# **1AC**

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

**Appropriation: [Webster Dictionary] to take or make use of without authority or right**

**Private Entity: [https://www.law.cornell.edu/definitions/uscode.php?height=800&def\_id=6-USC-625312480-168358316&term\_occur=999&term\_src=title:6:chapter:6:subchapter:I:section:1501]**

**any person or private group, organization, proprietorship, partnership, trust, cooperative, corporation, or other commercial or nonprofit entity, including an officer, employee, or agent thereof.**

**Outer Space: [Webster Dictionary] space immediately outside the earth's atmosphere**

# **1AC – Framing**

**Existential threats independently outweigh – all life has infinite value and extinction eliminates the possibility for future generations**

**Schell 82** [Jonathan Schell, Scholar and Visiting Fellow at Yale University. “The Fate of the Earth”]

Up to now, every risk has been contained within the frame of life; **extinction** would shatter the frame. It **represents not the defeat of some purpose but an abyss in which all human purposes would be drowned for all time. We have no right to place the possibility** of this **limitless, eternal defeat** **on the same footing as risks** that we run **in the ordinary conduct of** our **affairs** in our particular transient moment of human history. To employ a mathematical analogy, we can say that **although the risk of extinction may be fractional, the stake is, humanly speaking, infinite, and a fraction of infinity is still infinity**. In other words, once we learn that a holocaust might lead to extinction **we have no right to gamble**, because **if we lose, the game will be over, and neither we nor anyone else will ever get another chance.** Therefore, although, scientifically speaking, there is all the difference in the world between the **mere possibility** that a holocaust will bring about extinction **and** the **certainty** of it, morally they **are the same**, and we have no choice but to address the issue of nuclear weapons as though we knew for a certainty that their use would put an end to our species. In weighing the fate of the earth and, with it, our own fate, we stand before a mystery, and in tampering with the earth we tamper with a mystery. We are in deep ignorance. Our ignorance should dispose us to wonder, our wonder should make us humble, our humility should inspire us to reverence and caution, and our reverence and caution should lead us to act without delay to withdraw the threat we now pose to the earth and to ourselves.

**Pleasure and pain are intrinsically valuable.**

**Moen 16** [Ole Martin Moen, Research Fellow in Philosophy at University of Oslo “An Argument for Hedonism” Journal of Value Inquiry (Springer), 50 (2) 2016: 267–281] SJDI

Let us start by observing, empirically, that **a widely shared judgment about intrinsic value and disvalue is that pleasure is intrinsically valuable and pain is intrinsically disvaluable. On virtually any proposed list of intrinsic values and disvalues (we will look at some of them below), pleasure is included among the intrinsic values and pain among the intrinsic disvalues.** This inclusion makes intuitive sense, moreover, for **there is something undeniably good about the way pleasure feels and something undeniably bad about the way pain feels, and neither the goodness of pleasure nor the badness of pain seems to be exhausted by the further effects that these experiences might have.** “Pleasure” and “pain” are here understood inclusively, as encompassing anything hedonically positive and anything hedonically negative.2 The special value statuses of pleasure and pain are manifested in how we treat these experiences in our everyday reasoning about values. **If you tell me that you are heading for the convenience store, I might ask: “What for?”** This is a reasonable question, for when you go to the convenience store you usually do so, not merely for the sake of going to the convenience store, but for the sake of achieving something further that you deem to be valuable. **You might answer, for example: “To buy soda.” This answer makes sense, for soda is a nice thing and you can get it at the convenience store. I might further inquire, however: “What is buying the soda good for?”** This further question can also be a reasonable one, for it need not be obvious why you want the soda. You might answer: **“Well, I want it for the pleasure of drinking it.”** If I then proceed by asking **“But what is the pleasure of drinking the soda good for?”** the discussion is likely to reach an awkward end. The reason is that the **pleasure is not good for anything further**; it is simply that for which going to the convenience store and buying the soda is good.3 As Aristotle observes: **“We never ask [a man] what his end is in being pleased, because we assume that pleasure is choice worthy in itself.”**4 Presumably, a similar story can be told in the case of pains, for if someone says “This is painful!” we never respond by asking: “And why is that a problem?” **We take for granted that if something is painful, we have a sufficient explanation of why it is bad. If we are onto something in our everyday reasoning about values, it seems that pleasure and pain are both places where we reach the end of the line in matters of value.**

**Thus, the value is justice and the standard is maximizing expected well-being**

### **Prefer this framework for two reasons:**

### **1] Death is bad and extinction outweighs – a) agents can’t act if they fear for their bodily security which constrains every ethical theory, b) it destroys the subject itself – kills any ability to achieve value in ethics since life is a prerequisite which means it’s a side constraint since we can’t reach the end goal of ethics without life**

### **2] Actor specificity—Governments must aggregate since every policy benefits some and harms others, which also means side constraints freeze action. Actor-specificity comes first since different agents have different ethical standings.**

# **1AC – Advantages**

### **Space Pollution**

**Lack of regulation proliferates debris**

**Holden 18** [John Holden, The Irish Times, Writer, Journalist, EARTH producer]

https://www.irishtimes.com/business/innovation/why-space-capitalism-will-eat-itself-1.3556368

It would be trite to compare the commercial space sector to the **American Wild West.** But with no one policing the burgeoning industry, businesses operate untethered in a market where there are no rules and **no open channels of communication.** It means **satellites are launched unchecked every day by anyone** – from the amateur enthusiast in her back garden to major international space co-operatives. It’s nearly impossible to know what’s really going on up there. **US officials believe** there are about **half a million man-made objects floating around in orbit**. But that’s about as specific as they can get. Not very scientific. The only thing more predictable than tired Wild West analogies is the human species itself. We are a predictable bunch, prone to **making the same mistakes over and over.** As such, we enter a new era where space pollution is an issue. What could be a more iconic symbol of our wretched love for creating waste than flying devices designed never to return? **Earlier this year, India broke all previous records by launching 104 satellites at once into orbit.** Cool. Except those 104 satellites are **destined to become** 104 (or more) **pieces of trash floating around in space**. That’s right. **Satellite technology, in its current state, is the new “lightbulb” of planned obsolescence.** What could be a more iconic symbol of our wretched love for creating waste than flying devices designed never to return? When a satellite’s mission is complete, or it malfunctions, it’s gone. Girl, bye. **“Space junk” make**s **up a significant proportion of** the gu**esstimated 500,000 plus objects** floating around in orbit. About 23,000 of these objects are currently being tracked and maintained by the US Strategic Command. These so-called resident space objects are either satellites still in use or are known objects no longer fit for purpose. They could be as small as a tennis ball or the size of a double decker bus. In addition, however, there are hundreds of thousands of other objects – bolts, exploded satellite pieces, large rockets and **other space debris** – that **are unaccounted for**. Efforts have been made to try to consolidate public with private data on what is up there but, for various reasons, the space community does not openly share information on where all objects are located. For the entrepreneurially inclined, it is probably not that surprising to hear **many are taking advantage of the severe lack of regulation in space**. Sure why wouldn’t you? Moreover why would anyone publicly disclose how and where their interests lie in a given market, intergalactic or otherwise, if they weren’t obliged to? But space isn’t just another market. Thinking one can apply the same rules up there as we use on earth is shortsighted for so many reasons. Down here the economic “unknowns” are known. Space is replete with unknown unknowns. I**f a satellite that is used to collect data to sell on to business customers one day stops sending data, and you haven’t the foggiest notion why, what do you tell the customers? How do you attribute cause? How does a company predict the likelihood of loss or damage to its equipment in space or perform other prudent exercises before getting into the space game?** One of the chief concerns for any new business is risk and how to mitigate it. There couldn’t be a much riskier bet than entering a market with no regulation, patchy knowledge of your competitors’ location or size, and to top it all off, little understanding of the physical environment within which the business will operate. **Until everyone is economically incentivised to behave responsibly in space, the chaos will continue.** With aplomb. It won’t last forever though. The current lack of regulation is, in itself, the mother of all gaps in the biggest market civilization may ever exploit. And the Trump administration is the first to corner it. Suddenly the decision to give responsibility for space traffic management issues to the commerce department, and not the FAA, begins to make sense.

**Private actors uniquely cause debris cascades – they have lower safety standards and won’t cooperate with others**

**Yuan 21** [Alda Yuan, Public Health Analyst U.S. Department of Health and Human Services and visiting attorney at the Enivornmental Law Institute with a JD from Yale, 2021, “FILLING THE VACUUM: ADAPTING INTERNATIONAL SPACE LAW TO MEET THE PRESSURES CREATED BY PRIVATE SPACE ENTERPRISES,” Hein Online, https://heinonline.org/HOL/P?h=hein.journals/denilp49&i=27]/Kankee

C. Non-state Actors Introduce Practical Challenges that **Endanger** the Future of Space Travel If companies are permitted to access space without a proper legal framework or sufficient coordination, the practical risks may **doom** the project of humanity in outer space for the near future. The opening anecdote dramatized the risks, but the fact that a chain of cascading destruction might **preclude** the use of whole bands of outer space or make launches **impossible** is not farfetched. 99 Indeed, it is already happening.0 Because space missions always create debris and there is a **correlation** between the number of objects orbiting earth and the chances of collision, which thereby creates more debris, even no further activity in space will eventually result in a belt of debris encircling the earth.10 1 This cascade effect, called the Kessler Syndrome, 102 has the potential to speed up astronomically if activities in outer space expand without contingent regulation and mitigation measures.1 1 3 At current rates and in the absence of a catastrophic event, **l**ower **e**arth **o**rbit, in particular, might reach a **tipping point** within the next ten to fifty years.1 4 If the space debris problem is permitted to reach this tipping point, access to space may well be **cut off** for the near future because it will be impossible to launch satellites.1 5 Given that we do not have the technology to clean up debris yet, space travel faces an **existential threat**. In light of this, most space-faring states cooperate, working together to develop guidelines and pool resources to track the debris already orbiting the earth to minimize the chances of a collision.106 Given the high speeds the debris travels at, approximately 10 km/second,107 and the amount of damage even tiny pieces can do, 108 the existing tracking systems are not an absolute fix. At these speeds, a piece of debris weighing a mere two grams can produce an impact force equivalent to a kilogram of TNT.109 More than three hundred thousand pieces of debris greater than one cm in diameter," and therefore capable of causing enormous damage, orbit the earth while the US Space Surveillance Network (SSN) system can only track objects over five cm in diameter." There are millions of fragments smaller than one cm, which are impossible to track and yet can still cause significant damage.11 2 Still, the tracking system is important. In the last twenty years, the International Space Station has carried out several avoidance maneuvers to avoid potential collision with pieces of space debris being tracked by the SSN system.113 Between April of 2011 and April of 2012, the ISS performed four evasive maneuvers." 4 On two additional occasions, the crew fell back to the Soyuz since there was no time to set up an evasive maneuver." 5 This sort of cooperation works given the limited number of actors involved and the aligned interests of the nation-state parties. Commercial space companies do not have the same **incentives** to cooperate to share data and new technologies. This is why many have called for the creation of a new convention on managing orbital debris. 16 However, escalation of the Kessler Syndrome is not the only problem that might arise by failing to accommodate for the rise of the commercial corporations, so such a convention would not eliminate the threat. For instance, many satellites use nuclear power sources (NPS), which can **break up** upon reentry." As early as 1978, the Cosmos-954 incident scattered radioactive debris over Canada.118 Other **accidents** of this type could raise **fallout** concerns, especially if they occur over more densely populated regions. In an attempt to alleviate this risk and decrease the chances of collisions, various nations have cooperated to design and standardize methods of decommissioning satellites. 119 One strategy is to supply spacecraft with additional fuel and nudge it out of orbit so it will burn up in the atmosphere over the ocean. 120 Another is to push the ailing satellite into a graveyard orbit. 121 These methods require additional research and design and incur additional costs. 12 2 Private companies may not spontaneously take the steps **necessary** to comport with the common practices of space-faring nations. Thus, the rise of private corporations, while opening up new possibilities, may also **threaten** space travel itself and the international legal order in which coordination currently occurs. The coordination necessary to prevent and manage the unique problems that arise in space requires a more pragmatic framework. Directly binding private non-state actors benefits the international community because it prevents **abusive practices** and permits the coordination of efforts that make space safer. However, it will also benefit the private sector by providing companies with a background legal structure, neutral dispute resolution, and common guidelines to even the playing field. More importantly, if companies not subject to regulation and oversight are permitted to operate in outer space, disasters cannot be effectively prevented. In that case, space exploration and the benefits stemming from it might be closed off for all. III. SPACE IS A GLOBAL COMMONS UNDER CUSTOMARY INTERNATIONAL LAW

**Mass rocket launch pollutes the earth**

**Shammas and Holen 19** [Victor L, a sociologist working at the Department of Sociology and Human Geography, University of Oslo; Tomas B., independent scholar in Oslo, Norway) “Capitalism and Outer Space: Replies to an Interlocutor” Dr. Victor Lund Shammas Blog, https://www.victorshammas.com/blog/2019/12/17/capitalism-andouter-space, 12/18/2019] RM

**When speaking of viability, one aspect that gets underplayed are the significant ecological effects of launching into space.** For instance, SpaceX is developing the idea of Earth-to-Earth space flight, which might entail moving passengers from any point on Earth to any other point within, say, half an hour. **What would be the ecological consequences of burning tremendous amounts of rocket fuel to escape Earth’s gravity well, just so that a London-based billionaire could get to Sydney in 30 minutes?** There is something perverse about the idea that all the rest of us are being enjoined to cut back on flying, even as Musk and his cronies tinker away to make life easy for the hyper-rich. Of course, this would be just one more step in a general tendency under capitalism that the geographer David Harvey calls time-space compression: **The speed at which capital circulates increases and along with it life also accelerates.** Both space and time are compressed by new technologies. **One unfortunate consequence of Earth-to-Earth space flight, if it is ever realized, would be its damaging effects on our already CO2-saturated atmosphere.** But perhaps more worrying, **according to some rocket engineers, is the trail of soot and alumina left in the wake of rockets that could accumulate in the stratosphere and deplete our fragile ozone layer.** The United Nations’ 2018 Quadrennial Global Ozone Assessment is the first annual UN report to take this threat seriously. Ironically, as Musk dreams of shuttling humans off Earth to Mars as a species-preserving measure, **he could be co-responsible for 13 accelerating the very destruction of Earth that he purportedly fears.** In a radically decarbonized future, heavy caps on emissions might be enough to shutter the space industry - or at least seriously rein it in. This might not be a bad thing, because as a report from the non-profit Aerospace Corporation recently noted, emissions from rockets “inherently impact the stratosphere in a way that no other industrial activity does.” Reaching space on a grand scale might entail tearing open and ripping apart our own atmosphere in the process. This is why **we** may **need to rethink** our future in space—perhaps even holding off from **launching too many rockets into space**—precisely in order **to preserve life** here **on Earth.**

**Black carbon depletes the ozone layer**

**Grush 17** [Loren Grush, Loren Grush is a science reporter for The Verge, the technology and culture brand from Vox Media, where she specializes in all things space—from distant stars and planets to human space flight and the commercial space race. The daughter of two NASA engineers, she grew up surrounded by space shuttles and rocket scientists—literally. She is also the host of Space Craft, an original online video series that examines what it takes to send people to space. Before joining The Verge, Loren published stories in Popular Science, The New York Times, Nautilus Magazine, Digital Trends, Fox News, and ABC News.) “Why it’s time to study how rocket emissions change the atmosphere: Get the data now before the problem gets worse” The Verge, May 31, 2018]

RM Every time a rocket launches, it produces a plume of exhaust in its wake that leaves a mark on the environment. These plumes are filled with materials that can collect in the air over time, potentially altering the atmosphere in dangerous ways. It’s a phenomenon that’s not well-understood, and some scientists say we need to start studying these emissions now before the number of rocket launches increases significantly. **It’s not the gas** in these plumes **that’s most concerning.** Some rockets do produce heattrapping greenhouse gases, like carbon dioxide, but those emissions are negligible, according to experts. “The rocket business could grow by a factor of 1,000 and the carbon dioxide and water vapor emissions would still be small compared to other industrial sources,” Martin Ross, a senior project engineer at the Aerospace Corporation who studies the effects of rockets on the atmosphere, tells The Verge. Instead, it’s **tiny particles** that are produced inside the trail that we need to watch out for, Ross says. Small pieces **of soot and** a chemical called **alumina** are created in the wakes of rocket launches. They then get **injected into the stratosphere**, the layer of Earth’s atmosphere that begins six miles up and ends around 32 miles high. Research shows that **this material may build up in the stratosphere over time and slowly lead to the depletion of a layer of oxygen known as the ozone.** The ozone acts like a big shield, **protecting Earth against** the Sun’s harmful **ultraviolet radiation.** However, the magnitude of this ozone depletion isn’t totally known, says Ross. “IT’S A CALL FOR MORE RESEARCH IN THIS AREA TO KNOW EXACTLY WHAT 14 WE’RE PUTTING INTO THE UPPER ATMOSPHERE AND IN WHAT QUANTITIES.” That’s why he and others at the Aerospace Corporation, a nonprofit that provides research and guidance on space missions, are calling for more studies. They say it’s especially important now since the private space industry is at the early stages of a launch revolution. Currently, the number of launches each year is relatively small, around 80 to 90, so the aerospace industry’s impact on the atmosphere is not much of a concern. But in a new paper published in April, Ross and his colleague Jim Vedda argue that as launches increase, policymakers will eventually want to know what kind of damage these vehicles are causing to the environment and if regulations are necessary. When that time comes, it will be better to have as much data as possible to make the best decisions. “It’s a call for more research in this area to know exactly what we’re putting into the upper atmosphere and in what quantities,” Vedda, a senior policy analyst at the Aerospace Corporation, tells The Verge. “So when the debates start, we have the good hard data that says, ‘Here’s a well-defined model of what’s actually happening.’” So far, the research we have about these emissions mostly comes from lab experiments, modeling, and some direct detections of rocket plumes. At the turn of the century, a few high-altitude planes equipped with sensors flew through plumes created by the Space Shuttle and other vehicles to figure out what was inside. It turns out that all kinds of rockets produce these emissions, but some types of vehicles produce more than others. Rockets that run on solid propellants produce a higher amount of alumina particles, a combination of aluminum and oxygen that is white and reflective. Most orbital rockets don’t run on solid propellants these days, though some launch companies like the United Launch Alliance do add solid rocket boosters to vehicles to give them extra thrust. Meanwhile, rockets that run on **liquid kerosene**, a type of refined oil, **produce** more of the **dark soot** particles, what is known as **black carbon.** Kerosene is **used** as a propellant **for** rockets **such as** ULA’s **Atlas** V **and SpaceX**’s Falcon 9. ALL KINDS OF ROCKETS PRODUCE THESE EMISSIONS, BUT SOME TYPES OF VEHICLES PRODUCE MORE THAN OTHERS Alumina and black carbon from rockets can stick around in the stratosphere for three to five years, according to Ross. As these materials collect high above the Earth, they can have interesting effects on the air. Black carbon forms a thin layer that intercepts and absorbs the sunlight that hits Earth. “It would act as a thin, black umbrella,” says Ross. That may help keep the lower atmosphere cool, but the intercepted energy from the Sun doesn’t just go away; it gets deposited into the stratosphere, warming it up. This warming ultimately causes chemical reactions that could lead to the depletion of the ozone layer. The reflective alumina particles can also affect the ozone but in a different way. Whereas the soot acts like a black umbrella, the alumina acts like a white one, reflecting sunlight back into space. However, chemical reactions occur on the surface of these white particles, which, in turn, destroy the ozone layer, Ross says. Black carbon and alumina have actually been proposed by scientists as possible 15 geoengineering agents or tools for cooling down our warming climate. But while they may keep the lower atmosphere cool, geoengineering agents may have other unwanted side effects, too. **They** might **interact with jet streams, causing droughts or** more **tropical storms.** That’s why many scientists have criticized the idea of geoengineering to combat climate change. However, rockets are putting these particles into the air no matter what, and this byproduct of ozone loss is particularly concerning for Ross and Vedda. As the ozone diminishes, more of the Sun’s harmful radiation could reach the ground. These **UVB rays** can **cause skin cancer and cataracts**. “That’s what we need to understand — the ozone depletion aspect of this because protection of the ozone layer is an international imperative,” says Ross. The 1987 Montreal Protocol, for example, is an international agreement to phase out materials that deplete the ozone. Right now, Ross estimates that rocket launches around the world inject 10 gigagrams, or 11,000 tons, of soot and alumina particles into the atmosphere each year. But that number could be going up. **SpaceX has vowed to increase the number of launches it does each year, and numerous other companies are going to start launching their own vehicles soon.** What kind of impact that will have on the atmosphere is unclear. That’s why Ross and Vedda suggest the government and universities invest in a series of research programs, in which scientists collect more data on rocket particles from aircraft and satellites. “WE WANT TO **BE PROACTIVE BEFORE THIS TIPPING POINT OCCURS.”**

**Black carbon poses as a critical health threat**

**CHO 16** [Renee Cho, Communications Coordinator for Riverkeeper, the Hudson River environmental organization, Columbia Climate School - State of the Planet, "The Damaging Effects of Black Carbon", MARCH 22, 2016, https://news.climate.columbia.edu/2016/03/22/the-damaging-effects-of-blackcarbon/]

BD Air pollution, both outdoors and indoors, causes millions of premature deaths each year. The deaths are mainly caused by the inhalation of particulate matter. **Black carbon, a component of particulate matter, is especially dangerous to human health because of its tiny size. But black carbon not only has impacts on human health, it also affects visibility, harms ecosystems, reduces agricultural productivity and exacerbates global warming.** The World Health Organization’s new report on disease from preventable environmental risks attributes 3.7 million premature deaths in 2012 to outdoor air pollution, and 4.3 million to household air pollution. The breathing in of particulate matter (composed of black carbon, sulfate, nitrates, ammonia, sodium chloride, mineral dust and water) that measures 10 microns or less in diameter (PM10), poses the greatest health risks because **the particles can find their way deep into lungs and the bloodstream, and cause cardiovascular and respiratory disease, and premature death. Formed by the incomplete burning of fossil fuels, biofuels and biomass, black carbon, has a diameter of less than 2½ microns (PM2.5).** A major constituent of soot, **black carbon** is the most solar energy-absorbing component of particulate matter and **can absorb one million times more energy than CO2.** The amount of energy stored in the atmosphere is measured as watts per square meter of Earth’s surface; a 2013 study estimated black carbon’s effect to be 1.1 watts per square meter per year, second only to carbon dioxide, which is responsible for 1.56 watts per square meter. In other words, black carbon is the second largest contributor to climate change after CO2. But unlike CO2, **which can stay in the atmosphere for** hundreds to **thousands of years,** black carbon, because it is a particle, remains in the atmosphere only for days to weeks before it returns to earth with rain or snow. Because black carbon absorbs solar energy, it warms the atmosphere. When it falls to earth with precipitation, it darkens the surface of snow and ice, reducing their albedo (the reflecting power of a surface), warming the snow, and hastening melting.

**Ozone collapse causes extinction**

**Simmons 20** [Carla Simmons,, The Science Times, "A Repeat of One of the Biggest Extinctions Caused by Ozone Layer Erosion 359M Years Ago Possible, Warn Scientists | Science Times", May 27, 2020, https://www.sciencetimes.com/articles/25838/20200527/repeat-one-biggestextinctions-caused-ozone-layer-erosion-359m-years.htm]

BD University of Southampton researchers have delved deeper into an extinction event that occurred about 360 million years ago. According to their research, **the ozone layer's breakdown** caused by ultraviolet (UV) radiation **vanquished** much of the **Earth**'s marine life and greenery. Moreover, their discovery led to weighty indications for today's continually warming Earth. Numerous episodes of mass extinction occurred in the geological past. One of the most notorious ones caused the extinction of dinosaurs about 66 million years ago. Their destruction was believed to have been caused by an asteroid hitting the Earth. Additionally, two chapters were caused by large-scale volcanic eruptions that created the imbalance of oceans and atmospheres in the planets. Another one happened during the end of Permian Great Dying, which, according to Stanford, wiped out 96% of the Earth's aquatic species. Scientists have discovered evidence pointing to high levels of UV radiation responsible for **collapsing forest** ecosystem**s** **and** killing off **water animal species** during the Devonian 16 geological period about 359 million years ago. Their research revealed that warming temperatures after an intense ice age could have caused the ozone to collapse. The researchers suggest that the **Earth might** possibly **reach comparable temperatures,** thus might face the same consequences that occurred in the past. The findings of their study are published in the journal Science Advances. Additionally, the research was partly funded by a grant from the National Geographic Society. It was also regulated in collaboration with The Sedgwick Museum of Earth Sciences at the University of Cambridge. The team collected various rock samples during expeditions in locations in South America. They formed clues as to what was happening at the edge of the melting Devonian ice sheet, which allowed them to compare between the extinction event close to the pole and near the equator. The rocks were then dissolved in hydrofluoric acid back in the laboratory. The dissolved rocks released microscopic plant spores, which were preserved for hundreds of millions of years. On microscopic examination, the scientists found many of the spores had bizarrely formed spines on their surface. According to the researchers, the spikes were due to UV radiation damaging their DNA. Furthermore, they found that many spores had dark pigmented walls. These walls were thought to be a protective 'shield' against the increasing and damaging UV levels. From their findings, the scientists have concluded that during a time of expeditious global warming, the ozone layer collapsed for a short while. Moreover, the ozone collapse exposed life on Earth to **harmful UV radiation** levels and, therefore, **triggered a mass extinction** event. This affected life on land and in shallow water at the Devonian-Carboniferous boundary. **From Climate Change to Climate Emergency** Professor John Marshall, the lead researcher from the University of Southampton's School of Ocean and Earth Science, said that our ozone layer is currently in a state of alteration. He adds that they have seen this pattern in the past, where a stimulant or impetus was unnecessary for the phenomenon to kick in. He also says that current approximate calculations suggest that the Earth will reach similar global temperatures to those of 360 million years ago. Furthermore, they say it is possible that a similar **collapse of the ozone layer could occur again**, **dangerously exposing** surface and shallow sea life to **harmful radiation.**

### **Space Wars**

**Private companies are gearing up to extract resources from outer space**

**Gilbert 21** [Alex Gilbert, is a complex systems researcher and a PhD student in space resources at the Colorado School of Mines, 04/26/2021, “Mining in Space Is Coming”, Milken Institute Review, [https://www.milkenreview.org/articles/mining-in-space-is-coming]](https://www.milkenreview.org/articles/mining-in-space-is-coming) /Triumph Debate

Space exploration is back. after decades of disappointment, a combination of better technology, falling costs and a rush of competitive energy from **the private sector has put space travel front and** **center.** indeed, many analysts (even some with their feet on the ground) believe that commercial **developments in the** space **industry may** be on the cusp of **start**ing **the largest resource rush in history**: **mining on the Moon, Mars** **and asteroids.** While this may sound fantastical, some baby steps toward the goal have already been taken**. Last year, NASA awarded contracts to four companies to extract small amounts of lunar regolith by 2024,effectively beginning the era of commercial space mining.** Whether this proves to be the dawn of a gigantic adjunct to mining on earth — and more immediately, a key to unlocking cost-effective space travel — will turn on the answers to a host of questions ranging from what resources can be efficiently. As every fan of science fiction knows, the resources of the solar system appear virtually unlimited compared to those on Earth. There are whole other planets, dozens of moons, thousands of massive asteroids and millions of small ones that doubtless contain humungous quantities of materials that are scarce and very valuable (back on Earth).

**Space industry is booming – existing regulations aren’t enough to inform how entities should act**

**Elks 19** [Sonia Elks is a reporter at Thomson Reuters Foundation, 07/24/2019, “Space jam? Companies risk clutter, conflict in race for the skies” Reuters, [https://www.reuters.com/article/us-global-space-business-feature/space-jam-companies-risk-clutter-conflict-in-race-for-the-skies-idUSKCN1UK015]](https://www.reuters.com/article/us-global-space-business-feature/space-jam-companies-risk-clutter-conflict-in-race-for-the-skies-idUSKCN1UK015) /Triumph Debate

LONDON (Thomson Reuters Foundation) - Half a century after astronaut Neil Armstrong became the first man on the moon, a new space race is underway to exploit the skies for commercial profit. **Tech giants and startups pursuing bold plans such as selling space tourism, mining asteroids and beaming giant adverts into the skies are winning millions in investment with pledges to bring the stars into reach**. **Annual revenues from space**-related **business -** currently **worth $350 billion - could nearly triple in size by 2040, estimates U.S. investment bank Morgan Stanley**. But the **rapid growth of a market with** seemingly **boundless potential** has sparked concerns about **a lack of laws and potential conflicts** **over resources**, prompting calls for more rules to govern humanity’s use of the cosmos. “By 2040 (we believe) there will be 1,000 people living and working on the moon and 10,000 annual visitors,” said Aaron Sorenson, a spokesman from the Japanese lunar exploration startup ispace, inc. “Our company vision is to extend human presence into outer space. We believe that begins with the expansion of the earth’s economy to the moon,” he said. Drops in launch costs brought about by technological advances such as the development of commercial reusable rockets have caught the interest of startups and investors. Super-rich businesspeople including Tesla Inc chief executive Elon Musk and Amazon.com Inc founder Jeff Bezos who want to colonise space to support human life are pouring cash into cutting-edge private spacecraft. In addition, a resurgence in national space programmes of countries such as India - which this week launched a rocket aiming to get a rover on the moon - as well as the United States and China could provide a source of funding for businesses. GRAND AMBITIONS Space hotels, cosmic business insurance, celestial advertising billboards, and in-space manufacturing are among the businesses being explored by firms hoping that technology will open up new horizons amid a boom of commercial space activity. “I think very soon you are going to see major, traditional non-space businesses taking notice,” said Sorenson, whose company is working to develop a high-frequency shuttle between earth and the moon. Aerospace companies such as Musk’s SpaceX and Bezos’ Blue Origin are aiming to become the first private firm to launch a human into space.

**Finite resources on moon could lead to conflict - private companies are hoping to extract**

**Smith 20** [Adam Smith is a science and technology reporter, 11/24/2020, “FIGHT FOR MOON’S LIMITED RESOURCES COULD LEAD TO ‘CONFLICT’ BETWEEN GOVERNMENTS AND PRIVATE COMPANIES, SCIENTISTS FEAR” Independent, [https://www.independent.co.uk/life-style/gadgets-and-tech/moon-government-companies-resources-conflicts-b1761170.html]](https://www.independent.co.uk/life-style/gadgets-and-tech/moon-government-companies-resources-conflicts-b1761170.html) /Triumph Debate

Scientists fear that **the Moon might be plundered** too **quickly by private companies hoping to extract** **its valuable resources, new research has hypothesized.** A lack of international policies and agreements could result in tensions, overcrowding, and a rapid expansion of moon mining projects, the Center for Astrophysics | Harvard & Smithsonian says in a new paper. **Water and iron are particularly valuable resources that could be collected from the Moon, which would help companies construct infrastructure and develop agriculture as well as letting them avoid the vast expense of transporting such materials from the Earth. "**A lot of people think of space as a place of peace

and harmony between nations. The problem is there's no law to regulate who gets to use the resources, and there are a significant number of space agencies and others in the private sector that aim to land on the moon within the next five years," said Martin Elvis, astronomer at the Center for Astrophysics | Harvard & Smithsonian and the lead author on the paper, which has been published in Philosophical Transactions of the Royal Society A. "**We looked at all the maps of the Moon we could find and found that not very many places had resources of interest, and those that did were very small. That creates a lot of room for conflict over** certain **resources." The treaties that do exist, such as the 1967 Outer Space Treaty, do not offer staunch protection of celestial bodies from companies.** The Outer Space Treaty declares that “the moon and other celestial bodies shall be used by all states parties to the treaty exclusively for peaceful purposes”, but is not exclusive to governments. The United States insisted on a clause that allowed commercial companies to explore space as long as they “require authorisation and continuing supervision” of the government, as opposed to the Russian view that space exploration should be limited to governments. A following treaty, the 1979 Moon Treaty, has not been ratified by any state that engages in self-launched spaceflight such as the US, Russia, China, Japan, or members of the European Space Agency. "It tries to address the ownership of resources obtained from outer space, and really it was pretty much rejected by the international community”, Dr Jill Stuart, head of space policy at the London School of Economics, previously told The Independent. In 2020 the Artemis Accords were announced, which are a set of agreements that requires countries working with the US to return to the moon to commit to transparency about their work, to only explore space for “peaceful purposes”, and to guarantee they would work together to save any astronauts that came into danger during a mission. However, this still does not protect celestial bodies from

being overly exploited for resources. "The biggest problem is that **everyone is targeting the same sites and resources: states, private companies, everyone. But they are limited sites and resources. We don't** **have a second moon to move on to.** This is all we have to work with." Alanna Krolikowski, assistant professor of science and technology policy at Missouri University of Science and Technology, and a co-author on the paper, said in a statement. "While a comprehensive international legal regime to manage space resources remains a distant prospect, important conceptual foundations already exist and we can start implementing, or at least deliberating, concrete, local measures to address anticipated problems at specific sites today." Governments should also identify worse-case outcomes, such as overcrowding and interference at each site, and use those as a basis for legislation, Krolikowski added. Existing laws which protect common-pool resources, such as the oceans or local lakes on Earth, could be used as a baseline for these regulations, but policymakers need to decide how these resources will be classified. "Are these resources, say, areas of real estate at the high-value Peaks of Eternal Light, where the sun shines almost continuously, or are they units of energy to be generated from solar panels installed there? At what level can they can realistically be exploited? How should the benefits from those activities be distributed? Developing agreement on those questions is a likely precondition to the successful coordination of activities at these uniquely attractive lunar sites", Krolikowski said. Russian president Vladimir Putin warned last year that a new space race may develop between his country and the US, pushing the expansion of anti-satellite technologies and "space-based weapons" capable of targeting Earth and other objects in orbit.

**Space race risks militarization & outbreak of conflict**

**Thorne 21** [Stephen J. Thorne is a Writer/Photographer/Editor at Legion Magazine, 10/20/2021, “Militarization, not commercialization, is the problem in space” Legion Magazine, https://legionmagazine.com/en/2021/10/militarization-not-commercialization-is-the-problem-in-space/] /Triumph Debate

“The desire to counter the space ambitions of others and to achieve superiority in space seems to have re-emerged,”activities, and **the recognition of space as an essential part of every country’s economic, social and scientific progress, there is** an alarming **build-up of counter-space capabilities worldwide.**” The writers are

Kuan-Wei Chen, executive director of McGill’s Centre for Research in Air and Space Law; Ram S. Jakhu, acting director of McGill’s Institute of Air and Space Law; and Steven Freeland, emeritus professor of international law at Western Sydney University in Australia. Their essay on the militarization of space appeared Oct. 11 in The Conversation, a continuing series of online think pieces written by academic experts and researchers and distributed by a network of not-for-profit media outlets. “Even as private citizens can now crew space

missions, **military strategists** are **warn**ing **the competitive and congested nature of** **space will lead to** an **outbreak** of **conflict** in outer space,” they wrote. “Simmering tensions on Earth increase the risk that **humanity may** somehow **lurch into a**n unimaginable **space war, destroying economies and critical civilian and military infrastructure** that have become so heavily space-dependent.” In April, the International Committee of the Red Cross warned that “**the human cost of using weapons in outer space that could disrupt, damage, destroy or disable civilian or dual-use space objects is likely to be significant.**” And in September,

General John Raymond, chief of the fledgling U.S. Space Force, said the security of the final frontier is facing a “full spectrum of threats” from China that must be countered through international co-operation. **The Chinese have developed and are designing** **“everything from reversible jammers of our GPS system—which provides navigation and timing with precision—to jamming of communications satellites,”** Raymond told the Nikkei Asia news service. “They’ve got missiles they can launch from the ground and destroy satellites. I’m convinced that these capabilities that they’re developing would be utilized by them in their efforts in any potential conflict.” The Space Force was established as the U.S. military’s sixth branch by the Trump administration in 2019. Space science tracks weather patterns, enhances land use and advances humankind’s understanding of the planet and its place in the universe, the writers noted. Raymond said space also underpins “all of our instruments of national power, whether it’s diplomatic, economic, information, and national security.” “Great power competition is broader than just competition among the militaries,” he added. “It goes across all facets of governments. Space is critical to that.” Speaking at last spring’s virtual Ottawa Conference on Security and Defence, Lieutenant-General Stephen Whiting, head of U.S. Space Operations Command, said humankind is entering “a second golden age of space” but, like all things human, it brings unwanted baggage along with it. “The **space domain…has become congested, contested and competitive,”** said Whiting. He claimed that the U.S., Canada and their allies are monitoring some 30,000 scraps of debris and opayloads on each launch increased from just over four payloads per launch in 2019 to almost 12 payloads per launch in 2020.” It’s a new space race, as **rival countries clamour to gain dominance over** the high ground and **all the opportunities—both commercial and military—that come with it**. Raymond said he expects China or Russia would launch a debilitating attack on U.S. satellites should war ever break out. He is especially concerned about **China, which is developing** **“killer satellites” with robotic arms to incapacitate other satellites.** All such developments appear to run contrary to international treaties prohibiting the weaponization of space and U.S. President John F. Kennedy’s September 1962 declaration at Rice University in Houston that essentially told the Soviets the rules of the race. “There is no strife, no prejudice, no national conflict in outer space as yet. Its hazards are hostile to us all. Its conquest deserves the best of all mankind, and its opportunity for peaceful co-operation may never come again.” G7 nations agreed in June on a plan to advance international rulemaking at the United Nations and other global bodies. China and Russia have expressed willingness to co-operate and have called for limits on space weapons. The Conversation writers did sound a note of optimism, saying war is not inevitable and citing years of efforts to avoid it. “**In an era when humanity is faced with climate** **change, a global pandemic and the rapid exhaustion of resources, there is no room for assertions dominance and superiority**,” they wrote. “Rather, the common interests in peace that we all share are even more important, both on Earth and in outer space

**Space militarization risks nuclear war**

**Graham 05** [Thomas Graham, Jr. is a former special representative of the president for arms control, nonproliferation, and disarmament. In this and other senior capacities, he participated in every major arms control and nonproliferation negotiation in which the United States took part from 1970 to 1997, 12/08/2005, “Space Weapons and the Risk of Accidental Nuclear War”, Arms Control Association, [https://www.armscontrol.org/act/2005-12/features/space-weapons-risk-accidental-nuclear-war]](https://www.armscontrol.org/act/2005-12/features/space-weapons-risk-accidental-nuclear-war) /Triumph Debate

**The United States and Russia maintain thousands of nuclear warheads on long-range ballistic missiles on 15-minute alert. Once launched, they cannot be recalled, and they will strike their targets in roughly 30 minutes.** Fifteen years after the end of the Cold War, the chance of an accidental nuclear exchange has far from decreased.

Yet, the United States may be contemplating further exacerbating this threat by deploying missile interceptors in space.

**States and Russia rely on space**-based **systems to provide early warning of** a **nuclear attack.** If deployed, however, U.S. space-based missile defense interceptors could eliminate the Russian early warning satellites quickly and without warning. So, just **the existence of U.S. space weapons could make Russia’s** strategic **trigger fingers itchy.** The potential

protection space-based defenses might offer the United States is swamped therefore by their potential cost: a failure of or false signal from a component of the Russian early warning system could lead to a disastrous reaction and accidental nuclear war. There is no conceivable missile

defense, space-based or not, that would offer protection in the event that the Russian nuclear arsenal was launched at the United States. **Nor are the Russians or other countries likely to stand still and watch the United States construct space-based defenses. These states are likely to respond by developing advanced anti-satellite weapon systems.[1] These weapons, in turn, would endanger U.S. early warning systems, impair valuable U.S. weapons intelligence efforts, and increase the jitteriness of U.S. officials.** The Dangers of Failed Early Warning Systems The Russian early warning system is in serious disrepair. This system consists of older radar systems nearing the end of their operational life and just three functioning satellites, although the Russian military has plans to deploy more. The United States has 15 such satellites. Ten years ago, on January 25, 1995, this aging early warning network picked up a rocket launch from Norway. The Russian military could not determine the nature of the missile or its destination. Fearing that it might be a submarine-launched missile aimed at Moscow with the purpose of decapitating the Russian command and control structure, the Russian military alerted President Boris Yeltsin, his defense minister, and the chief of the general staff. They immediately opened an emergency teleconference to determine whether they needed to order Russia’s strategic forces to launch a counterattack. The rocket that had been launched was actually an atmospheric sounding rocket conducting scientific observations of the aurora borealis. Norway had notified Russia of this launch several weeks earlier, but the message had not reached the relevant sections of the military. In little more than two minutes before the deadline to order nuclear retaliation, the Russians realized their mistake and stood down their strategic forces. Thus, 10 years ago, when the declining Russian early warning system was stronger than today, it read this single small missile test launch as a U.S. nuclear missile attack on Russia. The alarm went up the Russian chain of command all the way to the top. The briefcase containing the nuclear missile launch codes was brought to Yeltsin as he was told of the attack. Fortunately, Yeltsin and the Russian leadership made the correct decision that day and directed the Russian strategic nuclear forces to stand down. Obviously, nothing should be done in any way further to diminish the reliability of the space-based components of U.S. and Russian

ballistic missile early warning systems. A **decline in confidence in** such **early warning systems caused by** the **deployment of weapons in space** would **enhance** the **risk of** an **accidental nuclear** weapons **attack.** Yet,as part of its plans for missile defense, the Pentagon is calling for the development of a test bed for space-based interceptors as well as examining a number of other exotic space weapons. In an interview published in Arms Control Today, Lt. Gen. Henry Obering, director of the Missile Defense Agency, touted what he said was “a very modest and moderate test-bed approach to launch some experiments.” Obering said the Pentagon would only deploy a handful of interceptors: “We are talking about onesies, twosies in terms of experimentation.”[2] Despite Obering’s claims, however, establishing a test bed for missile defense in space, as opposed to current preliminary research, would be a long step toward space weaponization**. Once space-based missile defenses are tested, they are likely to be deployed, and in significant numbers, no matter if the tests are successful**. To see the path that a space test bed is likely to follow, one need only look at the present ground-based program: the Pentagon claims there is little true difference between a test bed and an operational deployment. Moreover, in space the deployment could be more dramatic. Although the current ground-based configuration envisions a few dozen interceptors, continuous space coverage over a few countries of concern would likely require a very large number of interceptors because a particular interceptor will be above a particular target for only a few minutes a day. Today’s missile defenses provide very little real protection as the United States currently faces no realistic threat of deliberate attack by nuclear-armed long-range missiles. But **space weapons** could actually be detrimental to U.S. national security. They would **increase the** perceived **vulnerability of early warning systems to attack and cause Russia and** perhaps other countries such as **China to pursue** potentially **destabilizing countermeasures, such as advanced anti-satellite weapons.** These dangers would be particularly worrisome for those components that are placed in geosynchronous orbits (GEO). Space objects in GEO are sufficiently far from the Earth (about 36,000 kilometers) so that their speed roughly matches the rotational speed of the Earth and they remain “stationary” above one location. To be sure, any country that can place a satellite in these farther orbits— and there are several—could potentially threaten another country’s satellites there. Yet, it would be easier to do so, and perhaps more importantly, the threat perception would be greater with weapons based in space than with existing ground-based technology. The 15 U.S. early warning satellites are almost entirely in GEO. The three functioning Russian early warning satellites utilize two different orbits. Two of the satellites use a highly elliptical orbit, which ranges from low-Earth orbit (LEO)—100 to 2,000 kilometers above the Earth where space objects **Moreover, a space arms competition** could **hinder the flow of satellite imagery** that can be **used to track activities that might reveal programs to develop weapons of mass destruction in countries of concern.** For example, activities detected through space-based collection systems can be used to trigger requests for inspections pursuant to the Chemical Weapons Convention (CWC) (implicitly) or the Comprehensive Nuclear Test Ban Treaty (explicitly), should that treaty be brought into force. It is important in this respect to recall that the suspicions that Israel and South Africa may have conducted an atmospheric nuclear test in 1979 were driven by readout from a U.S. VELA satellite. Similarly, the United States has benefited from the revolution in national intelligence that began with and is based on photographic reconnaissance satellites and related systems, which has helped bring to an end the worst-case analysis and close calls with nuclear war that existed throughout the Cold War. If a truly peaceful and stable world order is ever achieved, the advent of this technology beginning in the late 1950s will be regarded by future generations as a major historical turning point.

**Thus, I urge the judge to vote for an affirmative ballot.**