerous designs to accommodate human habitation in space. After a long session of brainstorming, O'Neill boiled their theories down to the idea of a cylinder-like space settlement design. Later, additional details and the functioning of this design were published in Physics Today in 1974; the cylinder was aptly called the O'Neill cylinder. Design of the O'Neill Cylinder The O'Neill cylinder design consists of two cylinders rotating in opposite directions on a bearing to mitigate the gyroscopic effect. Each cylinder was proposed to be 20 miles long and 5 miles in diameter, with 6 broad stripes along its length (3 habitable spaces and 3 windows). O'Neill envisioned industrial processes and recreational facilities to be located on the central axis in a virtually zero-gravity environment. Gravity Simulation One key difference between living on Earth and living in space (or on any other astronomical body) is the difference in gravity. Artificial gravity is needed for stability, and the O'Neill cylinder has a provision to achieve exactly that. As the two giant cylinders rotate on their axis, they would leverage the centripetal force of any object in the inner surface to create artificial gravity. Considering the cylinder's dimensions, the acceleration equation:  $a=v^2/r$ , and substituting the acceleration value of Earth (i.e., 9.81), we can deduce that the cylinder would need to rotate roughly 28 times per hour to simulate an appropriate gravitational force. Earthly Environment Simulation Maintaining an atmosphere with a constitution similar to that of Earth is the next challenge when building a space habitation. The O'Neill cylinder is prudently designed with a ratio of gases similar to what is found on Earth. However, there is a caveat; the pressure is half of that at sea level. This would not impact our breathing substantially, but this minor trade-off would translate into a handful of benefits, such as bringing down the need for gas and the

construction of thick walls. The proposed O'Neill cylinder also has provisions wherein the habitat would be able to control its own micro-climate using an arrangement of mirrors and by altering the ratio of gases in the cylinder. Day and Night Simulation With the human habitat situated in a vacuum (space), the cylinder essentially turns into a huge thermos! The theoretical O'Neill cylinder tried to overcome this issue by using a series of mirrors hinged on each of the three windows. This way, direct sunlight could be directed into the cylinder to simulate day time. Similarly, by turning the mirror away, a night-like ambience could be created. This simulated 'night' would also permit the heat produced biologically to radiate out of the cylinder. **Despite the design of the O'Neill cylinder being technically sound, the idea is too sophisticated to be implemented with our present technology.** Thus far, its implementation has been confined to the realm of science fiction. However, **given the efforts of organizations like SpaceX and Mars One, perhaps some day O'Neill cylinders will actually help humanity settle in the great vastness of space!**

**This permanently solves extinction, which outweighs the affirmative.**

**Haynes 19, 5/17, Korey "O'Neill colonies: A decades-long dream for settling space," Astronomy,**  
<https://astronomy.com/news/2019/05/oneill-colonies-a-decades-long-dream-for-settling-space>

Last week, Amazon founder Jeff Bezos revealed his spaceship company's new lunar lander, dubbed Blue Moon, and he spelled out a bold and broad vision for humanity's future in space. Faced with the limits of resources here on Earth, most fundamentally energy, he pointed to life in space as a solution. "If we move out into the solar system, for all practical purposes, we have unlimited resources," Bezos said. "We could have a trillion people out in the solar system." And while colonies on other planets would be plagued by low gravity, long distances to Earth (leading to communication delays), and further limits down the road, those weaknesses are avoided if the colonies remain truly in space. To that end, Bezos instead suggested people consider taking up residence in O'Neill colonies, a futuristic concept for space settlements first dreamed up decades ago. "These are very large structures, miles on end, and they hold a million people or more each." Gerard O'Neill was a physicist from Princeton University who teamed up with NASA in the 1970s on a series of workshops that explored efficient ways for humans to live off-world. Beyond influencing Bezos, his ideas have also deeply affected how many space experts and enthusiasts think about realistic ways of living in space. "What will space colonies be like?" O'Neill once asked the Space Science Institute he founded. "First of all, there's no point in going out into space if the future that we see there is a sterile future of living in tin cans. We have to be able to recreate, in space, habitats which are as beautiful, as Earth-like, as the loveliest parts of planet Earth — and we can do that." Of course, neither O'Neill nor anyone since has actually made such a habitat, but in many ways, the concepts he helped developed half a century ago remain some of the most practical options for large-scale and long-term space habitation. While NASA has mostly focused on exploring the moon and Mars in recent years, **O'Neill colonies offer an option untethered to any planetary body. Instead, people would live in enormous circular structures in space that would be capable of hosting many thousands of people — or even millions according to Bezos — on a permanent basis.** You may have seen these kinds of colonies in science fiction, from Star Trek, to the movie Interstellar. But in real life, researchers have thought up a few variations: either a sphere, a cylinder, or a ring-shaped torus. All of these are designed to rotate and create a centrifugal force that mimics gravity for the inhabitants. While the sizes and specifications of the colonies vary, there are a few staples. In general, **O'Neill colonies were designed to be permanent, self-sustaining structures. That means they would use solar power for electrical energy and for growing crops.** The outer walls of an O'Neill colony are generally pictured as a transparent material, so that mirrors can aim sunlight through its walls as needed to provide light and energy — or to allow darkness, a feature humans also need, especially while we sleep. But building these colonies is a challenge beyond any humans have accomplished so far in space, and Bezos acknowledged that. He referred to two "gates" in his announcement, which he clarified as challenges that humans need to overcome. The first, which his company **Blue Origin and other space entrepreneurs have been tackling, is to reduce the cost and difficulty of getting to space at all.** But the second involves using resources from space, rather than hauling them from Earth. Bezos isn't alone in such thinking. Most of **NASA's long-term plans for the Moon and Mars involve rely on harvesting materials and manufacturing products locally, using lunar and martian regolith to build and repair structures.** And in the shorter term, three of the dozen experiments NASA selected as the first to fly as part of the new lunar program — possibly even by the end of the year — are what NASA terms "resource prospecting instruments." That pairs well with O'Neill's vision. These **colonies are meant to use resources gathered from space, whether asteroids, the Moon, or even Mars.** Doing so avoids the costly effort of heaving materials and goods out of Earth's deep gravity well. That means they would be built using materials available cheaply in space. The humans and their attendant plants and animals would need to be carried from Earth. But raw materials like oxygen, nitrogen and aluminum are plentiful in the solar system, and mining for resources in space is a common theme across space settlement discussions.

Because of their size, the colonies should be able to act as fully independent ecosystems, with plants to cycle air and water and resource cycles not so dissimilar from Earth. Humans are a long way from being able to launch anything like an O'Neill colony in the near future. But it's somewhat telling that, after 50 years

## Solvency

- 1. Aff regulation is Non-Unique. The status quo already prevents the worst-case scenario for private companies in space. Even though the Outer Space Treaty doesn't bind private entities, governments still restrict and regulate them to ensure just compliance.**

**Eijk 20** [Cristian van Eijk is finishing an accelerated BA in Law at the University of Cambridge. He holds a BA cum laude in International Justice and an LLM in Public International Law from Leiden University, and has previously worked at the T.M.C. Asser Institute and the International Commission on Missing Persons. "Sorry, Elon: Mars is not a legal vacuum – and it's not yours, either." Voelkerrechtsblog. May 11, 2020. <https://voelkerrechtsblog.org/sorry-elon-mars-is-not-a-legal-vacuum-and-its-not-yours-either/>] HW AL

Two provisions of the Outer Space Treaty (OST), both also customary, are particularly relevant here. OST 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." OST article III: "States... shall carry on activities in the exploration and use of outer space, including (...) celestial bodies, in accordance with international law". SpaceX is a private entity, and is not bound by the Outer Space Treaty – but that does not mean it can opt out. Its actions in space could have consequences for the United States in three ways. First, the US, as SpaceX's launch state, bears fault-based liability for injury or damage SpaceX's space objects cause to other states' persons or property (OST article VII, Liability Convention articles I, III). Second, the US, as SpaceX's state of registry, is the sole state that retains jurisdiction and control over SpaceX objects (OST article VIII, Registration Convention article II). Both refer to objects in space and are irrelevant. According to article VI OST, States "bear international responsibility for national activities in outer space", including Mars, including those by "non-governmental entities". The US, as SpaceX's state of incorporation, must authorise and continuously supervise SpaceX's actions in space to ensure compliance with the OST (OST article VI) and international law (OST article III). In practice, this task is done by the US Federal Communications Commission, which licenses and regulates SpaceX. Article VI OST sets a specific rule of attribution, supplementing the customary rules of state responsibility (Stubbe 2017, pp. 85-104). SpaceX acts with US authorisation, and its conduct in space within and beyond that authorisation is attributable to the US (ARSIWA articles 5, 7). In the absence of circumstances precluding wrongfulness, the result is straightforward. If SpaceX breaches a US obligation under international law, the US bears responsibility for an internationally wrongful act.

- 2. Even if the affirmative is correct in saying that public space efforts are good, the private sector is key to make public space development successful.**

### **Urrutia '18**

(Doris Elin Urrutia, October 12, 2018, Urrutia is a journalist for Inverse that bridge archaeological and paleontological discoveries with modern life. She also writes about astronomy and spaceflight for Space.com and on marine life for Scientific American, "How Will Private Space Travel Transform NASA's Next 60 Years?", <https://www.space.com/42113-nasa-future-private-spaceflight.html> //NL)

First, people should understand that about 75 percent of the worldwide space enterprise is already commercial, said Scott Hubbard, an adjunct professor in the Department of Aeronautics and Astronautics at Stanford University. This includes the satellites belonging to DirecTV and Sirius XM radio. "What's new is the extension of that into the human realm," said Hubbard, who also previously directed NASA's Ames Research Center in Silicon Valley. He served as the agency's "Mars czar," restructuring NASA's robotic Red Planet-exploration program after it suffered several failures in the 1990s. And if private companies can get the price of a suborbital flight down to about \$50,000, "you get a lot of interest," Hubbard told Space.com. The highest-profile program currently in the works between NASA and the private sector is the agency's Commercial Crew Program, said Eric Stallmer, president of the nonprofit Commercial Spaceflight Federation. Commercial Crew is encouraging the development of U.S. spacecraft that will carry astronauts to and from the International Space Station (ISS). Toward this end, NASA has awarded multibillion-dollar contracts to both SpaceX and Boeing, which are building capsules called Crew Dragon and CST-100 Starliner, respectively. These craft are currently scheduled to start flying astronauts sometime next year. There's also the maturing commercial cargo program, which has given contracts to SpaceX and Northrop Grumman Corp. to fly robotic cargo missions to the ISS. Both of these companies have already completed numerous such flights. Both Hubbard and Stallmer said that NASA wins by relying on private industry to provide such services in low Earth orbit. Hubbard argued that this strategy allows the space agency to continue "exploring the fringe where there really is no business case." NASA has a budget about five times larger than the next biggest national space agency out there,

but the U.S. agency's ambitious goals are still costly, said Stallmer. **To get the most bang for the buck, "you'd have to leverage the innovation and technology that is in the private sector and let NASA do the exquisite" projects.** The "exquisite" projects, Stallmer explained, are the "push-the-envelope-type things on deeper space exploration." "I see it not only as a cooperation or a collaboration, but maybe even interdependence," Hubbard said. "Without a thriving spaceflight entrepreneurship sector, I don't think that deep-space exploration with [regular] people is sustainable," he added. "And I think using the way in which **the private sector** has **demonstrated they can reduce costs**, through more nearly assembly-line production techniques, is really **critical to sustainable space exploration in the future.**" Phil McAlister, director of commercial spaceflight at NASA, also advocated these public-private partnerships. Private companies **offer the advantages of "being quick**, being nimble, being fast, making a decision maybe without perfect knowledge — then moving forward and adjusting as required," McAlister told Space.com. **NASA officials**, he **said**, "have a lot of meetings ... a lot of discussions, and **things tend to take longer**" than in private industry. **"The private sector wanting to move fast and wanting to be cost-effective** and NASA having our 50 years of human spaceflight experience ... you bring those two things together, **and they actually complement each other very effectively,**" McAlister said.

# Blocks

## **Catastrophe scenarios program us affectively to accept violence and dehumanization Evans And Reid, PhD's, 14**

(Brad, International Studies @ Bristol, Julian, International Politics @ Lapland, Resilient Life: The art of Living Dangerously)

Anybody who has experienced immunization will appreciate the violence of the encounter. The whole process begins with the awareness of some vaguely looming threat which promises in the worst case an extremely violent ending. To pre-empt this happening, the subject is physically penetrated by the alien body with a controlled level of the lethal substance which, although producing violent sickness, is a fate less than death. Such violence unto oneself offers to counter violence with violence such that life may carry on living in spite of the dangers we are incapable of securing ourselves against. It is to give over to a form of self-harm albeit in a way that is actively desired and positively conceived.

How else may we live otherwise? Resilience follows a similar logic. It encourages that we partake in the violence of the world to keep death at bay. For in the process of learning to live through the insecurity of the times, the subject is asked to incorporate the catastrophic intellectually, viscerally and affectively, thereby providing certain immunization against a more endangering fate. Indeed, since the ultimate litmus test is to bring to question the worst case scenario, the future cannot appear to us as anything other than completely monstrous. What, however, is actually slain as the future is wagered by the violence of the present may only become revealed with the passage of time. None of this operates outside of the realm of power politics. We only have to consider here (a) the moral judgements and political stakes associated with HIV as a pandemic that is more than simply biological, and (b) the development of viral analogies to explain more generally the problems 'infecting' societies from terror to criminality to evidence the point. Immunization is precisely about exposing oneself to something that is potentially lethal, thereby raising the threshold level for existence such that violence is normalized on account of our vulnerabilities to that which may be tempered but remains undefeatable.

We are drawn here to Stellan Rye's (1913) silent horror movie The Student from Prague (Der Student von Prag) which has inspired a number of compelling literary and cinematic classics. In this tragic tale of poverty and violence, the impoverished student, Balduin, makes a bargain with the Devil as he exchanges the reflection of image for more immediate compensations. Upon eventually seeing himself, however, the student is avenged by an angry double that begins to wreak havoc as it seeks out revenge in light of its betrayal. Following an eventual violent confrontation the student has with his double, Balduin shatters the mirror that is central to the plot, and invariably destroys the fantasy of endangerment which also became the source of his afflicted curse. Inevitably, however, since the double was an essential element of this Faustian agreement, in killing the violent double, so the student kills himself. Otto Rank famously related this to the narcissistic self whose very sense of loneliness and alienation is caused by an anguish of a fear of death; even though it is precisely the violence of the pact which pushes the subject further towards the precipice. Whilst it is tempting to read this in familiar dialectical terms, there is a more sophisticated double move at work here, as the violence is already encoded within the initial act of demonic violation before the tragic encounter. For the double merely highlights the self-propelling tendency, from the fantasy of endangerment to the reality of the catastrophic. There is also a semantic interchange at work in Rye's Doppelgänger as it stakes out the choice between a violated/violent life and eventual death. Since reason or logic prove utterly incapable of explaining the condition of Balduin's existence, let alone offering any promise of salvation from the oppressive situation to which he is fatefully bound, the double serves as an important metaphor for the narcissism of the times, as the subject wilfully accepts a violation and all the violence this entails in exchange for an illusion or fantasy of security which proves in the end to have been imbued with the catastrophic from the outset. Our understanding of the fundamental tenets of violence is invariably transformed such that we are forced to think about forms of violation/ intervention prior to any sense of dialectical enmity. Premetic Violence René Girard's thesis Violence and the Sacred offers a theory of violence that is exclusively bound to the desire to 'overcome' tragedy. To develop this theory, Girard specifically relates to the classic Greek play by Sophocles, Oedipus Rex, which he uses to illustrate the relationship between tragic dispossession and violence. It is through the tale of Oedipus and his return to reclaim the realm from which he was abandoned that we uncover a genesis of sacrificial violence that is linked to some 'past tragedy'.<sup>3, 9</sup> Oedipus thus epitomizes the motif of the lost prince whose modes of contestation can be understood through competing claims to the 'same object of desire: The story follows that when two uncompromising entities vie over the same object of desire, violence necessarily erupts. Through Girard's decoding of the Oedipus myth, what we therefore find is any attempt to re-possess the object of desire necessarily requires the guilt of those currently in possession - a sacrificial victim. Thus, to overcome tragedy one must come from the 'outside' - a violently destined return that can only be justified by making a claim to the original sin, or what Girard terms a return to the 'original scene: However, as Sophocles tells it, such violence is more than simply a reclamation of that which has been taken. The violence of the already dispossessed desires to re-establish the authentic order which has been falsely appropriated - the paradise lost. Importantly, for Girard, such violence is not a relation of difference but is more defined by the logic of mimesis: 'At first, each of the protagonists believes that he can quell the violence; at the end each succumbs to it. All are drawn unwittingly into a violent reciprocity - which they always think they are outside of, because they all initially came from outside and mistake this positional and temporary advantage for a permanent and fundamental superiority.<sup>40</sup> Plunging into an opposition which 'reduces the protagonists into a uniform condition of violence', all claims to 'difference' are effectively 'eclipsed' by 'a resurgence of reciprocity.<sup>41</sup> It has been common to read Rye's doubling as a clear example of mimetic behaviour. This has found clear applications from Hegelian-inspired revolutionary accounts of dialectical reasoning, to Frantz Fanon's theory of (post)colonial brutality, onto the exceptional violence of Schmitt's sovereign decisionism. While accepting how this logic has played a structural role in the demarcation of certain regimes of violence which came to hallmark distinct marks of separation, we need to depart from this logic if we are to make sense of the violence of the catastrophic imaginary. What, in other words, becomes of violence once we reconceptualize the idea of the original scene and its logics of exposure such that violence itself becomes virtually ordained? That is to say, what becomes of violence once it begins to precede any dialectical arrangement? Mimetic violence, we have noted, is objectifiable. Based upon establishing various forms of mystical foundations, it has a distinct materiality to it that permits clear lines of demarcation and embodiment. These work both spatially and temporally. The object for violence is locatable, while the time of its occurrence offers clear (if sometimes contested) conceptions as to its beginning and ending. It benefits, then, from the guarantees of identification and the ability to represent that which must be vanquished at a given moment 'in time! The virtual nature of the violence endured by the resilient subject offers no such guarantees. Collapsing the space-time continuum of mimetic rivalry, it is merely projected into the future without the prospect of bounce-back. Internalized, however, into the very living conditions of the subject now permanently under siege, the violence is no less real. As any author of horror fiction will tell, the mind can be a terrifying place to inhabit. Once the source of endangerment becomes unknowable by definition, everything becomes the potential source of a violent

**encounter.** Resilience challenges the logic of mimetic violence, therefore, in two fundamental ways. Firstly, it shows us that our only way of dealing with endangerment is to absorb its lethal tendencies. That which has the potential to destroy must become part of society's make-up and its epistemic fabric. We too, in the process, become more lethally endowed as a result. Invariably, the more lethal we become, the more we end up embracing the biophysical conditions of our potential undoing as a principle form of human conditioning. The body accepts the lethality on account of preparedness. Secondly, there is an outward projection against that which could potentially threaten our existence. But this projection doesn't connect to any mimetic rival. We have no clear sense of what it is that so endangers in its particular guise, only a generalizable indication that something which is part of the integral whole will eventually bring about our final demise. Deprived, then, of the potential to 'at last stand' upon a terrain whose forms of endangerment were known in advance, we continue to walk through a veritable minefield of potential disasters of a multi-dimensional nature, not knowing when the explosion will happen, with little comfort provided by the intellectual comforts of the past, and with no fence on the horizon beyond which relative security may be achieved and freedom from endangerment realized. The only solution, we are told, remains to expose oneself to all its disastrous permutations so that we may be better prepared against those already charged and yet to detonate, along with those yet to even be inserted into this catastrophic topography. But what does it mean to say that violence is now beyond representation? And what type of reality are we producing if we are calling into question the depths of field that once gave qualitative and quantitative meaning to our relations to violence? For Paul Virilio, whose work we may connect to the premet, this inaugurates 'the futurism of the instant' whose kairos shatters all metaphysical meaning: This spells disorientation in knowledge acquired over the course of millennia regarding the spatial environment and the cycle of seasons; an integral accident in knowledge of history as well as of the usual concrete geography that goes with it, the unity of place and time of a secular history. No doubt this is the fatal novelty of the historic tragedy befalling humanity and a progress that will no longer be exclusively technological and extra-planetary, but merely human, 'all too human'. Masochism vis-a-vis an abhorred past that no longer passes muster is now symmetrically doubled with a masochism in relation to a future where, for want of fear, we will, this time, have space, all the space of a minuscule planet reduced to nothing, or as good as, by the progress of our discoveries.<sup>2</sup> Nihilism Unbound Writing in the nineteenth century, Nietzsche argued that nothing was more deeply characteristic of the modern world than the power of nihilism.<sup>3</sup> Nietzsche's intervention here allowed us to move beyond the well-rehearsed attack upon Platonic reason or Christian faith, to focus instead upon 'the radical repudiation of value, meaning and desirability'.<sup>4</sup> Nihilism, thus understood, referred to the triumph of reactive thinking. It was all about the negation of life as it appeared to be incapable of affirming that which is properly and creatively different to human existence. Hence, for Nietzsche, nihilism was not simply reducible to some historical event in time, i.e. an exceptional moment in history which could be shamefully written into annals of human suffering. Nihilism was the recurring motor of history as the operation of power leads to a will to nothingness that strips life of any purposeful meaning. Crucially, as Nietzsche understood, this repudiation of the affirmative realm of experience is something we create for ourselves. Nihilism, in other words, is to be understood through a sophisticated manipulation of desires such that the individual subject depreciates itself to such an extent that it actively participates in a custom of political self-annihilation. Central to Nietzsche's thinking on the perpetuation of nihilism is the notion of resentment. In his *On the Genealogy of Morality*, Nietzsche explains this in terms of the slave mentality. This produces a feeling of impotence which not only translates into vengefulness, but more problematic still, teaches the slave that the only way it can become free is to give over to the prevailing reason mastery has set in place. Sloterdijk equates this resentment with rage, the basis of all great theisms.<sup>4</sup> Such a condition, as Nietzsche understood, was 'paralysing' inasmuch as it annuls the possibility of thinking and acting otherwise, and it was 'exhausting' inasmuch as life was forced to compromise with the very lethality that put its condition originally into question. Through a 'spirit of revenge' what is lacking is therefore produced in a double movement, for lack is not some original gesture, it derives out of the resentment to deny us the opportunity to bring something different into the world. This raises a number of pressing questions: Could it be that not only have we become slaves to our biological existence, but in claiming false mastery of the earth we have given to ourselves an illusory sovereignty? For how can we have mastery if that which we claim to be able to dominate as the principle force makes us increasingly vulnerable with each passing moment? Have we not, then, become slaves to ourselves and slaves to the earth, and resentful of them as a result? Nihilism has never been alien to liberal biopolitics. It is arguably its most potent expression. Its early development can be traced to Kant's Copernican revolution of the mind. Placing life at the centre of its universe, Kant forced us to look for meaning beyond the realms of theological destiny. Whilst this moved us beyond the suffering and lament of the Christian subject which so irked Nietzsche, Kant's universal substitute proved to be no substitute at all. The universal was actually denied to us due to the limits of our reason and our imperfections as finite beings - imperfections that significantly proved incapable of moving us beyond the reductionism of metaphysical idealism and its crude representations, towards a more affirmative form of meta-physics that worked in practice. As Drucilla Cornell writes, 'Martin Heidegger famously wrote that Kant takes us to the limit of the very notion of critique and ultimately raises, but does not fully address, the question of 'who' is this finite being that must think through the transcendental imagination! In a remarkably potent yet tragic stroke, Kant wrote the death of the omnipotent God and the types of docile subjects it produced who were rendered immobile due to its vengeance and fury, while putting in its place a fallen subject that was fated to be forever incomplete because of the burdens of its own actions. While Kant's thinking paved the way for new eschatological forms of power to emerge that took leave of traditional sovereign moorings, the fallen subject was compelled to become resentful of its biological existence. Bios were to remain forever imperfect by design and fated to be judged accordingly. With life fated to live a biologically endowed existence, it is stripped of its capacity to have a meaningful existence beyond the limits of its bodily formations, while political strategies operate by governing through the problem of finitude, even though the finite inevitably became a philosophical problem too difficult to comprehend. As a result, forced to endure a growing resentment of its unfolding drama, **liberalism** slowly became morally equipped to **continually intervene upon the souls of the living** simply by offering to prolong the subject's existence better than any other political rationality. Such was the realization of our finite entrapment in the bodily form that the ability to philosophically transgress the injunction between life and death became increasingly impossible. Indeed, as we shall point out later, while liberal societies have a particular relationship to the question of dying as our existence is continually put into question, such that with each passing second we learn to survive until we become truly meaningless in the end, the idea of death remains incommensurable to the liberal subject. No longer does the resilient subject solely project its resentfulness onto the souls of 'Others'. **It resents the living world, for it too is radically endangering**. It is here that catastrophic imaginaries begin to truly thrive. The resilient subject is shaped and anxiously mobilized by the prospect of the coming catastrophe. It fears the transformation of the subject, just as it fears the transformation of the ecosystem that gives sustenance to life. Our rage as such, to borrow from Sloterdijk, has become truly limitless. As everything becomes the source of our endangerment, we internalize the resentment and proliferate our impotence with unrivalled intensity and absolute necessity. Hence this produces a form of nihilism which is 'unbounded': For no longer do we simply resent the teleological unfolding of history as



we phase shift from masters to slaves to masters; there is no mastery to speak of and as a result all our lament filters into a politics of resentment as we are left to simply govern through our continually unfolding state of unending emergency. (111-17)

## Kessler syndrome is media hype – no risk

Von Fange 17

Daniel von Fange (systems engineer. Fond of charts), 5-21-2017, "Kessler Syndrome is Over Hyped," braino, [http://braino.org/essays/kessler\\_syndrome\\_is\\_over\\_hyped/](http://braino.org/essays/kessler_syndrome_is_over_hyped/), // HW AW

**Kessler Syndrome is overhyped.** A chorus of online commenters greet any news of upcoming low earth orbit satellites with worry that humanity will to lose access to space. I now think they are wrong. What is Kessler Syndrome? Here's the popular view on Kessler Syndrome. Every once in a while, a piece of junk in space hits a satellite. This single impact destroys the satellite, and breaks off several thousand additional pieces. These new pieces now fly around space looking for other satellites to hit, and so exponentially multiply themselves over time, like a nuclear reaction, until a sphere of man-made debris surrounds the earth, and humanity no longer has access to space nor the benefits of satellites. It is a dark picture. Is Kessler Syndrome likely to happen? I had to stop everything and spend an afternoon doing back-of-the-napkin math to know how big the threat is. To estimate, we need to know where the stuff in space is, how much mass is there, and how long it would take to deorbit. The orbital area around earth can be broken down into four regions. Low LEO - Up to about 400km. Things that orbit here burn up in the earth's atmosphere quickly - between a few months to two years. The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, Low LEO doesn't matter for Kessler Syndrome. If Low LEO was ever full of space junk, we'd just wait a year and a half, and the problem would be over. High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue. Mid Orbit - GPS satellites and other navigation satellites travel here in lonely, long lives. **The volume of space is so huge, and the number of satellites so few, that we don't need to worry about Kessler here.** GEO - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. Usually the **geostationary orbit** is used by big weather satellites and big TV broadcasting satellites. (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, all the satellites here are moving the same direction at the same speed - debris doesn't get free velocity from the speed of the satellites. Also, it's quite expensive to get a satellite here, and so there aren't many, only about one satellite per 1000km of the ring. Kessler is not a problem here. How bad could Kessler Syndrome in High LEO be? Let's imagine a worst case scenario. An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space? I'm guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I'll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm<sup>3</sup>, then that's 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, **its odds of hitting that cube are tiny - less than 1 in 10,000. So even in the worst case, we don't lose access to space.** Now though you can travel through the debris, you couldn't keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits. In real life, there's a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment. **Debris would be spread over a volume of space,** not a single orbital surface, making collisions orders of magnitudes less likely. Most **impact debris will have a slower orbital velocity** than either of its original pieces - this makes it deorbit much sooner. Any collision will create large and small objects. **Small objects are much more affected by atmospheric drag and deorbit faster** even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided. The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren't an issue for Kessler. Most importantly, all new satellite launches since the 1990's are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting) So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend

toward much smaller, cheaper micro satellites, this wouldn't even have a huge effect. I'm removing Kessler Syndrome from my list of things to worry about.

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

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

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

## Private space appropriation will solve extinction

### Ginsberg 17

Leah Ginsberg (senior editor covering entrepreneurs, this article is just a summary of a Musk interview), June 16 2017, "Elon Musk thinks life on earth will go extinct, and is putting most of his fortune toward colonizing Mars," CNBC, <https://www.cnbc.com/2017/06/16/elon-musk-colonize-mars-before-extinction-event-on-earth.html>, // HW AW

If we stay on earth forever, "there will be some eventual extinction event," says Elon Musk in an article published in academic journal New Space. In it, Musk says the alternative to this doomsday is for humans to become a multi-planetary species. He says Mars is the place to do it. Venus is a "hot acid bath," says Musk in the article, which summarizes a speech he gave in Sept. of 2016. Mercury is too close to the sun. The moon is too small, has no atmosphere and not as "resource-rich." Speaking like the entrepreneur he is, Musk says, Mars is better-suited "to scale up" to be a self-sustaining civilization. "[I]f we could warm Mars up," says Musk, which he believes is doable, "we would once again have a thick atmosphere and liquid oceans." Mars also has enough sunlight and an atmosphere in which, with some tweaking, it would be possible to grow plants. 1:29 SpaceX's Elon Musk's bold ambition to colonize Mars Musk also says, "It would be quite fun to be on Mars because you would have gravity that is about 37 percent of that of Earth, so you would be able to lift heavy things and bound around." The key, says Musk is his company SpaceX creating systems that make the move to Mars affordable – comparable to the median house price in the U.S. is the goal. Currently, Musk estimates trips to Mars would cost about \$140,000 per ton (taking into account transporting things like luggage, food and life support). But he believes the cost could potentially drop to below \$100,000 a ton. Musk sees a future where people would save up for a move to Mars like they do a home. "People could also get sponsorship. It gets to the point where almost anyone, if they saved up and this was their goal, could buy a ticket and move to Mars — and given that Mars would have a labor shortage for a long time, jobs would not be in short supply," he says. Ultimately, says Musk, funding this will be a joint effort between private and government resources. "As we show that this is possible and that this dream is real—it is not just a dream, it is something that can be made real—the support will snowball over time," says Musk. "I should also add that the main reason I am personally accumulating assets is in order to fund this," says Musk of his wealth. "I really do not have any other motivation for personally accumulating assets except to be able to make the biggest contribution I can to making life multi-planetary." Just 15 years ago, "SpaceX basically consisted of carpet and a mariachi band," says Musk. "We were basically clueless." Now, he believes SpaceX will have a spaceship by about 2020, with which it can start doing suborbital flights. That would also enable the transport of cargo "to anywhere on Earth in 45 minutes at the most," he says. "Most places on Earth would be 20–25 minutes away. If we had a floating platform off the coast of New York, 20–30 miles out, you could go from New York to Tokyo in 25 minutes and across the Atlantic in 10 minutes," he says. "If things go super-well, it might be in the 10-year time frame" to Mars, says Musk. "But I do not want to say that is when it will occur. There is a huge amount of risk. It is going to cost a lot. There is a good chance we will not succeed, but we are going to do our best and try to make as much progress as possible."

## Prohibitions on appropriation prevent asteroid mining despite growing space industries

**Myers 16** -- Ross Myers (J.D. candidate at the University of Oregon Law School.), The Doctrine of Appropriation and Asteroid Mining: Incentivizing the Private Exploration and Development of Outer Space, 2016, Oregon Review of International Law, <https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/19850/Myers.pdf?sequence=1> WJ

Despite a decrease in national space program funding, corporate space missions are on the rise. In 2010, President Obama proposed that NASA exit the business of flying astronauts from Earth to low Earth orbit and move it to private companies.<sup>52</sup> Several companies have stepped up to bat, and corporate space programs now include space tourism, supply missions, and in one case a one-way colonization mission to Mars.<sup>53</sup> Corporate interest in space tourism and development demonstrates a strong private

commercial interest in space as an industry, which could serve to finance the exploration of space in a period where national governments do not have an active financial interest in space. However, under current international treaties, the ownership of asteroids is prohibited, preventing corporations willing to invest in asteroid mining from having a secure claim.

### **Asteroid Mining key to prevent terrestrial mining and solve warming.**

**MacWhorter 16** [Kevin; J.D. Candidate, William & Mary Law School, "Sustainable Mining: Incentivizing Asteroid Mining in the Name of Environmentalism", William & Mary Environmental Law and Policy Review, Vol 40, Issue 2, Article 11, <https://scholarship.law.wm.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1653&context=wmelpr>] brett

In the next sixty years, scientists predict that certain elements crucial to modern industry such as platinum, zinc, copper, phosphorous, lead, gold, and indium could be exhausted on Earth.<sup>12</sup> Many of these have no synthetic alternative, unlike chemical elements such as oil or diamonds.<sup>13</sup> Liquid-crystal display (LCD) televisions, cellphones, and laptops are among the various consumer technologies that use precious metals.<sup>14</sup> Further, green technologies including wind turbines, solar panels, and catalytic converters require these rare elements.<sup>15</sup> As demand rises for both types of technologies, and as reserves of rare metals fall, prices skyrocket.<sup>16</sup> Demand for nonrenewable resources creates conflict, and consumerism in rich countries results in harsh labor treatment for poorer countries.<sup>17</sup> In general, the mining industry is extremely destructive to Earth's environment.<sup>18</sup> In fact, depending on the method employed, mining can destroy entire ecosystems by polluting water sources and contributing to deforestation.<sup>19</sup> It is by its nature an unsustainable practice, because it involves the extraction of a finite and non-renewable resource.<sup>20</sup> Moreover, by extracting tiny amounts of metals from relatively large quantities of ore, the mining industry contributes the largest portion of solid wastes in the world.<sup>21</sup> The Environmental Protection Agency (EPA) describes the industry as the source of more toxic and hazardous waste than any other industrial sector (in the United States), costing billions of dollars to address the public health and environmental threats to communities.<sup>22</sup> Poor regulations and oxymoronic corporate definitions of sustainability, however, make it unclear as to just how much waste the industry actually produces.<sup>23</sup> Platinum provides an excellent case study of the issue, because it is an extremely rare and expensive metal—an ore expected to exist in vast quantities in asteroids.<sup>24</sup> Further, production of platinum has increased sharply in the past sixty years in order to keep up with growing demand for use in new technologies.<sup>25</sup> In fact, despite their high costs, platinum group metals are so useful that [one] of [four] industrial goods on Earth require them in production.<sup>26</sup> Scholars do not expect demand to slow any time soon.<sup>27</sup> Among other technologies, industries use platinum in products such as catalytic converters, jewelry production, various catalysts for chemical processing, and hydrogen fuel cells.<sup>28</sup> While there is no consensus on how far the Earth's reserves of platinum will take humanity, many scientists agree that platinum ore reserves will deplete in a relatively short amount of time.<sup>29</sup> With the rate of mining at an all-time high,<sup>30</sup> it is increasingly clear that historical patterns of mineral resources and development cannot simply be assumed to continue unaltered into the future.<sup>31</sup> The platinum mining industry, however, has a strong incentive to increase its rate of extraction as profits grow with the rate of demand. Without any alternative, this destructive practice will continue into the future.<sup>32</sup> So-called platinum-group metal (PGM) ores are mined through underground or open cut techniques.<sup>33</sup> Due to these practices, all but a very small fraction of the mined platinum ore is disposed of as solid waste.<sup>34</sup> The environmental consequences of platinum production are thus quite significant, but like the mining industry in general, the amount of waste is typically under-reported.<sup>35</sup> While this is due to high production levels at the moment, those levels will only increase given the estimated future demand of platinum.<sup>36</sup> In spite of the negative consequences, mining continues unabated because it is

economically important to many areas.<sup>37</sup> The future environmental costs provide a major challenge in creating a sustainable system. **Relegating at least some mining companies to near-Earth asteroids would reduce the negative effects of future mining levels on Earth.** The economic benefits of mining need not be sacrificed for the sake of the environment.<sup>38</sup>

**Collision is unlikely – all countries receive collision warnings THREE days ahead AND their evidence doesn't assume new technology.**

**Mosher '19** [Dave; September 3rd; Journalist with more than a decade of experience reporting and writing stories about space, science, and technology; Business Insider, "Satellite collisions may trigger a space-junk disaster that could end human access to orbit. Here's How,"

[https://www.usafa.edu/app/uploads/Space\\_and\\_Defense\\_2\\_3.pdf](https://www.usafa.edu/app/uploads/Space_and_Defense_2_3.pdf); GR]///ww pbj

The **Kessler syndrome** plays center-stage in the movie "Gravity," in which **an accidental space collision** endangers a crew aboard a large space station. But Gossner said **that type of a runaway space-junk catastrophe is unlikely**. "Right now I don't think we're close to that," he said. "I'm not saying we couldn't get there, and I'm not saying we don't need to be smart and manage the problem. But I don't see it ever becoming, anytime soon, an unmanageable problem." There is no current system to remove old satellites or sweep up bits of debris in order to prevent a Kessler event. Instead, **space debris is monitored from Earth**, and new rules require satellites in low-Earth orbit be deorbited after 25 years so they don't wind up adding more space junk. "Our current plan is to manage the problem and not let it get that far," Gossner said. "I don't think that we're even close to needing to actively remove stuff." There's lots of research being done on that, and maybe some day that will happen, but I think that — **at this point**, and in my humble opinion — **an unnecessary expense**." A major part of the effort to prevent a Kessler event is the **Space Surveillance Network (SSN)**. The project, **led by the US military, uses 30 different systems around the world to identify, track, and share information about objects in space**. Many **objects are tracked day and night via a network of radar observatories around the globe**. Optical telescopes on the ground also keep an eye out, but they aren't always run by the government. "The commercial sector is actually putting up lots and lots of telescopes," Gossner said. The government pays for their debris-tracking services. Gossner said **one major debris-tracking company** is called **Exoanalytic**. It **uses about 150 small telescopes set up around the globe to detect, track, and report space debris to the SSN**. Telescopes in space track debris, too. **Far less is known about them because they're likely top-secret military satellites**. **Objects detected by the government and companies get added to a catalog of space debris and checked against the orbits of other known bits of space junk**. **New orbits are calculated with supercomputers to see if there's a chance of any collisions**. Diana McKissock, a flight lead with the US Air Force's 18th Space Control Squadron, helps track space debris for the SSN. She said the surveillance network issues warnings to NASA, satellite companies, and other groups with spacecraft, based on two levels of emergency: basic and advanced. **The SSN issues a basic emergency report to the public three days ahead of a 1-in-10,000 chance of a collision**. **It then provides multiple updates per day until the risk of a collision passes**. To qualify for such reporting, a rogue object must come within a certain distance of another object. In low-Earth orbit, that distance must be less than 1 kilometer (0.62 mile); farther out in deep space, where the precision of orbits is less reliable, the distance is less than 5 kilometers (3.1 miles). **Advanced emergency reports help satellite providers see possible collisions much more than three days ahead**. **"In 2017, we provided data for 308,984 events, of which only 655 were emergency-reportable"** McKissock told Business Insider in an email. Of those, 579 events were in low-Earth orbit (where it's relatively crowded with satellites).

## No debris impact at every layer of space

**Fange 17** (Daniel von Fange. Web Application Engineer. "Kessler Syndrome is Over Hyped," *Braino*, 5/21/17, [http://braino.org/essays/kessler\\_syndrome\\_is\\_over\\_hyped/](http://braino.org/essays/kessler_syndrome_is_over_hyped/)) dwc 19) //ww pbj

**Kessler Syndrome is overhyped.** A chorus of online commenters great any news of upcoming low earth orbit satellites with worry that humanity will to lose access to space. I now think they **are wrong.** // What is Kessler Syndrome? Here's the popular view on Kessler Syndrome. Every once in a while, a piece of junk in space hits a satellite. This single impact destroys the satellite, and breaks off several thousand additional pieces. These new pieces now fly around space looking for other satellites to hit, and so exponentially multiply themselves over time, like a nuclear reaction, until a sphere of man-made debris surrounds the earth, and humanity no longer has access to space nor the benefits of satellites. // It is a dark picture. // Is Kessler Syndrome likely to happen? I had to **stop everything and spend an afternoon doing back-of-the-napkin math to know how big the threat is.** To estimate, **we need to know where the stuff in space is, how much mass is there, and how long it would take to deorbit.** // The orbital area around earth can be broken down into four regions. // **Low LEO** - Up to about 400km. **Things that orbit here burn up in the earth's atmosphere quickly - between a few months to two years.** The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, **Low LEO doesn't matter for Kessler Syndrome. If Low LEO was ever full of space junk, we'd just wait a year and a half, and the problem would be over.** // High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue. // **Mid Orbit** - GPS satellites and other navigation satellites travel here in lonely, long lives. The **volume of space is so huge, and the number of satellites so few, that we don't need to worry about Kessler here.** // **GEO** - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. **Usually the geostationary orbit is used by big weather satellites and big TV broadcasting satellites.** (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, **all the satellites here are moving the same direction at the same speed** - debris doesn't get free velocity from the speed of the satellites. Also, **it's quite expensive to get a satellite here, and so there aren't many, only about one satellite per 1000km of the ring.** Kessler is not a problem here. // How bad could Kessler Syndrome in **High LEO be? Let's imagine a worst case scenario.** // An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space? // I'm **guessing the world has launched about 10,000 tons of satellites total.** For guessing purposes, I'll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm<sup>3</sup>, then that's 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. **If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000.** // So **even in the worst case, we don't lose access to space.** // Now though you can travel through the debris, you couldn't keep a satellite alive for long in this orbit of death. **Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits.** // **In real life, there's a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment.** // **Debris would be spread over a volume of space,** not a single orbital surface, making collisions orders of magnitudes less likely. // Most **impact debris will have a slower orbital velocity** than either of its original pieces - this makes it deorbit much sooner. // Any **collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar** and avoided. // The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren't an issue for Kessler. // Most importantly, all new satellite launches since the 1990's are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting) // So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn't even have a huge effect.



## **2] Military Precedent - Attacks on SATs do not trigger Nuclear War**

**Zarybnisky 18**, Eric J. Celestial Deterrence: Deterring Aggression in the Global Commons of Space. Naval War College Newport United States, 2018. (Senior Materiel Leader at United States Air Force)//Elmer

PREVENTING AGGRESSION IN SPACE While deterrence and the Cold War are strongly linked in the public's mind through the nuclear standoff between the United States and the Soviet Union, the fundamentals of deterrence date back millennia and deterrence remains relevant. Thucydides alludes to the concept of deterrence in his telling of the Peloponnesian War when he describes rivals seeking advantages, such as recruiting allies, to dissuade an adversary from starting or expanding a conflict.<sup>6F 6</sup> Aggression in space was successfully avoided **during the Cold War** because **both sides viewed an attack on military satellites as highly escalatory**, and such an action would likely result in general nuclear war.<sup>7F 7</sup> **In today's more nuanced world, attacking satellites, including military satellites, does not necessarily result in nuclear war.** For instance, **foreign countries have used highpowered lasers against American intelligence-gathering satellites**<sup>8F 8</sup> **and the United States has been reluctant to respond, let alone retaliate** with nuclear weapons. This **shift in policy is a result of the broader use of gray zone operations**, to which countries struggle to respond while limiting escalation. Beginning with the fundamentals of deterrence illuminates how it applies to prevention of aggression in space.

## **3] Won't go nuclear – seen as a normal conventional attack because of integration with ground forces**

**Firth 7/1/19** [News Editor at MIT Technology Review, was Chief News Editor at New Scientist. How to fight a war in space (and get away with it). July 1, 2019. MIT Technology Review]

**Space is so intrinsic to how advanced militaries fight on the ground that an attack on a satellite need no longer signal the opening shot in a nuclear apocalypse.** As a result, "deterrence in space is less certain than it was during the Cold War," says Todd Harrison, who heads the Aerospace Security Project at CSIS, a think tank in Washington, DC. Non-state actors, as well as more minor powers like North Korea and Iran, are also gaining access to weapons that can bloody the noses of much larger nations in space.