# 1nc

## 1

#### A] interp – the Affirmative must only defend that appropriation of outer space is unjust.

#### B] violation: they defend a plan with the actor “states”

#### C] standards – Effects and Extra-T which are voters for predictable limits and ground – allowing the Aff to defend implementation through any number of agreements/mechanisms explodes predictable limits – it shifts the topic to not appropriation good/bad but how we should end it which kills in-depth clash and makes prep impossible

#### D] paradigm issues:

#### 1] fairness and education are voters: debate’s a competitive activity that requires equal opportunities for both sides and it’s why schools fund debate

#### 2] dtd for norm setting especially this early on in the topic – dta makes no sense bc we indict their advocacy, use competing interps ­– reasonability invites arbitrary judge intervention, no rvis ­– you don’t win for being fair

## 2

#### a] interpretation: “THE appropriation of outer space” is a generic indefinite singular. The aff may not defend a subset of appropriation of outer space by private entities being unjust.

#### The definite article “the” makes the rez a definite singular – it’s generic

CCC n.d. [Capital Community College, a nonprofit 501 c-3 organization that supports scholarships, faculty development, and curriculum innovation.] “Articles, Determiners, and Quantifiers.” Capital Community College. <http://grammar.ccc.commnet.edu/grammar/determiners/determiners.htm#articles> TG

The three articles — a, an, the — are a kind of adjective. The is called the definite article because it usually precedes a specific or previously mentioned noun; a and an are called indefinite articles because they are used to refer to something in a less specific manner (an unspecified count noun). These words are also listed among the noun markers or determiners because they are almost invariably followed by a noun (or something else acting as a noun). caution CAUTION! Even after you learn all the principles behind the use of these articles, you will find an abundance of situations where choosing the correct article or choosing whether to use one or not will prove chancy. Icy highways are dangerous. The icy highways are dangerous. And both are correct. The is used with specific nouns. The is required when the noun it refers to represents something that is one of a kind: The moon circles the earth. The is required when the noun it refers to represents something in the abstract: The United States has encouraged the use of the private automobile as opposed to the use of public transit. The is required when the noun it refers to represents something named earlier in the text. (See below..) If you would like help with the distinction between count and non-count nouns, please refer to Count and Non-Count Nouns. We use a before singular count-nouns that begin with consonants (a cow, a barn, a sheep); we use an before singular count-nouns that begin with vowels or vowel-like sounds (an apple, an urban blight, an open door). Words that begin with an h sound often require an a (as in a horse, a history book, a hotel), but if an h-word begins with an actual vowel sound, use an an (as in an hour, an honor). We would say a useful device and a union matter because the u of those words actually sounds like yoo (as opposed, say, to the u of an ugly incident). The same is true of a European and a Euro (because of that consonantal "Yoo" sound). We would say a once-in-a-lifetime experience or a one-time hero because the words once and one begin with a w sound (as if they were spelled wuntz and won). Merriam-Webster's Dictionary says that we can use an before an h- word that begins with an unstressed syllable. Thus, we might say an hisTORical moment, but we would say a HIStory book. Many writers would call that an affectation and prefer that we say a historical, but apparently, this choice is a matter of personal taste. For help on using articles with abbreviations and acronyms (a or an FBI agent?), see the section on Abbreviations. First and subsequent reference: When we first refer to something in written text, we often use an indefinite article to modify it. A newspaper has an obligation to seek out and tell the truth. In a subsequent reference to this newspaper, however, we will use the definite article: There are situations, however, when the newspaper must determine whether the public's safety is jeopardized by knowing the truth. Another example: "I'd like a glass of orange juice, please," John said. "I put the glass of juice on the counter already," Sheila replied. Exception: When a modifier appears between the article and the noun, the subsequent article will continue to be indefinite: "I'd like a big glass of orange juice, please," John said. "I put a big glass of juice on the counter already," Sheila replied. Generic reference: We can refer to something in a generic way by using any of the three articles. We can do the same thing by omitting the article altogether. A beagle makes a great hunting dog and family companion. An airedale is sometimes a rather skittish animal. The golden retriever is a marvelous pet for children. Irish setters are not the highly intelligent animals they used to be. The difference between the generic indefinite pronoun and the normal indefinite pronoun is that the latter refers to any of that class ("I want to buy a beagle, and any old beagle will do.") whereas the former (see beagle sentence) refers to all members of that class.

#### The upward entailment test and adverb test determine the genericity of a definite singular

Leslie 16 [Sarah-Jane Leslie, Ph.D., Princeton, 2007. Dean of the Graduate School and Class of 1943 Professor of Philosophy. Served as the vice dean for faculty development in the Office of the Dean of the Faculty, director of the Program in Linguistics, and founding director of the Program in Cognitive Science at Princeton University.] “Generic Generalizations.” Stanford Encyclopedia of Philosophy. April 24, 2016. <https://plato.stanford.edu/entries/generics/> TG

1. Generics and Logical Form In English, generics can be expressed using a variety of syntactic forms: bare plurals (e.g., “tigers are striped”), indefinite singulars (e.g., “a tiger is striped”), and definite singulars (“the tiger is striped”). However, none of these syntactic forms is dedicated to expressing generic claims; each can also be used to express existential and/or specific claims. Further, some generics express what appear to be generalizations over individuals (e.g., “tigers are striped”), while others appear to predicate properties directly of the kind (e.g., “dodos are extinct”). These facts and others give rise to a number of questions concerning the logical forms of generic statements. 1.1 Isolating the Generic Interpretation Consider the following pairs of sentences: (1)a.Tigers are striped. b.Tigers are on the front lawn. (2)a.A tiger is striped. b.A tiger is on the front lawn. (3)a.The tiger is striped. b.The tiger is on the front lawn. The sentence pairs above are prima facie syntactically parallel—both are subject-predicate sentences whose subjects consist of the same common noun coupled with the same, or no, article. However, the interpretation of first sentence of each pair is intuitively quite different from the interpretation of the second sentence in the pair. In the second sentences, we are talking about some particular tigers: a group of tigers in ([1b](https://plato.stanford.edu/entries/generics/#ex1b)), some individual tiger in ([2b](https://plato.stanford.edu/entries/generics/#ex2b)), and some unique salient or familiar tiger in ([3b](https://plato.stanford.edu/entries/generics/#ex3b))—a beloved pet, perhaps. In the first sentences, however, we are saying something general. There is/are no particular tiger or tigers that we are talking about. The second sentences of the pairs receive what is called an existential interpretation. The hallmark of the existential interpretation of a sentence containing a bare plural or an indefinite singular is that it may be paraphrased with “some” with little or no change in meaning; hence the terminology “existential reading”. The application of the term “existential interpretation” is perhaps less appropriate when applied to the definite singular, but it is intended there to cover interpretation of the definite singular as referring to a unique contextually salient/familiar particular individual, not to a kind. There are some tests that are helpful in distinguishing these two readings. For example, the existential interpretation is upward entailing, meaning that the statement will always remain true if we replace the subject term with a more inclusive term. Consider our examples above. In ([1b](https://plato.stanford.edu/entries/generics/#ex1b)), we can replace “tiger” with “animal” salva veritate, but in ([1a](https://plato.stanford.edu/entries/generics/#ex1a)) we cannot. If “tigers are on the lawn” is true, then “animals are on the lawn” must be true. However, “tigers are striped” is true, yet “animals are striped” is false. ([1a](https://plato.stanford.edu/entries/generics/#ex1a)) does not entail that animals are striped, but ([1b](https://plato.stanford.edu/entries/generics/#ex1b)) entails that animals are on the front lawn (Lawler 1973; Laca 1990; Krifka et al. 1995). Another test concerns whether we can insert an adverb of quantification with minimal change of meaning (Krifka et al. 1995). For example, inserting “usually” in the sentences in ([1a](https://plato.stanford.edu/entries/generics/#ex1a)) (e.g., “tigers are usually striped”) produces only a small change in meaning, while inserting “usually” in ([1b](https://plato.stanford.edu/entries/generics/#ex1b)) dramatically alters the meaning of the sentence (e.g., “tigers are usually on the front lawn”). (For generics such as “mosquitoes carry malaria”, the adverb “sometimes” is perhaps better used than “usually” to mark off the generic reading.)

#### It applies to “the appropriation of outer space” – 1] upward entailment test – “the appropriation of outer space is unjust” doesn’t entail that “the use of outer space is unjust” because it doesn’t mean compulsory voting in dictatorships, 2] adverb test – “the appropriation of outer space is usually unjust” doesn’t mean anything substantially different

#### b] violation – they only defend mining

#### c] vote neg:

#### 1] limits – they can pick any form of appropriation from internet satellites to asteroid mining to moon basing and there’s no universal disad since they’re all different and require different uses space – explodes neg prep and leads to random appropriation of the week affs which makes cutting stable neg links impossible. PICs don’t solve – it’s absurd to say neg potential abuse justifies the aff being flat out not T, which leads to a race towards abuse. Limits key to reciprocal engagement since they create a caselist for neg prep.

#### 2] TVA – read the aff as an advantage to a whole rez aff.

c/a paradigm issues

## 3

#### CP text: states ought to join the artemis accords

Rajagopalan 21, Rajeswari Pillai Rajagopalan, 6-8-2021, "The Artemis Accords and Global Lunar Governance," ORF, <https://www.orfonline.org/research/the-artemis-accords-and-global-lunar-governance/> //tanya

NASA, the U.S. civil space agency, announced the [Artemis Accords](https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf) in October 2020. It is an agreement for lunar exploration and beyond, with participation of both international partners and commercial players. The program envisages the landing of the first woman on the Moon by 2024. The Artemis Accords are guided by key principles of peaceful exploration, transparency, interoperability, emergency assistance, registration of objects, release of scientific data, preserving outer space heritage, preventing harmful interference, and safe disposal of space debris. These are also principles enshrined in the existing international space law including the foundational legal instrument, the Outer Space Treaty (OST) of 1967, and the accords thus can reinforce the existing international space regime. On May 31, New Zealand became the 11th country to sign the Artemis Accords. A few days earlier, on May 24, Republic of Korea signed the accords. These two countries join Australia, Canada, Italy, Japan, Luxembourg, the United Kingdom, the United Arab Emirates, Ukraine, and the United States. The U.S. lead on this issue is important, but many important space powers, including Russia, China, and India, are yet to sign on to the accords. With more countries and industries pursuing lunar missions, there is a need for basic rules governing these activities that will minimize damage and evolve a set of good practices that would contribute to responsible behavior during lunar operations. Nevertheless, developing new governance measures to guide such activities is not going to be an easy matter. With more countries and industries pursuing lunar missions, there is a need for basic rules governing these activities that will minimize damage and evolve a set of good practices that would contribute to responsible behavior during lunar operations. Nevertheless, developing new governance measures to guide such activities is not going to be an easy matter Welcoming New Zealand to the accords, NASA Administrator Bill Nelson [claimed](https://www.nasa.gov/feature/new-zealand-signs-artemis-accords) that the accords are “simple, universal principles [that] will enable the next generation of international partnerships for the exploration of the Moon and beyond.” Announcing New Zealand’s signing of the accords, Foreign Minister Nanaia Mahuta [also pointed](https://www.beehive.govt.nz/release/space-exploration-soars-artemis-accords) to principles such as “transparency, interoperability, release of scientific data, sustainable use of resources, safe disposal of debris, and prevention of harmful interference in other’s activities.” She also acknowledged another important aspect: Although international laws exist in these areas, there was a need for “additional rules or standards to ensure the conservation and long-term sustainability” of space. While the Artemis Accords have been developed primarily by the U.S. for pushing lunar exploration, its utility in the broader area of global governance is also important. It would be useful to have spacefaring powers agree upon and comply with a common set of principles, guidelines, and best practices, which could be greatly beneficial for safe and sustainable use of space and maintain space as common heritage for all humankind. This is only a political commitment for ensuring better compliance with the commitments that state parties have already made by being parties to the OST and its four subsidiary agreements. It would be useful to have spacefaring powers agree upon and comply with a common set of principles, guidelines, and best practices, which could be greatly beneficial for safe and sustainable use of space and maintain space as common heritage for all humankind One of the serious problems facing outer space activities is the absence of full compliance by states to their commitments under the existing legal framework. A fuller compliance to treaty commitments by state parties can immediately change the dynamics in terms of openness and transparency, which will help reduce suspicion between different space powers. The need for more confidence building measures that would reassure states of their policies and activities in outer space cannot be emphasized enough. Given that global politics has grown much more competitive, the major spacefaring powers (many of whom are also the major global powers) need to make significant investments in measures that would enhance trust and confidence in each other. Therefore, space powers need to contemplate the global governance challenges they face and how they might address these.

#### Solves the aff by creating a uniform legal interpretation – that’s 1ac thompson:

**Thompson 16** Clive Thompson [Clive Thompson (@pomeranian99) is a WIRED contributing editor and author of Coders: The Making of a New Tribe and the Remaking of the World], 01.14.2016, "The Minerals Found in Asteroids and Faraway Planets Could Be Worth Trillions. Who Gets to Mine Them?," Wired, <https://www.wired.com/2016/01/clive-thompson-11/> // ash

SPACE IS LOUSY with profits. Consider the asteroid Ryugu: It’s made of so many tons of nickel, iron, cobalt, and water, it’s worth an estimated $95 billion. Venture into deeper space and there’s even richer plunder---like Davida, an asteroid that the wanna-be space mining company Planetary Resources values at more than $100 trillion. That’s more than five times the GDP of the US.

These jaw-dropping payloads are why extraterrestrial mining is becoming an increasingly serious endeavor. Companies like Planetary Resources, backed by the likes of Googlers Larry Page and Eric Schmidt, are already launching satellites to scan for the most promising asteroids. Space experts say some firm could be ready to launch a mission within 10 years. But are they allowed to? Of course, anyone can reach an asteroid---NASA already has. But can you own one?

Let’s start with existing space law. The big one on the books is the 1967 Outer Space Treaty. Ratified by 103 countries, including the spacefaring ones, it prohibits anyone from “appropriating” territory in space. (There’s an even more restrictive 1979 Moon Treaty as well, but the spacegoing countries haven’t signed, so it’s probably less relevant.) The upshot, most space-law scholars agree, is that nobody can claim a celestial body for their own.

But what about just extracting resources and bringing them home? The issue hasn’t been litigated, but extraction is probably legally OK. Indeed, there’s precedent: The US brought 842 pounds of rocks back from the moon, and they’re designated as property of the US. No other country has disputed that ownership; in fact, the US and USSR traded moon rocks and regolith. “Russia has even sold some commercially,” says James Dunstan, a spacelaw expert with the Mobius Legal Group.

The big wrinkle may not be whether it’s legal to mine an asteroid but how to figure out who has permission and who owns what claims. The US has no agency or process to issue licenses for space mining. “The politics can’t be known, but there will be politics,” says Joanne Gabrynowicz, a spacelaw expert at the University of Mississippi. Licenses give clarity not only to would-be miners but also to investors and governments starting their own operations. “If you don’t have that license, the investors are taking a big chance,” she says.

The US is now drawing up a law. Problem is, it’s unilateral and incomplete. The Commercial Space Launch Competitiveness Act of 2015 says citizens can “possess, own, transport, use, and sell” an asteroid resource once they obtain it. But the bill doesn’t establish an agency or process for issuing licenses. Worse, it says your ownership claim begins as soon as you detect the existence of metals on an asteroid. You don’t even have to plant a flag. But what if China and Russia have different ideas—and different laws for their own citizens? Commercial activity in distant space could easily cause seething international strife here on our home planet.

## 4

#### Private sector is key to mining – empirics prove public sector alone is insufficient

Gilbert 21, Alex Gilbert, 4-26-2021, "Mining in Space Is Coming," Milken Institute Review, <https://www.milkenreview.org/articles/mining-in-space-is-coming> //wr tanya

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](https://payneinstitute.mines.edu/wp-content/uploads/sites/149/2020/09/Payne-Institute-Commentary-The-Era-of-Commercial-Space-Mining-Begins.pdf). 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](https://www.fastcompany.com/90347364/jeff-bezos-wants-to-save-earth-by-moving-industry-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. That said, there’s no grass growing under potential pioneers’ feet. Potential economic, scientific and even security benefits underlie an emerging [geopolitical competition](https://nationalinterest.org/feature/geostrategic-importance-outer-space-resources-154746) 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 space resources 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](https://issues.org/new-policies-needed-to-advance-space-mining/) to facilitate private investment and ensure international cooperation. 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](https://www.theverge.com/2018/8/23/17769034/nasa-moon-lunar-water-ice-mining-propellant-depots). 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. The Moon is a prime [space mining target](https://theconversation.com/mining-the-moon-110744). Boosted by NASA’s mining solicitation, it is likely the first location for commercial mining. The Moon has several advantages. It is relatively close, requiring a journey of only several days by rocket and creating communication lags of only a couple seconds — a delay small enough to allow remote operation of robots from Earth. Its low gravity implies that relatively little energy expenditure will be needed to deliver mined resources to Earth orbit. Asteroids are another near-term [mining target](https://foreignpolicy.com/2016/04/28/the-asteroid-miners-guide-to-the-galaxy-space-race-mining-asteroids-planetary-research-deep-space-industries/). There are all sorts of space rocks hurtling through the solar system, with varying amounts of water, rare earth metals and other materials on board. The asteroid belt between the orbits of Mars and Jupiter contains most of them, many of which are greater than a kilometer in diameter. Although the potential water and mineral wealth of the asteroid belt is vast, the long distance from Earth and requisite travel times and energy consumption rule them out as targets in the near term. The prospects for space mining are being driven by technological advances across the space industry. The rise of reusable rocket components and the now-widespread use of off-the-shelf parts are lowering both [launch and operations costs](https://aerospace.csis.org/data/space-launch-to-low-earth-orbit-how-much-does-it-cost/). Once limited to government contract missions and the delivery of telecom satellites to orbit, private firms are now emerging as leaders in developing “[NewSpace](https://www.sciencedirect.com/science/article/pii/S0094576519313451)” activities — a catch-all term for endeavors including orbital tourism, orbital manufacturing and mini-satellites providing specialized services. The space sector, with a market capitalization of $400 billion, could grow to [as much as $1 trillion](https://milkeninstitute.org/videos/infinity-and-beyond-business-space) by 2040 as private investment soars. In the long term, production in space to supply Earth could drive massive growth in the space industry — but not with commodities competing with terrestrial production. Rather, Earth markets are likely to be most receptive to the exotic: specialized materials and alloys manufactured in microgravity conditions, large-satellite services such as [space-based solar power](https://www.globalpolicyjournal.com/blog/21/10/2019/emerging-competition-space-solar-power), or unique products like helium-3. The latter two are particularly promising, as they could provide large contributions to global decarbonization after 2050. Other nations are following the U.S. lead in developing space-resources law and policy. As noted earlier, Luxembourg has passed a space mining law of its own, [prioritizing space resources](https://space-agency.public.lu/en/space-resources/the-initiative.html) and forming partnerships with space agencies worldwide. The United Arab Emirates is moving toward a similar law, as the country looks to space as part of the oil-drenched state’s modernization plans. As Japan continues scientific sampling missions, its government is currently [considering a space mining law](https://www.japantimes.co.jp/news/2020/11/06/national/science-health/japan-bill-space-samples/) of its own. The nature of China’s space ambitions isn’t easy to decipher, but [space mining and lunar exploration](https://www.thecairoreview.com/wp-content/uploads/2019/05/cr33-global-forum.pdf) are clearly part of the strategy. Indeed, many U.S. advocates of space mining point to Chinese ambitions as a reason for the United States to get out ahead of the pack of liberal democracies with space capabilities.

#### Mining solves climate change

Duran 21, Paloma Duran, 11-3-2021, "Is Space Mining the Best Option to Face Climate Change?," Mexico Business, <https://mexicobusiness.news/mining/news/space-mining-best-option-face-climate-change> //tanya

Is Space Mining the Best Option to Face Climate Change? Going to net zero means that more mining is needed. Experts have said that the current supply cannot support the necessary metals demand for the green transition. As a result, new mining alternatives have gained greater relevance, among them is space mining. Several countries, including Mexico, have shown their interest in this alternative, creating a new space race. “The solar system can support a billion times greater industry than we have on Earth. When you go to vastly larger scales of civilization, beyond the scale that a planet can support, then the types of things that civilization can do are incomprehensible to us … We would be able to promote healthy societies all over the world at the same time that we would be reducing the environmental burden on the Earth,” said Dr. Phil Metzger, Planetary Scientist at the University of Central Florida. Currently, there are several attempts to address global warming and transition to a net zero carbon economy. There has been an increasing interest in renewable energy and infrastructure, which has increased demand for various minerals, especially lithium, cobalt, nickel, copper and rare earth elements. However, according to experts, the world is close to entering a metals supercycle, where demand will exceed available supply, causing prices to skyrocket. Consequently, the mining industry has sought alternatives to achieve the required supply. Options include recycling and improved mine waste management, sea mining and space mining. The latter is considered one of the alternatives with the greatest potential. According to a study from the Space Policy Journal, The use of extraterrestrial resources to facilitate space science and exploration, there have been important advances in the field of robots and nanotechnology, which would allow a closed supply chain through the use of self-replicating robots in a few decades. “Asteroid mining will be one of the means through which humanity expands into space. Saving planet Earth could very well happen as a result, but only in the long run. Between growing demand, the danger posed by climate change and the possible need to look off-world for human survival, asteroid mining may be an inevitability. In other words, it is not a question of can we or should we, but when will we?” said Matthew S. Williams, Author and Writer for Universe Today and the curator of the publication’s Guide to Space section.

#### It’s try or die – climate change is a threat multiplier and causes extinction

Sears 20 — Nathan Alexander Sears is a PhD Candidate in Political Science at the University of Toronto. Before beginning his PhD, he was a Professor of International Relations at the Universidad de Las Américas, Quito. His research focuses on international security and the existential threats to humanity posed by nuclear weapons, climate change, biotechnology, and artificial intelligence. (“Great Powers, Polarity, and Existential Threats to Humanity: An Analysis of the Distribution of the Forces of Total Destruction in International Security” International Studies Association, 2021 Annual Conference, March/April 2021. https://www.researchgate.net/profile/Nathan-Sears-2/publication/350500094\_Great\_Powers\_Polarity\_and\_Existential\_Threats\_to\_Humanity\_An\_Analysis\_of\_the\_Distribution\_of\_the\_Forces\_of\_Total\_Destruction\_in\_International\_Security/links/60639248a6fdccbfea1a4cc4/Great-Powers-Polarity-and-Existential-Threats-to-Humanity-An-Analysis-of-the-Distribution-of-the-Forces-of-Total-Destruction-in-International-Security.pdf)//JLPark

Climate Change

Humanity faces existential risks from the large-scale destruction of Earth’s natural environment making the planet less hospitable for humankind (Wallace-Wells 2019). The decline of some of Earth’s natural systems may already exceed the “planetary boundaries” that represent a “safe operating space for humanity” (Rockstrom et al. 2009). Humanity has become one of the driving forces behind Earth’s climate system (Crutzen 2002). The major anthropogenic drivers of climate change are the burning of fossil fuels (e.g., coal, oil, and gas), combined with the degradation of Earth’s natural systems for absorbing carbon dioxide, such as deforestation for agriculture (e.g., livestock and monocultures) and resource extraction (e.g., mining and oil), and the warming of the oceans (Kump et al. 2003). While humanity has influenced Earth’s climate since at least the Industrial Revolution, the dramatic increase in greenhouse gas emissions since the mid-twentieth century—the “Great Acceleration” (Steffen et al. 2007; 2015; McNeill & Engelke 2016)— is responsible for contemporary climate change, which has reached approximately 1°C above preindustrial levels (IPCC 2018). Climate change could become an existential threat to humanity if the planet’s climate reaches a “Hothouse Earth” state (Ripple et al. 2020). What are the dangers? There are two mechanisms of climate change that threaten humankind. The direct threat is extreme heat. While human societies possesses some capacity for adaptation and resilience to climate change, the physiological response of humans to heat stress imposes physical limits—with a hard limit at roughly 35°C wet-bulb temperature (Sherwood et al. 2010). A rise in global average temperatures by 3–4°C would increase the risk of heat stress, while 7°C could render some regions uninhabitable, and 11–12°C would leave much of the planet too hot for human habitation (Sherwood et al. 2010). The indirect effects of climate change could include, inter alia, rising sea levels affecting coastal regions (e.g., Miami and Shanghai), or even swallowing entire countries (e.g., Bangladesh and the Maldives); extreme and unpredictable weather and natural disasters (e.g., hurricanes and forest fires); environmental pressures on water and food scarcity (e.g., droughts from less-dispersed rainfall, and lower wheat-yields at higher temperatures); the possible inception of new bacteria and viruses; and, of course, large-scale human migration (World Bank 2012; Wallace-Well 2019; Richards, Lupton & Allywood 2001). While it is difficult to determine the existential implications of extreme environmental conditions, there are historic precedents for the collapse of human societies under environmental pressures (Diamond 2005). Earth’s “big five” mass extinction events have been linked to dramatic shifts in Earth’s climate (Ward 2008; Payne & Clapham 2012; Kolbert 2014; Brannen 2017), and a Hothouse Earth climate would represent terra incognita for humanity. Thus, the assumption here is that a Hothouse Earth climate could pose an existential threat to the habitability of the planet for humanity (Steffen et al. 2018., 5). At what point could climate change cross the threshold of an existential threat to humankind? The complexity of Earth’s natural systems makes it extremely difficult to give a precise figure (Rockstrom et al. 2009; ). However, much of the concern about climate change is over the danger of crossing “tipping points,” whereby positive feedback loops in Earth’s climate system could lead to potentially irreversible and self-reinforcing “runaway” climate change. For example, the melting of Arctic “permafrost” could produce additional warming, as glacial retreat reduces the refractory effect of the ice and releases huge quantities of methane currently trapped beneath it. A recent study suggests that a “planetary threshold” could exist at global average temperature of 2°C above preindustrial levels (Steffen et al. 2018; also IPCC 2018). Therefore, the analysis here takes the 2°C rise in global average temperatures as representing the lower-boundary of an existential threat to humanity, with higher temperatures increasing the risk of runaway climate change leading to a Hothouse Earth.

# Case

## Adv 1

### t/l lbl

#### nasa is a MASSIVE thumper, you don’t solve debris – we’ll read blue

Scoles 15 [(Sarah Scoles, freelance science writer, contributor at Wired and Popular Science, author of the books Making Contact and They Are Already Here) “Dust from asteroid mining spells danger for satellites,” New Scientist, May 27, 2015, <https://www.newscientist.com/article/mg22630235-100-dust-from-asteroid-mining-spells-danger-for-satellites/>] TDI

* Study this is citing – Javier Roa, Space Dynamic Group, Applied Physics Department, Technical University of Madrid. Casey J Handmer, Theoretical Astrophysics, California Institute of Technology. Both PhD Candidates. “Quantifying hazards: asteroid disruption in lunar distant retrograde orbits,” arXiv, Cornell University, May 14, 2015, <https://arxiv.org/pdf/1505.03800.pdf>

NASA chose the second option for its [Asteroid Redirect Mission](http://www.nasa.gov/content/what-is-nasa-s-asteroid-redirect-mission/), which aims to [pluck a boulder from an asteroid’s surface](https://www.newscientist.com/article/dn27243-rock-grab-from-asteroid-will-aid-human-mission-to-mars) and relocate it to a stable orbit around the moon. But an asteroid’s gravity is so weak that it’s not hard for surface particles to escape into space. Now a new model warns that debris shed by such transplanted rocks could intrude where many defence and communication satellites live – in geosynchronous orbit.

According to [Casey Handmer](http://www.caseyhandmer.com/) of the California Institute of Technology in Pasadena and Javier Roa of the Technical University of Madrid in Spain, 5 per cent of the escaped debris will end up in regions traversed by satellites. Over 10 years, it would cross geosynchronous orbit 63 times on average. A satellite in the wrong spot at the wrong time will suffer a damaging high-speed collision with that dust.

The study also looks at the “catastrophic disruption” of an asteroid 5 metres across or bigger. Its total break-up into a pile of rubble would increase the risk to satellites by more than 30 per cent ([arxiv.org/abs/1505.03800](http://arxiv.org/abs/1505.03800)).

#### Squo debris thumps – also massive solvency deficit

1ac Intagliata 17 [(Christopher Intagliata, MA Journalism from NYU, Editor for NPRs All Things Considered, Reporter/Host for Scientific American’s 60 Second Science) “The Sneaky Danger of Space Dust,” Scientific American, May 11, 2017, <https://www.scientificamerican.com/podcast/episode/the-sneaky-danger-of-space-dust/>] TDI

When tiny particles of space debris slam into satellites, the collision could cause the emission of hardware-frying radiation, Christopher Intagliata reports. Aside from all the satellites, and the space station orbiting the Earth, there's a lot of trash circling the planet, too. Twenty-one thousand [baseball-sized chunks](https://www.scientificamerican.com/article/orbital-debris-space-fence/) of debris, [according to NASA](https://www.orbitaldebris.jsc.nasa.gov/faq.html). But that number's dwarfed by the number of small particles. There's hundreds of millions of those. "And those smaller particles tend to be going fast. Think of picking up a grain of sand at the beach, and that would be on the large side. But they're going 60 kilometers per second." Sigrid Close, an applied physicist and astronautical engineer at Stanford University. Close says that whereas mechanical damage—like punctures—is the worry with the bigger chunks, the dust-sized stuff might leave more insidious, invisible marks on satellites—by causing electrical damage. "We also think this phenomenon can be attributed to some of the failures and anomalies we see on orbit, that right now are basically tagged as 'unknown cause.'" Close and her colleague Alex Fletcher modeled this phenomenon mathematically, based on plasma physics behavior. And here's what they think happens. First, the dust slams into the spacecraft. Incredibly fast. It vaporizes and ionizes a bit of the ship—and itself. Which generates a cloud of ions and electrons, traveling at different speeds. And then: "It's like a spring action, the electrons are pulled back to the ions, ions are being pushed ahead a little bit. And then the electrons overshoot the ions, so they oscillate, and then they go back out again.” That movement of electrons creates a pulse of electromagnetic radiation, which Close says could be the culprit for some of that electrical damage to satellites. The study is in the journal Physics of Plasmas. [Alex C. Fletcher and Sigrid Close, [Particle-in-cell simulations of an RF emission mechanism associated with hypervelocity impact plasmas](http://aip.scitation.org/doi/full/10.1063/1.4980833)]

#### This means you err neg – a) they don’t solve existing debris b) this ev is from five years ago! Zero collision brightline means you presume neg and should be very skeptical – empirically proven by the 2009 satellite collision which didn’t escalate – this answers 1ac zaitsev

**Zenko is about ASAT testing which they also don’t solve! We’ll read blue:**

Micah **Zenko**, Whitehead Senior Fellow on the US and Americas Programme at Chatham House, 4-16-20**14**, "Dangerous Space Incidents," Council on Foreign Relations, https://www.cfr.org/report/dangerous-space-incidents?sp\_mid=45655631&sp\_rid=emFjay5iZWF1Y2hhbXBAZ21haWwuY29tS0

A January 2007 direct ascent ASAT test carried out by China against its defunct Fengyun-1C weather satellite instantly increased the amount of space debris in low earth orbit (LEO) by 40 percent. Debris is especially problematic in LEO, where half of the world's 1,100 active satellites operate. Space objects—even flecks of paint—travel as fast as eighteen thousand miles per hour and can cause catastrophic damage to manned and unmanned spacecraft—creating even more debris in the process. The U.S. National Research Council estimates that portions of LEO have reached a "tipping point," with hundreds of thousands of space debris larger than one centimeter stuck in orbit that will collide with other pieces of debris or spacecraft, thus creating exponentially more debris. Significant growth in the quantity or density of space debris could render certain high-demand portions of outer space **unnavigable and inutile**. Currently, there are no legal or internationally accepted means for removing existing debris. China could also test co-orbital antisatellite systems in which an interceptor spacecraft destroys its target by exploding in close proximity, creating even more debris. For several years, Beijing has conducted a series of close proximity maneuvers with its satellites in LEO; the most recent occurred after a July 20, 2013, launch of three satellites on the same rocket, which have since conducted sudden maneuvers toward other Chinese satellites. Human or operating errors during these maneuvers could inadvertently result in a collision that produces harmful debris. While these maneuvers could eventually be used for civilian purposes, most U.S. officials believe these experiments are primarily intended to demonstrate latent ASAT capabilities. An ASAT test that causes unintended damage to U.S. and ally satellites or an accident in space caused by debris could trigger a **major international crisis** between the United States and China. The risk is heightened by the fact that both countries have **no pre–space-launch notification arrangements**, similar to the U.S.-Russia agreement on notifications of intercontinental ballistic missile (ICBM) and submarine-launched ballistic missile (SLBM) launches. Management of such a crisis could also be hindered by a lack **of direct communication** between U.S. authorities and the PLA agency that oversees Chinese military space launches.

#### No ilink to miscalc or nuke war – taiwan, hong kong, esc, scs should all prove the probablity is v low

Bernat says space commercial coming now but also no brightline

### debris

#### 1] private companies solve

Katz 21, Miranda Katz, 10-31-2021, "Space Debris: Another Frontier in the Commercialization of Space — Columbia Journal of Transnational Law," Columbia Journal of Transnational Law, https://www.jtl.columbia.edu/bulletin-blog/space-debris-another-frontier-in-the-commercialization-of-space //wr tanya

Space “Junk” is a threat to any spacefaring operator, be they a sovereign or private actor. The current legal framework does not directly address space debris, leaving the door open for private companies to not only solve the technical problems of clean up, but also craft the policy that supports their involvement. In the Summer of 2021, we got a glimpse of what some hope will be commonplace in the future: space tourism.  While it might be billionaires and their associates for now, if this technology is to follow the arc of many other advancements previously reserved for the rich (cell phones and air travel, for example), eventually there may come a time in the future where space tourism is a realistic financial goal for those of more restricted means.  As humanity broaches this great commercial frontier, it will have to clear the great and neglected hurdle of “space junk,” and current trends appear to indicate that industry will shape not only the technology designed to solve the problem, but the policy as well. Outside the realms of fictional space-thrillers, even the smallest pieces of space junk can present real danger.  In 2016, a tiny piece of space junk, believed 0to be a paint chip or a piece of metal no more than a few thousandths of a millimeter across, cracked the window of the International Space Station.  In May 2021, a piece of space debris punctured the robotic arm of the International Space Station.  This is seriously concerning, as, according to the European Space Agency, there are 670,000 pieces of space debris larger than 1cm and 170,000,000 between 1mm and 1cm in width. Unfortunately8, public action and policy struggles to keep up with these risks.  International law affords little clarity on the problem, as its control is a novel, emerging field with many technical tracking and removal challenges.  None of the existing space treaties directly tackle the issue, rendering responsibility for it ambiguous.  Absent such responsibility, legal incentives are non-existent.  Guidelines are occasionally issued by international governing bodies, but provide little legal significance and are more targeted at the practicalities of tracking and removal. The nation best positioned to notify space actors of collision risks is the United States, and the burden of that task currently falls on the Department of Defense.  However, the Trump administration issued a directive in 2018, shifting the responsibility from the DoD to the Department of Commerce, and the transition has yet to materialize, leaving DoD struggling to keep pace with increasing commercial activity.  In the face of public paralysis, addressing the problem through industry looks more and more attractive. This has led some to call for a new legal order that still leaves room for government, but reframes who the rules exist to serve.  Rather than our current, rudimentary treaty regime designed to prevent international conflict, commentators have called for an additional regime resembling maritime law that preserves the interests of a more diverse set of stakeholders, including those in the future that can bring technology and interests to space that may not yet exist.  These commentators shun the common conception that space regulation should resemble air-traffic control, which is suited to a narrower set of uses (transport).  Under such a “maritime” regime, the light touch of central regulatory bodies, and perhaps their non-existence, is preferred, just as it has been on the seas.  This way, individual nations have a degree of flexibility in instituting controls they see fit while leaving room for industry to address problems and introduce new uses for space. Furthermore, governments seem ready and willing to construct the legal and incentive framework in concert with such private action.  In a joint statement this summer, G7 members expressed openness to resolving the technical aspects of the debris problem with private institutions, and there is some promising progress.  Apple co-founder Steve Wozniak signaled his plans to address the problem through a new company with a telling name: Privateer Space.  Astroscale, a UK-based company, successfully launched a pair of satellites in the Spring of 2021 that will remove certain space debris from orbit.  Astroscale also stated their desire to work with governments and international governing bodies to craft policy with private efforts to control the problem top of mind.   In light of public policy’s silence on space debris, the initiative of actors like Astroscale involving themselves in policy may be advised, as it could promote further private investment in technology for space debris removal.  A popular policy recommendation among experts is the establishment of public-private partnerships, and Astroscale has entered several such agreements including with Japan and the European Space Agency.  Other actors include ClearSpace, OneWeb, and D-Orbit.

#### 2] No debris cascades—This ev answers all aff warrants

Fange 2017 (Daniel Von Fange, Web Application Engineer, Founder and Owner of LeanCoder, Full Stack, Polyglot Web Developer, “Kessler Syndrome is Over Hyped”, 5/21/2017, http://braino.org/essays/kessler\_syndrome\_is\_over\_hyped/)

Kessler Syndrome is overhyped. A chorus of online commenters great any news of upcoming low earth orbit satellites with worry that humanity will to lose access to space. I now think they are wrong. What is Kessler Syndrome? Here’s the popular view on Kessler Syndrome. Every once in a while, a piece of junk in space hits a satellite. This single impact destroys the satellite, and breaks off several thousand additional pieces. These new pieces now fly around space looking for other satellites to hit, and so exponentially multiply themselves over time, like a nuclear reaction, until a sphere of man-made debris surrounds the earth, and humanity no longer has access to space nor the benefits of satellites. It is a dark picture. Is Kessler Syndrome likely to happen? I had to stop everything and spend an afternoon doing back-of-the-napkin math to know how big the threat is. To estimate, we need to know where the stuff in space is, how much mass is there, and how long it would take to deorbit. The orbital area around earth can be broken down into four regions. Low LEO - Up to about 400km. Things that orbit here burn up in the earth’s atmosphere quickly - between a few months to two years. The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, Low LEO doesn’t matter for Kessler Syndrome. If Low LEO was ever full of space junk, we’d just wait a year and a half, and the problem would be over. High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue. Mid Orbit - GPS satellites and other navigation satellites travel here in lonely, long lives. The volume of space is so huge, and the number of satellites so few, that we don’t need to worry about Kessler here. GEO - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. Usually the geostationary orbit is used by big weather satellites and big TV broadcasting satellites. (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, all the satellites here are moving the same direction at the same speed - debris doesn’t get free velocity from the speed of the satellites. Also, it’s quite expensive to get a satellite here, and so there aren’t many, only about one satellite per 1000km of the ring. Kessler is not a problem here. How bad could Kessler Syndrome in High LEO be?Let’s imagine a worst case scenario. An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space? I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000. So even in the worst case, we don’t lose access to space. Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits. In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment. Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely.Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner.Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided. The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler. Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting) So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect. I’m removing Kessler Syndrome from my list of things to worry about.

#### 3] alt causes and resiliency checks

Swinhoe 21, Dan Swinhoe, 5-7-2021, "Just how resilient are satellites?," No Publication, https://www.datacenterdynamics.com/en/analysis/just-how-resilient-are-satellites/

But what about satellites? GPS has become integral to daily life, weather and observation satellites provide a number of information services to commercial companies, and now we’re beginning to see a number of commercial companies provide broadband and 5G connectivity from orbit. Are the satellites we depend on as robust as we need them to be? The costs to build and launch large satellites runs into the tens, if not hundreds of millions of dollars per launch and can take months to prepare, and so the multi-ton satellites flown to Geostationary Earth Orbit (GEO) 35,786 kilometers (22,236 miles) above the Earth are routinely built with multiple layers of redundancy on key systems and payloads and rigorously tested. “Satellites are reliable in the sense that they get strapped into a rocket and blasted into space through several Gs of acceleration and a ton of heat noise and vibration, and then operate in a vacuum with significant temperature shifts as they go from sunlight into the shadow back into sunlight, and radiation,” says Dr. Brian Weeden, director of program planning, Secure World Foundation. “In that sense, they are pretty durable.” Assuming a satellite survives the launch and calls home without any troubles, it faces a constant battle for survival out in the harshness of space. Even Earth satellites in low orbits can see temperature swings of minus 50°C (-58°F) to plus 50°C (122°F) every 90 minutes, which can have a big effect on the equipment onboard, as can the lack of air. Space weather is another major contributor to satellite failures. Many of these bus-sized, multi-ton satellites are out in GEO, thousands of miles from Earth where there is little atmospheric protection from extreme conditions and large amounts of radiation. And the void can be surprisingly active and unpredictable when it comes to weather. X-rays, ultraviolet rays, radiation, and geomagnetic storms can all wreak havoc on-board; components can be damaged by the high current that discharges into the satellite or damaged by high-energy particles that penetrate the satellite.  Sun Outages, where the satellite passes in front of the Sun, don't harm the satellite. However, the sun's interference swamps the signal from the satellite, causing a loss of data. These outages affect the signals from geostationary satellites, and can last for around ten minutes a day during the Equinox - but they are predictable. The University of Reading recently recorded the first ‘space hurricane’ which it described as a ‘1,000km-wide swirling mass of plasma raining electrons several hundred kilometers above the North Pole.’ To better predict coronal ejections from the sun and provide more notice about potential space weather events, the ESA has planned a mission called Lagrange, where spacecraft will be positioned at "Lagrange points", where the gravity of the Earth and Sun balance providing stable locations to observe the sun’s activity a few days ahead of the Earth’s position. Before satellites launch, they go through a rigorous testing regime that can see them placed into climate chambers to simulate the super cold and hot vacuum of space, as well as vibration and shock tests to see how machines cope with the rigors of launch and booster separation en-route to orbit. Satellites are built on the assumption they will never be touched again, so operators want to make sure their investments are built to last. “The systems are built to be resilient and operate autonomously,” says Kevin Bell, VP of space program operations at the Aerospace Corporation, “and have several different kinds of fault management systems built into them; either to self-repair and recover or to go into a safe mode where a human can come in and figure out what happened and recover them. Reliability and testing have improved over the years, and satellites are now less over-engineered as we learn about what actually causes satellites to fail once out in orbit. We are also slowly starting to open up the possibilities to repair, refuel, and potentially upgrade existing satellites even after years in orbit. Northrop Grumman’s Mission Extension Vehicle is the first satellite that can service other satellites and extend their lifespan. MEV-1 completed its first docking to a client satellite, Intelsat IS-901 in February 2020, to keep the satellite operational for a further five years, while MEV-2 is due to dock with the Intelsat IS-1002 satellite in early 2021. Nasa is working on a similar in-orbit service satellite as part of the agency’s OSAM-1/Restore-L project. The arrival of these constellations means the industry is seeing a divergence. There are huge, highly-resilient individual machines in high orbits; and large swarms of small and breakable machines in low orbits that, while individually fragile, create a more resilient overall system because there can be tens or even hundreds of failover points. “You go from a few very large, very expensive, very powerful things to a more distributed set of satellites. Maybe each one individually is not quite as powerful but you've got dozens to hundreds or thousands of them, which is a different kind of resilience,” he says. “The bigger ones are more resilient on an individual basis. We’re seeing a shift towards individual satellites that are probably less resilient, but a system that is more resilient on the whole. If you've got one satellite and it fails you're screwed. If you've got 100, and five of them fail, you're probably okay.” “The new players have effectively scaled for production,” Bell adds. “They're able to evolve because of quantity and the amount of industrial base, it's huge compared to the kinds of quantity and scale we have. They’re trying to look at what it takes to build production lines where you can stabilize the production line and build large unit counts, and they've actually been able to spend more time optimizing testing.” Smaller satellites can be tested more easily; they no longer need cranes and high bays, but can be pushed around on a wheeled cart by a person, which can massively simplify assembly integration and test. And once in space, companies can glean more information about what causes failures. The fact these commercial companies are willing to take risks and fail on some iterations of satellites marks a change from the more traditional companies, which are reluctant to accept the larger costs of failure, and the political ramifications if Government/military agencies are on board.

## Adv 2

#### Massive thumpers in their own ev – we’ll read green

**Funnell 18** Antony Funnell [Antony Funnell is a Walkley Award-winning journalist and broadcaster. He is the presenter of the Future Tense series on ABC Radio National and is a former host of The Media Report], 8-1-2018, " War in space 'inevitable' because there's so much money to be made, expert warns," ABC Radio National, [https://www.abc.net.au/news/2018-08-24/conflict-in-space-is-inevitable-expert-warns/10146314 //](https://www.abc.net.au/news/2018-08-24/conflict-in-space-is-inevitable-expert-warns/10146314%20//) ash

A leading Australian space law expert has warned conflict over space assets is "inevitable", and more needs to be done now to avert the potential for hostility. Professor Melissa de Zwart, the Dean of Law at the University of Adelaide, says growing commercial interest in the mining of precious minerals on asteroids and planets has heightened the danger. "I think you have to be a realist about that," she said. "Where you have resources, where you have competition for those resources, where you have investment of money in the extraction of those resources ... there will be an expectation of security around that investment." While full-scale mining is yet to be tried, there is significant international interest. Japanese aerospace agency Jaxa has already successfully landed a robotic craft on an asteroid and taken samples. It currently has another probe hovering over an asteroid named Ryugu. Two American companies — Deep Space Industries and Planetary Resources — are thought to be the leaders in the field, but in May this year a UK firm called Asteroid Mining Corporation also entered the race. "Those corporations will be looking to the nation-state to say, well, are you going to protect our investment in this business?" Professor de Zwart said. A very crowded space The US Government and American firms continue to play a dominant role in more traditional space technology development and deployment. SpaceX, for example, is a major private supplier of rockets, while the US Air Force currently coordinates international satellite traffic, providing advanced warnings about potentially dangerous space debris. Two American companies — Deep Space Industries and Planetary Resources — are thought to be the leaders in the field, but in May this year a UK firm called Asteroid Mining Corporation also entered the race. "Those corporations will be looking to the nation-state to say, well, are you going to protect our investment in this business?" Professor de Zwart said.

#### So does skibba – and it’s about tiny satellites to get hunks of debris which they also don’t solve

**Skibba 18** Ramin Skibba [Current Assistant Project Scientist at UCSD studying the evolution of galaxy clustering. Ph.D. in Physics & Astronomy at the University of Pittsburgh], 5-2-2018, " Mining in Space Could Lead to Conflicts on Earth," Nautilus, <https://nautil.us/blog/-mining-in-space-could-lead-to-conflicts-on-earth> // ash

Space mining is no longer science fiction. By the 2020s, Planetary Resources and Deep Space Industries—for-profit space-mining companies cooperating with NASA—will be sending out swarms of tiny satellites to assess the composition of hurtling hunks of cosmic debris, identify the most lucrative ones, and harvest them. They’ve already developed prototype spacecraft to do the job. Some people—like Massachusetts Institute of Technology planetary scientist Sara Seager, former NASA deputy administrator Lori Garver, and science writer Phil Plait—argue that, to continue advancing as a space-faring species, we need to embrace this commercial space mining industry, and perhaps even facilitate it, too. But should we?

This question concerns me, as both an astrophysicist and a space enthusiast. Before becoming a science communicator, I worked for 15 years researching the evolution of galaxies, the properties of dark matter, and the expansion of the universe. From that perspective, the distance from us to the asteroid belt is actually rather small, so the question of whether to mine it, and in what way, hits close to home. The Space Act of 2015 authorizes the U.S. president “to facilitate the commercial exploration and utilization of space resources to meet national needs.” It’s an exciting prospect, to be sure, but also a troubling one.

For one thing, it appears to violate international law, according to Congressional testimony by Joanne Gabrynowicz, a space law expert at the University of Mississippi. Before NASA’s moon landing, the United States—along with other United Nations Security Council members and many other countries—signed the 1967 Outer Space Treaty. “Outer space, including the moon and other celestial bodies,” it states, “is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.” The 1979 Moon Agreement went further, declaring outer space to be the “common heritage of mankind” and explicitly forbidding any state or organization from annexing (non-Earth) natural resources in the solar system.

Major space-faring nations are not among the 16 countries party to the treaty, but they should arguably come to some equitable agreement, since international competition over natural resources in space may very well transform into conflict. Take platinum-group metals. Mining companies have found about 100,000 metric tons of the stuff in deposits worldwide, mostly in South Africa and Russia, amounting to $10 billion worth of production per year, according to the U.S. Geological Survey. These supplies should last several decades if demand for them doesn’t rise dramatically. (According to Bloomberg, supply for platinum-group metals is constrained while demand is increasing.)

Palladium, for example, valued for its conductive properties and chemical stability, is used in hundreds of millions of electronic devices sold annually for electrodes and connector platings, but it’s relatively scarce on Earth. A single giant, platinum-rich asteroid could contain as much platinum-group metals as all reserves on Earth, the Google-backed Planetary Resources claims. That’s a massive bounty. As Planetary Resources and other U.S. and foreign companies scramble for control over these valuable space minerals, competing “land grabs” by armed satellites may come next. Platinum-group metals in space may serve the same role as oil has on Earth, threatening to extend geopolitical struggles into astropolitical ones, something Trump is keen on preparing for. Yesterday he said he’s seriously weighing the idea of a “Space Force” military branch.

Moreover, the technology that might enable this free-for-all—versatile “nanosatellites,” no larger than a loaf of bread—is relatively inexpensive. While reporting for a story about these tiny satellites, also known as CubeSats, I came across some missions applicable to mining asteroids. In November, NASA will launch a satellite for a mission called Near-Earth Asteroid Scout, for example. It will deploy a solar sail, propel itself with sunlight, and journey to the asteroid belt, where it will scope out a particular asteroid and analyze its properties. NASA has also awarded grants to Planetary Resources to advance the designs of spectral imagers and propulsion systems for CubeSats, and other missions will develop the satellites’ abilities to communicate and network with each other. NASA also awarded Deep Space Industries contracts to assess commercial approaches for NASA’s asteroid goals, which may involve hosting DSI’s asteroid-prospecting equipment on its missions.

Like all forms of mining, it will be dangerous. If space-mining activities break up asteroids, the resulting debris could be hazardous for satellites, other spacecraft, and astronauts nearby. On the other hand, in a best-case scenario, space mining could be environmentally safe, capture only necessary minerals and water, and, in the more distant future even lead to the construction of a far-flung space station led by NASA and other space agencies, orbiting 200 million miles from Earth and serving as both a mining depot and a pit-stop for passing spacecraft.

But it’s not clear that a pact between the commercial space mining industry and NASA would align with the public’s interest. NASA’s increasing collaboration with space mining companies could distort and divert efforts previously focused on space exploration and basic research, and discourage public interest and engagement in astronomy.

For example, Seager advocated for space mining at a science writing conference I attended in 2015. She’s part of a motley group of advisors for Planetary Resources, including the movie director James Cameron, a lawyer for a prominent Washington D.C. firm, and Dante Lauretta, another astronomer whom I respect. Seager seems to believe that encouraging private space mining will lead to more investments and technological innovation that would enable more scientific research. In a 2012 interview with The Atlantic, for instance, she said, “The bottom line is that NASA is not working the best that it could for space science right now, and so in order for people like me to succeed with my own research goals, the commercial space industry needs to be able to succeed independently of government contracts.”

But if the U.S. and U.S.-based companies lay claim to the richest and most easily accessible prospecting sites, not allowing other companies and nations to share in the wealth, economic and political relations could be damaged. That’s why this seems to be a dangerous path for space explorers. Once you’re on board with the commercial space industry, then you as a researcher must accept, if not support, everything that comes with it. Seager and a few other researchers may be willing to take this risk, but what about the rest of the space science community? Moreover, to succeed, these businesses will seek profitable missions, while science, exploration, and discovery—goals that stimulate public interest—will inevitably have lower priority. (Other commercial spaceflight companies, like Elon Musk’s SpaceX, do generate public interest, but they’re not directly involved in mining asteroids.) NASA may have its shortcomings, but at least its missions and research goals answer to the public. It’s not exactly a welcome thought to imagine more and more of our presence and activity in space being ceded, with NASA’s help, to private industry.

#### Counterplan solves the internal link on skibba and thompson– it’s about conflicting legal interpretations which the cp unifies

#### No ilink to nuke war

#### No miscalc or escalation

James Pavur 19, Professor of Computer Science Department of Computer Science at Oxford University and Ivan Martinovic, DPhil Researcher Cybersecurity Centre for Doctoral Training at Oxford University, “The Cyber-ASAT: On the Impact of Cyber Weapons in Outer Space”, 2019 11th International Conference on Cyber Conflict: Silent Battle T. Minárik, S. Alatalu, S. Biondi, M. Signoretti, I. Tolga, G. Visky (Eds.), <https://ccdcoe.org/uploads/2019/06/Art_12_The-Cyber-ASAT.pdf>

A. Limited Accessibility Space is difficult. Over 60 years have passed since the first Sputnik launch and only nine countries (ten including the EU) have orbital launch capabilities. Moreover, a launch programme alone does not guarantee the resources and precision required to operate a meaningful ASAT capability. Given this, one possible reason why space wars have not broken out is simply because only the US has ever had the ability to fight one [21, p. 402], [22, pp. 419–420]. Although launch technology may become cheaper and easier, it is unclear to what extent these advances will be distributed among presently non-spacefaring nations. Limited access to orbit necessarily reduces the scenarios which could plausibly escalate to ASAT usage. Only major conflicts between the handful of states with ‘space club’ membership could be considered possible flashpoints. Even then, the fragility of an attacker’s own space assets creates de-escalatory pressures due to the deterrent effect of retaliation. Since the earliest days of the space race, dominant powers have recognized this dynamic and demonstrated an inclination towards de-escalatory space strategies [23]. B. Attributable Norms There also exists a long-standing normative framework favouring the peaceful use of space. The effectiveness of this regime, centred around the Outer Space Treaty (OST), is highly contentious and many have pointed out its serious legal and political shortcomings [24]–[26]. Nevertheless, this status quo framework has somehow supported over six decades of relative peace in orbit. Over these six decades, norms have become deeply ingrained into the way states describe and perceive space weaponization. This de facto codification was dramatically demonstrated in 2005 when the US found itself on the short end of a 160-1 UN vote after opposing a non-binding resolution on space weaponization. Although states have occasionally pushed the boundaries of these norms, this has typically occurred through incremental legal re-interpretation rather than outright opposition [27]. Even the most notable incidents, such as the 2007-2008 US and Chinese ASAT demonstrations, were couched in rhetoric from both the norm violators and defenders, depicting space as a peaceful global commons [27, p. 56]. Altogether, this suggests that states perceive real costs to breaking this normative tradition and may even moderate their behaviours accordingly. One further factor supporting this norms regime is the high degree of attributability surrounding ASAT weapons. For kinetic ASAT technology, plausible deniability and stealth are essentially impossible. The literally explosive act of launching a rocket cannot evade detection and, if used offensively, retaliation. This imposes high diplomatic costs on ASAT usage and testing, particularly during peacetime. C. Environmental Interdependence A third stabilizing force relates to the orbital debris consequences of ASATs. China’s 2007 ASAT demonstration was the largest debris-generating event in history, as the targeted satellite dissipated into thousands of dangerous debris particles [28, p. 4]. Since debris particles are indiscriminate and unpredictable, they often threaten the attacker’s own space assets [22, p. 420]. This is compounded by Kessler syndrome, a phenomenon whereby orbital debris ‘breeds’ as large pieces of debris collide and disintegrate. As space debris remains in orbit for hundreds of years, the cascade effect of an ASAT attack can constrain the attacker’s long-term use of space [29, pp. 295– 296]. Any state with kinetic ASAT capabilities will likely also operate satellites of its own, and they are necessarily exposed to this collateral damage threat. Space debris thus acts as a strong strategic deterrent to ASAT usage.

#### hotlines check miscalc

Lan 16, Chen Lan 16, an independent analyst and founder of the 'Go Taikonauts!', “Chinese Space Quarterly Report”, January 2016, http://www.go-taikonauts.com/images/newsletters\_PDF/GoTaikonauts18.pdf

During the IAC 2015, China re-iterated the wish for international participation and cooperation in its space station project including extending the station by modules provided by international partners. Twitter messages posted by a European journalist from the Congress, that is still to be confirmed, however, showed a different view from ESA. ESA’s new Director General JohannDietrich Wörner said he had told China that the world does not need two space stations and will likely persuade China to drop its space station in favour of joining the ISS. On the other side, during the traditional “Heads of Space Agencies Panel” in IAC 2015, NASA Administrator Charles Bolden expressed his belief that the current exclusion of China from the ISS will not last forever. Though Sino-U.S. cooperation on human spaceflight is still uncertain, a positive move between the two countries has been made, that is the establishment of a space hotline. Western media reported in November that the hotline has been setup between Washington and Beijing to allow easy sharing of technical information about their space operations, hopefully avoiding any misunderstandings or accidents. Russia’s space agency Roscosmos on 17 December signed a cooperation agreement with the China National Space Administration (CNSA). The document was signed at the 20th regular meeting of Russian and Chinese Heads of Government, during Russian Prime Minister Dmitry Medvedev’s three-day visit to Beijing. The two sides agreed to promote the use of “GLONASS” and “Beidou” and their augmentations in their own countries and around the world, expanding the market of navigation services provided by these systems. The two space agencies signed another agreement on the same day on cooperation in the field of space electronics. It was reported earlier that the two countries were discussing a barter deal that Russia will import Chinese space electronic components and will export rocket engines, presumably the RD-180, to China. However, an official statement about the agreement did not mention the engine. Also on the same day, Russian state-owned nanotechnology company RUSNANO and the China Aerospace Science and Industry Corporation (CASIC) signed a strategic partnership agreement. CNSA also signed an agreement with the Netherlands on 26 October, and a memorandum of understanding with the UAE (United Arab Emirates) on 15 December, on exploration and peaceful use of outer space. A year after India signed its first space cooperation agreement with China, scientists from ISRO and the Chinese space agency have decided on six major areas of interest, including the hosting of payloads on each other’s satellites and inter-planetary missions. The other areas of interest are Earth observation, disaster management, space science and navigation, as the Times of India reported on 5 October. The Brazilian Ministry of Science, Technology and Innovation announced on 30 December that the sixth CBERS (China-Brazil Earth Resources Satellite) satellite, CBERS-4A, is scheduled to be launched into space in December 2018. The Planetary Science Institute signed a cooperation agreement with the Qian Xuesen Laboratory of Space Technology (Qian Xuesen Lab), CAST, on 15 December to advance their mutual interests in facilitating the open-ended expansion of the exploration of the solar system and to use the knowledge thus gained in supporting the expansion of human activity beyond the Earth. Both institutions also wish to advance their common interest in communicating to the public the knowledge and benefits gained through robotic and human exploration of the solar system.