# 1

#### Interpretation: the affirmative debater must specify in a delineated text in the 1AC their mechanism for banning private appropriation of outer space.

#### Violation: they don’t

#### Standards:

#### 1] Ground – this topic is extremely vague – includes billion of different plans about different types of appropriation with different actors and methods and all have different DAs that link and different solvency mechanisms – no idea what DAs we can read or what NCs

#### 2] CX doesn’t check –

#### a] doesn’t solve pre round prep, which is also key to check the evidence ethics and qualifications of your definitions

#### b] judges don’t flow CX – even if this judge does it’s about the norm their interp sets

#### c] shiftiness – debaters waste my whole CX trying to get them to answer my questions

#### Vote neg because fairness is constitutive of the game of debate, drop the debater bc their arg is their advocacy, competing interps because reasonability is arbitrary, no rvis – they’re illogical and chill theory by creating a disincentive.

# 2

#### Commercial asteroid mining is coming now – lower costs and improving tech make it economically viable – and the legal basis is already in place in multiple countries– that helps acquire water for rocket fuel and rare earth metals

Gilbert 21 alex gilbert, is a complex systems researcher and a PhD student in space resources at the Colorado School of Mines. "Mining in Space Is Coming." Milken Institute Review, April 26, 2021, [www.milkenreview.org/articles/mining-in-space-is-coming](http://www.milkenreview.org/articles/mining-in-space-is-coming). [Quality Control]

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 starting 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). Visionaries including Jeff Bezos imagine heavy industry moving to space and Earth becoming a residential area. However, as entrepreneurs look to harness the riches beyond the atmosphere, access to space resources remains tangled in the realities of economics and governance.

Start with the fact that space belongs to no country, complicating traditional methods of resource allocation, property rights and trade. With limited demand for materials in space itself and the need for huge amounts of energy to return materials to Earth, creating a viable industry will turn on major advances in technology, finance and business models.

That said, there’s no grass growing under potential pioneers’ feet. Potential economic, scientific and even security benefits underlie an emerging geopolitical competition to pursue space mining. The United States is rapidly emerging as a front-runner, in part due to its ambitious Artemis Program to lead a multinational consortium back to the Moon. But it is also a leader in creating a legal infrastructure for mineral exploitation. The United States has adopted the world’s first spaceresources law, recognizing the property rights of private companies and individuals to materials gathered in space.

However, the United States is hardly alone. Luxembourg and the United Arab Emirates (you read those right) are racing to codify space-resources laws of their own, hoping to attract investment to their entrepot nations with business-friendly legal frameworks. China reportedly views space-resource development as a national priority, part of a strategy to challenge U.S. economic and security primacy in space. Meanwhile, Russia, Japan, India and the European Space Agency all harbor space-mining ambitions of their own. Governing these emerging interests is an outdated treaty framework from the Cold War. Sooner rather than later, we’ll need new agreements to facilitate private investment and ensure international cooperation.

What’s Out There

Back up for a moment. For the record, space is already being heavily exploited, because space resources include non-material assets such as orbital locations and abundant sunlight that enable satellites to provide services to Earth. Indeed, satellite-based telecommunications and global positioning systems have become indispensable infrastructure underpinning the modern economy. Mining space for materials, of course, is another matter.

In the past several decades, planetary science has confirmed what has long been suspected: celestial bodies are potential sources for dozens of natural materials that, in the right time and place, are incredibly valuable. Of these, water may be the most attractive in the near-term, because — with assistance from solar energy or nuclear fission — H2O can be split into hydrogen and oxygen to make rocket propellant, facilitating in-space refueling. So-called “rare earth” metals are also potential targets of asteroid miners intending to service Earth markets. Consisting of 17 elements, including lanthanum, neodymium, and yttrium, these critical materials (most of which are today mined in China at great environmental cost) are required for electronics. And they loom as bottlenecks in making the transition from fossil fuels to renewables backed up by battery storage.

#### However, the legal framework that strikes the best balance of providing economic incentives for mining while preventing unbeneficial land claims requires a doctrine of appropriation – the plan prevents that

Meyers 15 Meyers, Ross. 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." Or. Rev. Int'l L. 17 (2015): 183. Italics in original. [Quality Control]

The doctrine of appropriation is a reasonable rule for adjudicating asteroid claims, and it could easily be modified to apply to asteroid mining. In the context of water rights, the doctrine of appropriation requires that the claimant be a landowner in order to claim the right to use a water source. It does not make sense, however, for the international community to grant complete ownership over asteroids toa single entity, so the landowner requirement of the rule should be removed. A similar modification would need to be made to the "beneficial use" language of the doctrine.

In the context of water rights, an appropriator obtains rights only to water that he or she can reasonably put to beneficial use. The metals contained in asteroids have a high level of marketability. For that reason, a mining entity could potentially put any amount of obtained metal to beneficial use, in the sense that the resources can be sold. This, however, would defeat the purpose of the rule, which is to limit such unreasonable claims. To ameliorate this problem, the doctrine of appropriation could be modified to define "beneficial use "constructively by providing that beneficial use is assumed for any resources that have been removed from the asteroid that the mining entity can reasonably hope to transport to market in a return journey. With the astronomical cost of undertaking a trip to such an asteroid, this modification would limit mining entities to only what they can carry back, thereby leaving the untapped resources available to other entities capable of making the same trip. Considering the size and profitability of metal deposits on asteroids, this modification to the doctrine of appropriation would not be overly burdensome to corporate interests. At the same time, it would satisfy the economic imperative of promoting the rapid development of asteroid resources.

By changing the landowner requirement, and qualifying the “beneficial use" language, the doctrine of appropriation would be essentially ready for application to asteroid mining claims. The only other changes necessary would be some additional requirements that are common to other space related provisions, like those found in the Outer Space Treaty of 1968. For example, a reporting requirement or clause guaranteeing asylum for other astronauts. A functional rule might read something like this:

*State parties or private entities may, upon actual possession, lay claim to natural resources found on or below the surface of asteroids. Rights to appropriate are given in order of seniority, starting with the first party to land on the surface of the asteroid and establish control over the resources, be it water, methane, metal, or any other beneficial substances. A party will be said to have established control over a resource once he has mined the substance and removed it from the asteroid. A senior appropriator may use as much of the asteroid's resources as he can take from the asteroid and put to beneficial use, and may continue to enlarge his share until another junior appropriator begins to appropriate resources from source for beneficial use. For the purposes of this Agreement, "beneficial use “refers to the amount of resources that an appropriator has removed from the asteroid that the actor may reasonably hope to bring home in a return voyage. Resources in excess of what an appropriator can reasonably hope to transport to market in a single voyage do not qualify as having a beneficial use, and are therefore not yet claimed. This means that the extraction of metal from an asteroid does not serve to provide ownership if the appropriator plans on letting the resources languish until another voyage is undertaken to secure the resources and bring them back to Earth. Junior appropriators receive rights in the source of resources (the asteroid) as they find it, and may prevent the senior appropriator from enlarging his share to the junior appropriator’s detriment under a no-injury rule. No state party will attempt to hinder other parties from landing on or using the asteroid, and parties will assist other entities on an asteroid, should they need emergency assistance. Mining claims on asteroids will be reported to the Secretary-General of the United Nations, and state parties agree to release the location of the asteroid, and any scientific findings to the United Nations, the general public, and the scientific community. In the event that the asteroid is on a collision course with any other celestial body, all state parties agree to follow the course of action suggested by the United Nations. Should the United Nations decide the asteroid must be destroyed, no state party may claim liability for resources contained within the asteroid, but not yet captured. This provision applies only to asteroids as classified by the scientific community, and does not apply to planets, comets, meteorites, or any other celestial body not mentioned.*

There is no doubt that asteroids may be extremely beneficial to mankind, both as a source of resources and as a jumping-off point to far off locations in space. The human-race has progressed scientifically and technologically to the point that space travel is within commercial reach, and the need for new international laws governing the ownership of space has never been more apparent. The Outer Space Treaty of 1968made great strides in developing rational rules for space and many of its provisions should be maintained in their original form. However, by allowing ownership of asteroids under the doctrine of appropriation, the international community can incentivize the exploration and development of space in a way that reflects the needs of society in general, without vesting an absolute monopoly in a single entity. The doctrine of appropriation helped drive American westward expansion, and its application to space mining would help drive the human race in its expansion into the space, the final frontier.

#### Asteroid mining solves rare earth metal depletion – prevents tech stagnation and unsustainable resource extraction

Mitchell 20 Robin Mitchell is an electronic engineer who has been involved in electronics since the age of 13. After completing a BEng at the University of Warwick, Robin moved into the field of online content creation developing articles. "How might asteroid mining be key to electronics future?" 28-09-2020, [www.electropages.com/blog/2020/09/how-might-asteroid-mining-be-key-electronics-future](http://www.electropages.com/blog/2020/09/how-might-asteroid-mining-be-key-electronics-future). [Quality Control]

As electronics continue to become increasingly more important in everyday life, so is the ability to produce electronic components. With the supply of minerals on Earth having a finite size, some are worried that Earth will soon run out of critical resources such as platinum and lithium. What are asteroids, what are they composed of, and could they be the key to providing humanity with a near-infinite source of minerals?

What minerals are commonly needed for electronics?

Since the introduction of the first commercial circuits, electronics have become incredibly advanced with silicon dies having billions of active components, resistors the size of dust specks, and capacitors that can hold obscene amounts of charge for their size. However, many of these components rely on minerals that most will never have heard of for them to be able to work. Basic components such as resistors and capacitors use common materials including iron, carbon, and aluminium, but components such as LEDs, silicon dies, and thin-film displays use lanthanum, cerium, neodymium, and europium. While many of these minerals fall under the “rare-earth” category, that does not necessarily mean that they are rare; but many are.

Why are these minerals running out?

Minerals that are rare by nature are uncommon in the crust, and mass industrialisation is quickly using up remaining reserves of these minerals. However, it is important to understand what reserve means and how reserves are calculated. Let’s take Uranium as an example to understand this concept better; as things currently stand, there are 80 years of Uranium reserves left. Now, this does not mean that all the uranium will be used up globally in 80 years, this means that at the current price of Uranium, proven sources will continue to supply Uranium at a profitable rate for 80 years. When all reserves are used up, the price for that mineral increases, and this makes areas that used to be unprofitable more profitable, thus generating new reserves.

However, there is another aspect to resources that need to be considered; environmental damage. A good example to demonstrate this is Lithium. While Lithium is rather abundant in the crust, it is spread very wide, making most crust uneconomical to mine. If all cars on earth went electric, the proven reserves of Lithium would run out in 3 years. Of course, new reserves would be made available, and this would extend the ability to use Lithium in industrial practices. However, mining Lithium has a massive environmental impact and sees vast amounts of land destroyed and made toxic due to by-products in the extraction process. The same applies to many rare minerals; many tons of earth is needed to get even the smallest quantity.

What are asteroids, and what are they made of?

Asteroids are small cosmic bodies that orbit a star and can range in size, density, and composition. One of the largest asteroids in the Solar System, Vesta, has a diameter approximately 330 miles, while some of the smallest can be just two meters across. Asteroids mostly consist of rock as well as minerals, but their exact composition greatly varies. For example, M-type asteroids are those that mostly consist of nickel-iron, while C-type asteroids consist of clay and silicate rocks. Other minerals that are often found in asteroids include gold, cobalt, palladium, platinum, and osmium.

Could asteroid mining be the key to ensuring limitless supplies?

While asteroids themselves may contain trace amounts of rare minerals, their size and lack of an ecosystem would allow for a mining operation to destroy an entire asteroid with no repercussions. Asteroids are also plentiful in the Solar System, and would most likely provide humanities resource needs for millions of years. For perspective, the total weight of the asteroid belt is only 3% that of the moon, but that is still 2.39×1021 kilograms. Even then, that is only the asteroid belt and does not consider stray asteroids that orbit the sun, planets, and rings around Saturn / Jupiter.

#### Both of those cause extinction

Bell 19 Aidan Bell is the co-founder of EnviroBuild, a sustainable building materials company based in London. PhD from Manchester in Inorganic Chemistry. "The Conflict of Tech Innovation and Sustainability." TechNative, 22 Jan. 2019, technative.io/the-conflict-of-tech-innovation-and-sustainability. [Quality Control]

Technological advancement has existed throughout human history

Humans have walked the Earth for 200,000 years, inventing countless new processes and systems along the way. The somewhat gradual expansion of human knowledge exploded after the burgeoning of agriculture in the Middle Eastern region of the Levant around 12,000 years ago. Societies at this time manipulated their environment for food-crop cultivation for the first time, inventing sophisticated activities like irrigation and logging.

This nascent field of agriculture created more food and thereby lead to a rapid increase in population size. Yet human expansion also resulted in the increased degradation of the environment. Experts theorise that the mass extinction of megafauna across North America and Australasia was the result of humans rather than environmental factors, while the Mayans were also at fault for causing widespread deforestation and a severe drought through excessive logging, a mistake that brought their eventual demise.

The exploration and proliferation of new technologies is the inevitable result of human intelligence, and the consequences thereof have always been difficult to avoid. Yet our awareness of this damage places humanity in a position of knowledge outside the standard predator-prey relationship that otherwise dominates the world and results in starvation for animals that overeat their food sources.

The current technological dilemmas that we face today are similar to those of ancient time. Overuse of a resource for immediate human benefit risks longer-term negative influence. A report conducted by Greenpeace found that Internet data centres have incredibly large carbon footprints, accounting for 3% of global electricity use, much of it in locations that offer cheap, but dirty, electricity. Likewise, the minerals that are found in electronic devices like mobile phones, such as tantalum and gold, often originate from unregulated mining that releases harmful substances into the surrounding soil, air and water. Mining also contributes hugely to deforestation, which is responsible for 15% of global greenhouse gas emissions.

The negative impacts of technological innovation are increasing and action needs to be taken soon to resolve this crisis for the sake of future generations. The Intergovernmental Panel on Climate Change (IPCC) report last month warned that we have just 12 years to reduce the rate of global warming before widespread flooding and droughts become unavoidable. The demand for minerals and energy brought about by technological advancements shows no sign of slowing down, painting a worrying picture for the future of the planet.

Faced with the consequences of our intelligence, humanity now has to use its incredible versatility to overcome the challenges it has created for itself. For example, wind and solar power are increasingly becoming economically-viable sources of unlimited, free electricity and provide us with the opportunity to reduce our dependence on harmful fossil fuels. Bioengineering should help us protect surface soils and the ecosystems that depend on them by maintaining healthy levels of nutrients and soil salinity. Technological advancements will even help us prevent species extinction events that would otherwise destroy our Earth altogether, with NASA already developing spacecraft to push approaching asteroids out of our orbit.

# 3

#### NASA’s stuck in low orbit but the space race lets it extend further. Julie 12-9

Alyssa Julie, 12-9-2021, "How the private space race is allowing NASA to explore new frontiers ," Global News, <https://globalnews.ca/news/8408558/how-the-private-space-race-is-allowing-nasa-to-explore-new-frontiers/>, //hzheng

In February, NASA will launch the first un-crewed test flight of its Orion spacecraft and SLS rocket as it prepares to send astronauts back to the moon. Artemis I is the first in a series of increasingly complex missions to take place over the next few years. It will be followed by a second crewed test flight and a third flight that will land astronauts on the moon’s south-pole. NASA expects that will be in 2025, at the earliest. The agency says partnerships with private companies like SpaceX will build the lunar lander to ferry astronauts to the moon’s surface, making the Artemis program possible. The private space race has allowed NASA, and agencies like it, to turn their attention from Earth’s lower orbit and start planning for future missions, like Artemis. And as the agency plans to send astronauts to new frontiers, it is encouraging private industry to establish a greater presence in lower-Earth orbit — by collaborating with the private sector on a new space station. The International Space Station is now more than 20 years old, approved for use until 2024, with a likely extension only until the end of 2028 or 2030. NASA’s office of audits released a report at the start of December detailing the “costly repairs” to the orbiting laboratory that have been needed over time. It said maintenance and system upgrades to the ISS increased to approximately $169 billion in 2020. On Dec. 3, NASA announced three U.S. Companies that would receive over $400 million in government funding to develop commercial space stations — Jeff Bezos’ Blue Origin, Nanoracks and Northrop Grumman. Misty Snopkowski, Program Executive for the commercial LEO development program at NASA, says commercial stations, like the one’s these three companies are developing, will help the agency travel deeper into space. “We’re trying to go deeper into space and we can give this very well understood environment in LEO to commercial entities — for them to start establishing that LEO economy,” she says, adding that instead of owner and operator of a new space station, NASA would be one of many customers using the orbiting laboratory. With less of its funding tied up in the International Space Station, the agency will be free to throw more cash at deep space exploration, Snopkowski says. But there is still research that needs to be done in order to make these frontier missions possible. She says the agency has approximately 200 long-term experiments, most of which study the impact of space travel on the human body. The agency needs that work to continue after the International Space Station is decommissioned. “Those types of research, human research, [have] long lead times,” she explains. Such research not only helps further NASA’s ambitions in space, it is also helps us tackle big challenges on Earth, says York University astrophysicist Jesse Rogerson. “Going to the moon and going to Mars is going to push our understanding of how to do agriculture,” he says, as an example of how research in space can help us improve conditions on Earth. “Because we can’t do a permanent settlement on the moon or Mars without ‘living off the land.’ So pushing that science to the very edge so that we can grow something on Mars would inevitably help us do better on Earth.” Canadian astronaut Jeremy Hansen, who acts as CAPCOM at the Canadian Space Agency while he awaits his first flight assignment, says his agency is also involved in discussions about a future commercial space station. In addition to freeing-up funding for future deep space travel, he says such a partnership could reveal new ways to save money on research. “The space agency, we expect, will always be doing research in orbit. But the model on how we do that could change, could create more opportunities and could allow us to do more for less money,” he says. Hansen adds that collaborating with private industry will create more opportunities for astronauts to explore space, a boon for the Canadian Space Agency, whose astronauts have had to wait years to go to space as they wait for a seat to open on a mission. One upcoming mission Canada is taking part in will be Artemis II, the crewed test of the Orion spacecraft that will eventually transport astronauts to the moon. The private space race will also create more opportunities for scientists and astronomers hoping to conduct research in space, Rogerson adds.

#### We need to get off the rock – diversification ensures isolated populations prevent extinction and bolsters tech that mitigates existential threats. Reuter 12-9

Timothy Reuter (Head of Aerospace and Drones, World Economic Forum), 12-9-2021, "Why the human race must become a multiplanetary species," World Economic Forum, <https://www.weforum.org/agenda/2021/12/humans-multiplanetary-species/>, //hzheng

Supporters of space exploration sometimes suggest that sending robotic probes to the remote corners of the solar system and beyond can teach us what we need to know about the universe at less cost and risk than sending people. Yet, for the safety of our descendants and to reach humanity’s full potential, we must become a multiplanetary species. Humans have a one in six chance of going extinct this century according to Oxford Philosopher Toby Ord. In his book, The Precipice: Existential Risk and the Future of Humanity, Dr Ord lays out a variety of long-tail risks that are both existential and very difficult to mitigate. These include nature-based risks like asteroids, large-scale volcanic eruptions and stellar explosions. Although we can track many of these phenomena, we do not have the technology (nor are we likely to develop it anytime soon) to prevent large eruptions or redirect large asteroids. Initial efforts to nudge space objects are just beginning. This is to say nothing of the human-created risks of nuclear war or bioweapons intentionally or unintentionally released on the public, a scenario made easier to imagine by the current pandemic. As long as humanity is grouped together on a single planet there will always be a possibility that all of us can be killed at once. It is equivalent to having everyone in a single building: there is always a risk greater than zero of a collapse or fire that kills everyone. By establishing, at first, small outposts and eventually larger scale settlements on other planets, the risk of our species being destroyed is significantly curtailed. On a more positive note, human habitation in a greater variety of settings will radically expedite science and commerce. While we currently have small-scale experimentation with manufacturing items in micro and zero gravity on the International Space Station, the potential for us to set up large-scale industry in different physics requires us to have a presence on other celestial locations. Large-scale settlements of people are hubs of innovation and human flourishing. Just think of how many more discoveries and marvels could be created by 80 billion people in the future instead of today’s 8 billion. Our current planet has a limited carrying capacity but our solar system can accommodate many more people than any single planet can. Just as cultural and geographic variety contributes to the richness of our current society, further expanding the diversity of human settings would continue to expand the creativity of our species. Space travel itself has already been an incredible inspiration to numerous scientists, engineers and artists with many people citing seeing the moon landing as one of the most formative events of their lives. The technologies we develop on our way to becoming a multiplanetary species will also benefit us here on earth. Today, satellites are used to monitor carbon and other greenhouse gas emissions to give us a better picture of the causes of global warming and promote accountability. In her first speech devoted to space, US Vice-President Kalama Harris said: “I truly believe space activity is climate action.” In a recent report, the World Economic Forum's Global Future Council on Space laid out the many ways satellite data is being used to address climate change and suggests feeding data from space-based assets into an “Earth Operations Centre” to provide a real-time picture of activities and phenomena that contribute to warming. Less well known are the many other technologies developed on our way to space but used in our daily lives. The CMOS sensor was first invented at NASA’s Jet Propulsion Laboratory in the 1990s. No one could have predicted that this technology would eventually be part of all our phones, enabling high-quality digital images and affecting everything from how we document human rights abuses to how we present ourselves to potential mates on dating apps.

#### And, solves environment via monitoring and tech race. Broom 12-2

Douglas Broom (Senior Writer, Formative Content), 12-2-2021, "The space tech keeping tabs on COP26 carbon pledges," World Economic Forum, <https://www.weforum.org/agenda/2021/12/satellites-ai-saving-planet>, //hzheng

At the COP26 climate conference last month, world leaders pledged to stop and reverse the loss of the world’s forests by 2030. Now satellite technology is taking a hand in ensuring those promises are kept and protecting the environment more generally. The stakes could not be higher. The World Economic Forum’s 2021 Global Risks Report identified “climate action failure” as the second most likely long-term existential risk facing the world and the second biggest risk by impact. As well as measuring shrinking ice caps and warning of extreme weather, satellite imagery is increasingly being interpreted by artificial intelligence (AI) to measure the density of woodland, track the growth of new trees, and even calculate how much CO2 is being absorbed. By combining satellite pictures with 3D laser-scanning Lidar technology on drones, AI applications can provide much more detail about our changing environment than conventional observations. This technology is beginning to be used around the world. Google’s little-known Earth Engine has transformed access to satellite imagery. Its library of images covers 30 years and is updated daily with new images from space. The data is in a format that allows individuals and organizations to analyze it using their own algorithms. While better-known Google Earth includes satellite imagery, Earth Engine, which describes itself as “a tool for analyzing geospatial information”, has its own collection. This data can be analyzed to create a time sequence showing, for example, how tree cover has changed. The World Resources Institute’s (WRI) Global Forest Watch uses Earth Engine to monitor the state of the world’s woodlands. WRI CEO Dr Andrew Steer says it is a world-first: “Global Forest Watch would not exist without it.” The COP26 plan involves individuals, companies and governments investing in what are known as carbon credits - effectively paying landowners to protect and grow more trees, which capture carbon in order to offset emissions elsewhere in the world. It has been estimated that a single mature tree captures around 22 kilograms of carbon each year - making it possible to produce rough estimates of the amount of CO2 taken out of the atmosphere by planting in a carbon offset scheme. But now AI is enabling greater accuracy. Pachama: Forest Carbon Credits - a start-up developing a market for forest carbon credits featured on the Forum’s Uplink innovation crowdsourcing platform - uses satellite imagery to monitor the veracity of reforestation projects. In addition to space imagery, Pachama uses drone-based Lidar laser scanning to measure the number of trees planted and to spot deforestation. So far, it has validated 30 reforestation projects in three continents confirming that carbon offsetting is taking place. Another tech start-up says it can provide accurate carbon data for small areas of forest. Reforestum & Ecosphere+ has developed an AI solution that not only monitors tree growth, but also determines the exact amount of carbon captured by the growing forest. The technology allows individuals to sponsor small parcels of land and still get accurate information: on carbon, or about the number of trees and hectares of forest protected or restored, and the jobs supported in the local area. Connecting forest owners with people and organizations that want to offset their emissions is part of the solution offered by Treeconomy. Founded by two graduates of Imperial College London, the platform helps owners to secure a fair price for carbon offset by their woodlands. As well as conventional forests, Treeconomy says its AI technology can be used to monitor marine Blue Carbon projects. The aim is to restore natural coastal habitats like mangrove forests and salt marshes, as well as underwater seagrass, to increase their ability to capture carbon. Alongside climate change, oceans are also vulnerable to the effects of illegal, unreported and unregulated fishing, which not only depletes fish stocks at a cost of $ 23.5 billion every year, but harms all marine life. That’s where Uplink contributor Unseenlabs can help protect the marine environment. Unseenlabs’ satellite-based AI technology is able to identify a vessel’s unique electromagnetic signature from space. So, even if illegal fishers turn off their boat’s identification beacon, the vessel can still be tracked. A fifth of the world’s fish supplies come from illegal fishing.

#### Warming causes extinction and it’s try or die. Spratt 19

David Spratt, Research Director for Breakthrough National Centre for Climate Restoration, Ian Dunlop, member of the Club of Rome, formerly an international oil, gas and coal industry executive, chairman of the Australian Coal Association, May 2019, “Existential climate-related security risk: A scenario approach,” <https://docs.wixstatic.com/ugd/148cb0_b2c0c79dc4344b279bcf2365336ff23b.pdf>, //recut hzheng

An existential risk to civilisation is one posing permanent large negative consequences to humanity which may never be undone, either annihilating intelligent life or permanently and drastically curtailing its potential. With the commitments by nations to the 2015 Paris Agreement, the current path of warming is 3°C or more by 2100. But this figure does not include “long-term” carbon-cycle feedbacks, which are materially relevant now and in the near future due to the unprecedented rate at which human activity is perturbing the climate system. Taking these into account, the Paris path would lead to around 5°C of warming by 2100. Scientists warn that warming of 4°C is incompatible with an organised global community, is devastating to the majority of ecosystems, and has a high probability of not being stable. The World Bank says it may be “beyond adaptation”. But an existential threat may also exist for many peoples and regions at a significantly lower level of warming. In 2017, 3°C of warming was categorised as “catastrophic” with a warning that, on a path of unchecked emissions, low-probability, high-impact warming could be catastrophic by 2050. The Emeritus Director of the Potsdam Institute, Prof. Hans Joachim Schellnhuber, warns that “climate change is now reaching the end-game, where very soon humanity must choose between taking unprecedented action, or accepting that it has been left too late and bear the consequences.” He says that if we continue down the present path “there is a very big risk that we will just end our civilisation. The human species will survive somehow but we will destroy almost everything we have built up over the last two thousand years.”11 Unfortunately, conventional risk and probability analysis becomes useless in these circumstances because it excludes the full implications of outlier events and possibilities lurking at the fringes.12 Prudent risk-management means a tough, objective look at the real risks to which we are exposed, especially at those “fat-tail” events, which may have consequences that are damaging beyond quantification, and threaten the survival of human civilisation. Global warming projections display a “fat-tailed” distribution with a greater likelihood of warming that is well in excess of the average amount of warming predicted by climate models, and are of a higher probability than would be expected under typical statistical assumptions. More importantly, the risk lies disproportionately in the “fat-tail” outcomes, as illustrated in Figure 1.

# 4

#### Counterplan: Private appropriation in outer space except for the development and deployment of a solar shield is unjust.

#### **Solar Shields prevent blackouts through early detection**

Timon Singh, 11/15/10 (Timon Singh is a graduate of Liverpool University where he received a degree in Social and Economic History. He has previously worked for BBC Magazines on BBC Who Do You Think You Are? Magazine, the publication for the popular genealogy show. He has written extensively on the portrayal of history in cinema, worldwide construction projects and film.<http://inhabitat.com/nasa-devises-solar-shield-to-protect-us-national-grid/solarstorm/>

There are many things threatening the [US National Grid](http://inhabitat.com/2010/11/05/8gw-of-geothermal-energy-to-be-added-to-national-grid/geothermal-6/) at the moment – rolling blackouts, lack of funding and problems integrating renewable energy; but [NASA](http://science.nasa.gov/)is working on their defense against another threat: solar storms. NASA’s scheme, dubbed the[Solar Shield](http://science.nasa.gov/science-news/science-at-nasa/2010/26oct_solarshield/), will aim to prevent blackouts caused by solar storms through a forecasting system that would enable the Space Agency to pinpoint certain high-risk transformers. The Solar Shield would then warn grid operators, giving them enough time to isolate the problem and prevent widespread damage. Solar storms have become a major concern for utility providers and the national military in recent years. Although major solar storms only occur every 100 years or so, when a storm cloud from the sun (or coronal eruption) makes the Earth’s magnetic field shake,  it sends electrical currents all over the planet, disturbing systems on the ground and in the air. These events even have the potential to melt transformer parts.The last major solar storm was the [Carrington Event](http://science.nasa.gov/science-news/science-at-nasa/2008/06may_carringtonflare/), which occurred in 1859, disrupting the telegraph services. More recently, mild storms in 1989 and 2003 caused ‘power fluctuations’ in transformers in the US, Canada, Great Britain and other countries. Today, if a solar storm the size of the Carrington Event was to occur, it would cause major damage to the National Grid as well as affected electronic systems all over the world. As a result, NASA scientists believe an early warning system would give utility companies time to disconnect major transformers in time, preventing damage and even fire. A lack of an effective system could result in blackouts and very expensive repairs.In addition to acting as an ‘early warning system’, the Solar Shield would take images of any coronal eruptions via NASA spacecraft and satellites, and would order and assess the size and potential impact. While the Solar Shield is still in the experimental stages, NASA has recruited a number of utility companies to install monitors at their transformers. This stage should give the agency time to devise a suitable defense as the next major solar storm event is predicted for 2013

#### Solar superstorm is likely in the next few years and will cause catastrophic internet and electricity outages and global chaos.

Sparks 9/22/21 (Hannah, “Solar ‘superstorm’ could prompt ‘internet apocalypse,’ global outages”; New York Post; https://nypost.com/2021/09/22/solar-superstorm-could-prompt-internet-apocalypse-global-outages/)

Ninety-three million miles away, a solar storm brews with the power to prompt an “internet apocalypse,” according to recent findings. University of California Irvine assistant professor Sangeetha Abdu Jyothi presented the new research last month during the Association for Computing Machinery’s annual conference for their Special Interest Group on Data Communication (SIGCOMM). In [the report](https://www.ics.uci.edu/~sabdujyo/papers/sigcomm21-cme.pdf), Jyothi warned that an unmitigated solar “superstorm” could “cause large-scale Internet outages covering the entire globe and lasting several months” — pointing to inadequacies in submarine cables, a major component of internet infrastructure. Most of the time, we’re protected from the sun’s constant littering of radiation, called “solar wind,” thanks to the ionosphere, otherwise known as Earth’s magnetic shield. With nowhere to go, those magnetic particles are pulled to the North and South Poles, producing awe-inspiring auroras before dissipating. But sometimes, solar flares kick up what’s called a coronal mass ejection (CME), a solar storm strong enough to penetrate our shield and wreak havoc on just about anything powered with electromagnetism — which just about runs the world. It has [been estimated](https://www.eurekalert.org/news-releases/653733) that the potential damage caused by a disastrous CME in 2012, which only narrowly missed Earth, would have cost the US alone up to $2.6 trillion. “Our [internet] infrastructure is not prepared for a large-scale solar event,” Jyothi [told Wired](https://www.wired.com/story/solar-storm-internet-apocalypse-undersea-cables/) recently, ticking off the consequences: widespread blackouts, mass traffic jams and a breakdown in the global supply chain, to name a few. Local and regional internet infrastructure often relies on optical fiber, which isn’t affected by geomagnetic currents, or grounded short-span cables, which are by nature protected from an electromagnetic surge. But it’s a different story with undersea cables, which connect continents via the internet. While the cables themselves aren’t vulnerable, the electronic repeaters therein, which help amplify the optical signal, are susceptible to damage by geomagnetically induced currents. If enough repeaters blow out, the whole line could be shot. For some countries, damage to these mainline cables may cut their connectivity at the source — not to mention potential damage to satellites, which enable internet for many. It’s happened before, researchers have said. In 1921, a solar storm sparked fires in electrical equipment across the world, from train station control rooms to telegraph dispatch centers. Again, in 1989, a solar storm of moderate severity knocked the power out in northeast Canada for nine hours — still before the rise of internet-based infrastructure. Jeffrey Love, a geophysicist in the geomagnetism program of the US Geological Survey, [told the Independent](https://www.independent.co.uk/life-style/gadgets-and-tech/solar-storm-2021-internet-apocalypse-cme-b1923793.html) that the impact of that 1921 New York Railroad Storm would be much greater today. “When we look back at this time, anything that’s related to electricity wasn’t as important in 1921 as it is today,” he said. In an interview [for NextGov.com](https://www.nextgov.com/ideas/2021/05/racing-sun-protect-america/174029/) in May, Dr. Scott McIntosh, deputy director of the National Center for Atmospheric Research, told Dana A. Goward, president of the Resilient Navigation and Timing Foundation, that the sun’s current electromagnetic cycle, which lasts about 11 years, is projected to be a doozy. “We have every reason to believe that the current solar cycle which began in December 2019 could be the most active since the 1970s. This is a particular concern for the GPS,” said McIntosh, who estimated a 35% to 45% chance a CME will disrupt Global Positioning System service, for potentially several days, sometime during the next decade. He continued, “Strong solar storms can charge the atmosphere and prevent signals from getting through for days. The strongest can damage or even destroy satellites.” Researchers, as well as lawmakers, have discussed GPS alternatives in the past, prompting Congress to pass the National Timing Resilience and Security Act in 2018, asking the Department of Transportation to devise terrestrial backup for global navigation services, in the event satellites are rendered useless. Despite concerns, no progress has been made, according to RNT’s Goward. “Even with the most concerted government efforts, five or six years will be needed to establish systems and encourage, or where needed, require, users to protect themselves and vital services,” warned Goward. “Such a timeline will take us well into the coming solar danger zone.”

#### Electricity shortages causes civilization collapse and extinction—cascades down and wrecks every single industry.

**Weiss** and Weiss **19** [Matthew Weiss, American Jewish University, 15600 Mulholland Drive, Bel Air, CA, 90077, USA. Martin Weiss, UCLA-Olive View Medical Center, 1444 Olive View Drive, Sylmar, CA, 91342, USA. Weiss, Matthew, and Martin Weiss. “An Assessment of Threats to the American Power Grid.” Energy, Sustainability and Society, vol. 9, no. 1, May 2019, p. 18, doi:[10.1186/s13705-019-0199-y](https://doi.org/10.1186/s13705-019-0199-y).]//Anton

Consequences of a sustained power outage

The EMP Commission states “Should significant parts of the electrical power infrastructure be lost for any substantial period of time, the Commission believes that the consequences are likely to be catastrophic, and many people will die for the lack of the basic elements necessary to sustain life in dense urban and suburban communities.” [[67](https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-019-0199-y#ref-CR67)].

Space constraints preclude discussion on how the loss of the grid would render synthesis and distribution of oil and gas inoperative. Telecommunications would collapse, as would finance and banking. Virtually all technology, infrastructure, and services require electricity.

An EMP attack that collapses the electric power grid will collapse the water infrastructure—the delivery and purification of water and the removal and treatment of wastewater and sewage. Outbreaks that would result from the failure of these systems include cholera. It is problematic if fuel will be available to boil water. Lack of water will cause death in 3 to 4 days [[68](https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-019-0199-y#ref-CR68)].

Food production would also collapse. Crops and livestock require water delivered by electronically powered pumps. Tractors, harvesters, and other farm equipment run on petroleum products supplied by an infrastructure (pumps, pipelines) that require electricity. The plants that make fertilizer, insecticides, and feed also require electricity. Gas pumps that fuel the trucks that distribute food require electricity. Food processing requires electricity.

In 1900, nearly 40% of the population lived on farms. That percentage is now less than 2% [[69](https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-019-0199-y#ref-CR69)]. It is through technology that 2% of the population can feed the other 98% [[68](https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-019-0199-y#ref-CR68)]. The acreage under cultivation today is only 6% more than in 1900, yet productivity has increased 50 fold [[69](https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-019-0199-y#ref-CR69)].

As stated by Dr. Lowell L Wood in Congressional testimony:

“If we were no longer able to fuel our agricultural machine in the country, the **food production** of the country **would simply stop**, because we do not have the horses and mules that used to tow agricultural gear around in the 1880s and 1890s”.

“So the situation would be exceedingly adverse if both electricity and the fuel that electricity moves around the country……… stayed away for a substantial period of time, we would miss the harvest, and we would starve the following winter” [[70](https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-019-0199-y#ref-CR70)].

People can live for 1–2 months without food, but after 5 days, they have difficulty thinking and at 2 weeks they are incapacitated [[68](https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-019-0199-y#ref-CR68)]. There is typically a 30-day perishable food supply at regional warehouses but most would be destroyed with the loss of refrigeration [[69](https://energsustainsoc.biomedcentral.com/articles/10.1186/s13705-019-0199-y#ref-CR69)]. The EMP Commission has suggested food be stockpiled for a possible EMP event.

A prescription for failure

Even if all the recommendations of the Congressional EMP Commission were implemented, there is no guarantee that the grid will not sustain a prolonged collapse. There should therefore be contingency plans for such a failure.

There is also another consideration. The foundational pillars of prior American nuclear defense policy, in today’s climate, are of uncertain validity. Mutual assured destruction is the Maginot line of the 21st century. Nonproliferation will prove difficult to resurrect.

#### A new era of space means NASA is losing its power. It’s up to the private space sector to lead space projects now.

Christian Davenport 5/6/21 (“As private companies erode government’s hold on space travel, NASA looks to open a new frontier”; The Washington Post; https://www.washingtonpost.com/technology/2021/02/25/nasa-space-future-private/)

The four astronauts who will fly on a SpaceX mission by the end of the year will be a [bunch of private citizens](https://www.washingtonpost.com/technology/2021/02/01/spacex-st-jude-fundraising-flight/?itid=lk_inline_manual_2)with no space experience. One’s a billionaire funding the mission; another is a health care provider. The third will be selected at random through a sweepstakes, and the last seat will go to the winner of a competition. In the new Space Age, you can buy a ticket to orbit — no need to have been a fighter pilot in the military or to compete against thousands of other overachievers for a coveted spot in NASA’s astronaut corps. In fact, for this mission, the first composed entirely of private citizens, NASA is little more than a bystander. It does not own or operate the rocket that will blast the astronauts into space or the capsule they will live in for the few days they are scheduled to circle Earth every 90 minutes. NASA has no say in selecting the astronauts, and it will not train or outfit them — that will all be done by Elon Musk’s SpaceX. The money to pay for the flight also will not come from NASA — or any other government account. The cost of the project is being borne by a billionaire, Jared Isaacman, who has set it up as a fundraiser for St. Jude’s Research Hospital and a promotional device for his business, [Shift4Shop](https://www.shift4shop.com/?utm_term=shift4&utm_campaign=Product_Brand_Campaign_%5BKNOWN%5D&utm_source=adwords&utm_medium=ppc&hsa_acc=4516218500&hsa_cam=12263139112&hsa_grp=116935590466&hsa_ad=497758599975&hsa_src=g&hsa_tgt=kwd-304285625492&hsa_kw=shift4&hsa_mt=e&hsa_net=adwords&hsa_ver=3&gclid=Cj0KCQiA7NKBBhDBARIsAHbXCB5Tj74ZYo0YYuVh5NT5L3j0dYXlKbLrRC4e-1ilUTxRbUMfA7-OtVkaAnuyEALw_wcB), which helps businesses set up websites and process payments. This is the new look of human space exploration as government’s long-held monopoly on space travel continues to erode, redefining not only who owns the vehicles that carry people to space, but also the very nature of what an astronaut is and who gets to be one. And it comes as NASA confronts some of the largest changes it has faced since it was founded in 1958 when the United States’ world standing was challenged by the Soviet Union’s surprise launch of the first Sputnik into orbit. Now it is NASA’s unrivaled primacy in human spaceflight that is under challenge. Thanks to NASA’s investments and guidance, the private space sector has grown tremendously — no entity more than SpaceX, which [according to CNBC](https://www.cnbc.com/2021/02/16/elon-musks-spacex-raised-850-million-at-419point99-a-share.html) is now worth $74 billion. The commercial space industry is taking on ever more roles and responsibilities — flying not just cargo and supplies to the International Space Station, but even NASA’s astronauts there. The private sector will launch some of the major components of the space station NASA wants to build in orbit around the moon, and private companies are developing the spacecraft that will fly astronauts to and from the lunar surface. Space enthusiasts, including NASA, see enormous benefit in the shift — a new era of space exploration that will usher in a more capable and efficient space industry. But the changing dynamic also has left NASA, which for decades has set the pace for the American space project, with an uncertain role, a development NASA’s Safety Aerospace Safety Advisory Panel warns could have consequences for years to come. The growth of companies like SpaceX has "tremendous upside potential — and are accompanied by equally tremendous challenges for managing the risk of human space exploration,” [it said in its annual report](https://oiir.hq.nasa.gov/asap/documents/2020_ASAP_Report-TAGGED.pdf), released last month. “NASA leadership in human space exploration is still preeminent, but the agency’s role is evolving with critical implications for how risk and safety will be managed.” So far, NASA has done well “as it shifts from principally executing its programs and missions to commercially acquiring significant key elements and services,” it said. But as the agency continues to evolve, “NASA must make some strategically critical decisions, based on deliberate and thorough consideration, that are necessary because of their momentous consequences for the future of human space exploration and, in particular, for the management of the attendant risks.” In an interview, Steve Jurczyk, NASA’s acting administrator, said the agency is well aware of how its identity and role are changing, and he likened the agency’s role to how the U.S. government fostered the commercial aviation industry in the early 20th century. NASA’s predecessor, NACA, or the National Advisory Committee for Aeronautics, “did research, technology development to initially support defense … but also later on supporting a burgeoning commercial aircraft industry and aviation industry,” he said. “So that may be how we evolve, moving forward on the space side. We’re going to do the research and the technology development and be the enablers for continuing to support the commercial space sector.”

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