# 1nc

## 1

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

#### Resolved is

Merriam Webster, https://www.merriam-webster.com/dictionary/resolution

1: the act or process of [resolving](https://www.merriam-webster.com/dictionary/resolve#h1): such as a: the act of analyzing a complex notion into simpler ones b: the act of answering : [SOLVING](https://www.merriam-webster.com/dictionary/solving) c: the act of determining d: the passing of a voice part from a [dissonant](https://www.merriam-webster.com/dictionary/dissonant) to a [consonant](https://www.merriam-webster.com/dictionary/consonant#h1) tone or the progression of a chord from [dissonance](https://www.merriam-webster.com/dictionary/dissonance) to [consonance](https://www.merriam-webster.com/dictionary/consonance) e: the separating of a chemical compound or mixture into its [constituents](https://www.merriam-webster.com/dictionary/constituent#h1) f(1): the division of a [prosodic](https://www.merriam-webster.com/dictionary/prosodic) element into its component parts (2): the substitution in Greek or Latin [prosody](https://www.merriam-webster.com/dictionary/prosody) of two short syllables for a long syllable g: the analysis of a [vector](https://www.merriam-webster.com/dictionary/vector#h1) into two or more vectors of which it is the sum

#### B] violation: they defend a plan with an actor “private entities”

#### 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] accessibility – it is literally impossible for me to cut nc’s to every possible aff, esp bc i am not from a big school like hwl which has multiple competitors and coaches helping cut prep in between rounds

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

#### 3] dtd to deter future abuse – 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 aff may not defend that a subset of appropriation

#### “Appropriation” is a generic bare plural. The upward entailment test and adverb test determine the genericity of a bare plural

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 //recut tanya

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.)

#### The resolution is generic – mining is unjust doesn’t entail all appropriation

**1] Semantics outweigh: It’s the only stasis point we know before the round so it controls the internal link to engagement, and there’s no way to use ground if debaters aren’t prepared to defend it.**

#### b] violation – They specified mining

#### c] vote neg:

#### 1] precision ­– their interp justifies the aff getting away w random words in the res which decks neg ground and prep bc they’re no longer bounded by the res

#### 2] limits ­– they explode the topic since they can spec infinitely any appropriation in any country ie china, the us, spacex, amazon, etc ­– spec means generic da’s don’t link which decks neg ground, kills in-depth clash, causing appropriation of the week affs which makes reciprocal prep impossible

#### tva ­– just read your aff as advantages under a wholres aff – pics don’t solve because potential neg abuse doesn’t justify aff abuse

c/a paradigm issues

## 3

#### 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.

#### Taking away property rights scares investors away and spills over to other space activities. Freeland 05

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V. THE NEED FOR CELESTIAL PROPERTY RIGHTS? ¶ The fundamental principle of "non-appropriation" upon which the international law of outer space is based stems from the desire of the international community to ensure that outer space remains an area beyond the jurisdiction of any state(s). Similar ideals emerge from UNCLOS (in relation to the High Seas) as well as the Antarctic Treaty, 42 although in the case of the latter treaty, it was finalised after a number of claims of sovereignty had already been made by various States and therefore was structured to "postpone" rather than prejudice or renounce those previously asserted claims.43 In the case of outer space, its exploitation and use is expressed in Article I of the Outer Space Treaty to be "the province of all mankind," a term whose meaning is not entirely clear but has been interpreted by most commentators as evincing the desire to ensure that any State is free to engage in space activities without reference to any sovereign claims of other States. This freedom is reinforced by other parts of the same Article and is repeated in the Moon Agreement (which also applies to "other celestial bodies within the solar system, other than the earth")." Even though both the scope for space activities and the number of private participants have expanded significantly since these treaties were finalised, it has still been suggested that the nonappropriation principle constitutes "an absolute barrier in the realization of every kind of space activity., 4 ' The amount of capital expenditure required to research, scope, trial, and implement a new space activity is significant. To bring this activity to the point where it can represent a viable "stand alone" commercial venture takes many years and almost limitless funding. From the perspective of a private enterprise contemplating such an activity, it would quite obviously be an important element in its decision to devote resources to this activity that it is able to secure the highest degree of legal rights in order to protect its investment. Security of patent and other intellectual property rights, for example, are vital prerequisites for private enterprise research activity on the ISS, and these rights are specifically addressed by the ISS Agreement between the partners to the project and were applicable to the experiments undertaken by Mark Shuttleworth when he was onboard the ISS.46

#### 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.

## 4

#### 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.

#### Laundry list of benefits

Newton 21, Memme Onwudiwe and Kwame Newton, 3-19-2021, "Africa and the Artemis Accords: A Review of Space Regulations and Strategy for African Capacity Building in the New Space Economy," New Space, <https://www.liebertpub.com/doi/full/10.1089/space.2020.0043> //tanya

The U.S. perspective on exploiting natural resources in space is reaffirmed in the recently announced Artemis Accords, which is a framework for international engagement and cooperation in space backed by the United States that allows for private corporations to exploit resources in space under the regulation of their national governments. Historically, the space regulations have primarily come from national governments, in the form of national legislation, policies and practices, and bilateral agreements.[49](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B49) Artemis Accords are unique in that they propose broadscale changes to assumptions about space exploration (such as the sanctioning of private companies mining for profit in space) by way of a network of bilateral agreements. Announced on May 15, 2020, by NASA, the Artemis program is framed as Principles for a Safe, Peaceful, and Prosperous Future.[51](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B51)Via the Artemis program, NASA will land the first woman and the next man on the Moon by 2024. While NASA is leading the Artemis program, international partnerships will play a key role in growing a presence on the Moon while preparing to conduct a human mission to Mars. International space agencies that join NASA in the Artemis program do so by executing bilateral Artemis Accords agreements. On Tuesday October 13, 2020 NASA announced the following 8 nations as the founding members of the Artemis Accords: Australia, Canada, Italy, Japan, Luxembourg, United Arab Emirates, United Kingdom, and the United States of America.[52](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B52) The Artemis Accords are to be agreed upon bilaterally with NASA partners; it is unclear how many, if any, AfSAs are part of ongoing negotiations. Despite the potential lack of input from AfSAs, the Accords represent a shift in the development of a global space economy. On one hand, the Accords can be seen as an amazing opportunity for African Nations to be more engaged in the global space economy as it, among numerous other things, lowers the barrier cost of entry for space faring nations by creating an environment that fosters security and economic growth. These benefits could be crucial as even domestically on earth, African nations have struggled to create robust environments for economic growth, and therefore, the shared ground rules and regulated economic zones offered to Artemis member states make the Accords an attractive opportunity. The Artemis Accords articulate 10 principles that member states must adhere to join the program. The principles are as follows: Peaceful Exploration, Transparency, Interoperability, Emergency Assistance, Registration of Space Objects, Release of Scientific Data, Preserving Heritage, Space Resources, Deconfliction of Activities, and Orbital Debris. The Artemis Accords call for peaceful international cooperation between states in space. NASA has pledged to have “safety zones” to protect private industries engaging in space resource extraction from “harmful interference.” The goal here is to establish special zones for economic activities in space. The principle of these safety zones is based in Article IX of the OST, which states that countries must conduct space operations with due regard to the corresponding interests of the other countries also operating in space, as to avoid causing harmful interference to the other countries' activities.[64](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B64) That being said, there are many headwinds against the proposed exploitation of space resources in the Artemis Accords. It is unclear whether or not economic harm is within the definition of “harmful interference” in which case competing economic activities in space could lead to conflict. The recent establishment of the Space Force as a new arm of the U.S. military also raises questions about how peaceful activities in space will remain as territories are opened up for economic activity.[65](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B65) In addition, as the Artemis Accords will be bilateral in nature, it will be difficult to ensure peace for countries outside of the accords. The militarization of space is a real issue, U.S. Vice President Mike Pence has recently gone as far as to call space a “war-fighting domain,” and part of the reasoning behind not including Russia as an early negotiator to the Artemis Accords themselves are heightened tensions due to threatening satellite maneuvers between the 2 nations.[65](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B65) However, in essence, a commitment to peaceful exploration and economic activity in space is hugely beneficial to Africa. Without it, the additional cost barrier of needing to create a space-based military force to protect space activity. Economic zones also would allow for economic activity in space to presumably be done using shared resources and infrastructure, which would additionally lower costs of barrier to entry for developing countries in Africa. It is unclear, however, how downstream space activities will benefit from these economic zones as there seems to be a focus on mining and other upstream activities. Transparency is required by the Artemis Accords among partner nations. Broadly, transparency in the accords are aligned with the obligations of the OST where states agree to “inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations and results of such activities.”[64](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B64) This means that nations must be open about potential hazards in human spaceflight, nations should be able to view each other's launches, and an acknowledgment in Article X that cooperation between nations is dependent on transparency and is ultimately necessary should claims for damage or responsibility arise.[65](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B65) Transparency, coupled with confidence building mechanisms, has long been critical components of space security, allowing rival countries to prevent misapprehensions between them.[66](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B66) NASA is encouraging countries participating in Artemis to share policies and plans in a transparent way and create interoperability between systems.[67](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B67) However, this is mainly so information can easily be exchanged and shared between nations, not with the goal of opening up this technology to states that do not yet have access. There is no specific requirement of interoperability in modern international space law, as states are free to explore space on their own, and thus do not require standardization or the permission of the international community.[68](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B68) This also is not anything new as there have been similar bilateral ISS agreements, as well as joint space missions, and even a joint American/Russian space station.[69](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B69) Under the OST, nations are internationally responsible for their national space activities and thus must register their space objects with the UN so that the UN can keep an open and accessible database for all.[72](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B72) The 1975 Registration Convention, which was agreed to by 75 states makes this regime mandatory.[70](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B70) This commitment is important for creating a safe environment for space-based economic activity. Space objects gone astray and untracked could do serious damage to spacecraft and astronauts. Here, the Artemis Accords are once again lowering the barrier to entry as it would take most nations an outsized investment in satellite and monitoring technology to create a database of all space objects, and even then, it is unlikely to be as comprehensive as what the UN has been able to bring together via a partnership. It has been NASA's policy for some time to share scientific findings and data that result from its missions.[73](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B73) NASA has committed that this will remain to be the case throughout the life of any Artemis mission. Openness and willingness to share scientific knowledge is mentioned in Article XII of the OST where it says “States shall inform the international scientific community of the nature, conduct, locations, and especially the findings of space activities.”[74](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B74) This commitment is also key to the aforementioned commitments on transparency. NASA hopes to protect “historic sites” such as where Neil Armstrong walked on the moon in 1969. In addition to protecting existing sites, this ideal allows for the establishment of new protected sites as humans spend more time on the moon.[75](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B75) NASA Administrator Jim Bridenstine said “We want to be able to protect heritage…On the surface of the moon, we have the Apollo landers, but we had landings with robots even before Apollo. We want to be able to protect those sites on the surface of the moon, so if we are enabling people to go to the moon with us, we want to make sure that those sites are all protected.”[76](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B76) Overall, this article seeks to ensure that protecting historic sites and artifacts will be just as important in space as it is here on Earth. Preserving a safe and sustainable environment in space is critical for both public and private activities. Therefore, under the Artemis Accords, NASA and partner nations will agree to act in a manner that is consistent with the principles reflected in the Space Debris Mitigation Guidelines of the United Nations Committee on the Peaceful Uses of Outer Space. Moreover, NASA and partner nations will agree to plan for the mitigation of orbital debris, including the safe, timely, and efficient disposal of spacecraft at the end of their missions. Continuing the work of existing policies and groups who seek to minimize and document debris, The chief among them is the Inter-Agency Space Debris Coordination Committee (IADC) whose primary mission is to (1) exchange information on space debris research activities between member space agencies, (2) facilitate opportunities for cooperation in space debris research, (3) review the progress of ongoing cooperative activities, and (4) identify debris mitigation options. IADC provides technical recommendations to the world space communities. It is not a regulatory organization.[78](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B78) Regulation in this area would both affect space faring nations wary of debris damaging vehicles, and also nation states on the ground as space debris can sometimes land on Earth, as seen recently in the Ivory Coast when space debris from a Chinese launch landed there.[79](https://www.liebertpub.com/doi/full/10.1089/space.2020.0043#B79) Much like the registration of space objects, having a centralized body to regulate space debris and actively try to dispose of said space debris for the benefit of all member states would be a positive for member African nations. It would be one more area where private actors in the African space economy do not need to rely on their respective state actors supplying this essential enabling service.

#### Solves debris via management

#### Solves deflection via transparency

# Case

## Solvency

#### Plan flaw – restriction means limitation -- if any of their links are true than one small actor like Blue Origin mining thumps solvency since the 1ac doesn’t outright ban mining

#### NASA thumps

O’Callaghan 20, Jonathan O’Callaghan, 5-13-2020, "This NASA Mission May Cause an Artificial Meteor Shower (Published 2020)," No Publication, <https://www.nytimes.com/2020/05/13/science/meteor-shower-nasa-dart.html> //tanya

If all goes to plan, in September 2022 a NASA spacecraft, the Double Asteroid Redirection Test mission or DART, will slam into a space rock with the equivalent energy of three tons of TNT. The goal is to nudge the orbit of its target object ever-so-slightly, a practice run to see if we could [divert an asteroid from a catastrophic impact with our planet](https://www.nytimes.com/2019/03/08/science/asteroids-nuclear-weapons.html) in the future. The impact on that asteroid could produce the first [meteor shower](https://www.nytimes.com/2020/01/01/science/meteor-showers-2020.html) ever to result from human activities in space, according to a paper published earlier this year in [The Planetary Science Journal](https://iopscience.iop.org/article/10.3847/PSJ/ab75bf). Observing the shower could let scientists on Earth study the composition of near-Earth asteroids. But this cloud of debris would also mark a small irony for a space mission that has a goal of helping to protect our planet. If this small shower of space rocks reaches our planet, it will create a minuscule amount of peril for orbiting satellites. Although the risk is tiny, the study’s author says, anticipating the effects of the spacecraft’s operations could establish a template for future space missions to minimize their impacts on Earth and the commons of space through which it travels. NASA plans to launch the 1,100-pound DART spacecraft in 2021. Its target is Didymos, a pair of near-Earth asteroids that travel around the sun together. DART is aiming for the smaller of the two, affectionately named Didymoon, which measures about 535 feet across and orbits the larger asteroid. The force of the impact is expected to change Didymoon’s 11.92-hour orbit by about [4 minutes](https://www.neoshield.eu/wp-content/uploads/Weisenberger-Instrumentation-for-an-asteroid-kinetic-impactor-demonstration-mission.pdf), a big enough change for telescopes on Earth to detect. If it succeeds, the mission might help confirm that humanity’s best defense against a rogue asteroid is to bump it into another orbit away from Earth. Most of the wreckage should be ejected at less than about 2,000 miles per hour and will follow the orbit of the asteroid, with no chance of reaching Earth for thousands of years. If some of the debris reaches more than about 13,000 miles per hour, which will depend on the structure of the asteroid and the angle of impact, it could make the relatively short jump to Earth, in as little as 15-30 days.

#### **The plan gets circumvented through public/private partnerships**

Wetzel 22, Corryn Wetzel (Corryn Wetzel is a freelance science journalist based in Brooklyn. Her work has also appeared in Audubon magazine, National Geographic and others) Smithsonian Magazine, 2-3-2022, "NASA Plans to Crash the International Space Station Into the Ocean in 2031," <https://www.smithsonianmag.com/smart-news/the-international-space-station-will-crash-into-the-ocean-in-2031-nasa-says-180979512/> //tanya

Since the International Space Station (ISS) launched more than two decades ago, it has hosted more than 200 astronauts and aided countless scientific discoveries. The aging spacecraft is approaching its retirement, and like other decommissioned spacecraft, NASA will crash the ISS into a remote part of the Pacific Ocean in a controlled landing planned for 2031, according to [newly released details](https://www.nasa.gov/sites/default/files/atoms/files/2022_iss_transition_report-final_tagged.pdf) from the agency. "While the ISS will not last forever, NASA expects to be able to operate it safely through 2030," the [report](https://www.nasa.gov/sites/default/files/atoms/files/2022_iss_transition_report-final_tagged.pdf) states. The station, which orbits 227 nautical miles above Earth, has served as a science lab in space for astronauts from 19 different countries. It was assembled in sections, starting when a Russian rocket launched the first piece in 1998. Two years and a few module additions later, the station was ready for its first astronauts, which arrived on November 2, 2000. By 2011, the spacecraft was complete with five bedrooms, two bathrooms, a gym, and huge solar arrays to capture energy from the sun. For the past 20 years, the ISS has been able to host around six astronauts at a time, sustaining a human presence in space. To break from its orbit, the ISS will perform thrusting maneuvers that would ensure "safe atmospheric entry,” according to NASA’s report. The football field–length station will crash into the Earth at [Point Nemo](https://oceanservice.noaa.gov/facts/nemo.html), a location in the Pacific Ocean that has been called the “[Spacecraft Cemetery.](https://www.atlasobscura.com/places/spacecraft-cemetery)" Point Nemo is around 3,000 miles off of New Zealand's eastern coast and 2,000 miles north of Antarctica and has been a space junk target for decades. It's estimated that the United States, Russia, Japan, and European space agencies have sunk more than 250 pieces of space debris at the location since 1971, Katie Hunt reports for [CNN](https://www.cnn.com/2022/02/02/world/nasa-international-space-station-retire-iss-scn/index.html). Until the ISS meets its watery end in nine years, the agency plans to make the most of the station, including conducting research, boosting international cooperation, and helping the private spaceflight industry gain more momentum, according to [Scientific American](https://www.scientificamerican.com/article/nasa-plans-a-fiery-end-for-the-international-space-station-by-2031/)’s Mike Wall. "The International Space Station is entering its third and most productive decade as a groundbreaking scientific platform in microgravity," says Robyn Gatens, director of the ISS at NASA Headquarters, in a [statement](https://www.nasa.gov/sites/default/files/atoms/files/2022_iss_transition_report-final_tagged.pdf). "We look forward to maximizing these returns from the space station through 2030 while planning for transition to commercial space destinations that will follow." Next, NASA is looking to private companies to help sustain the ISS and build future stations. Houston-based company Axiom Space has agreed to attach a privately built module to the station as soon as 2024. In December of last year, NASA awarded a total of $415 million to Blue Origin, Nanoracks, and Northrop Grumman to build their own private space stations, according to Jennifer Hassan and Christian Davenport for the [Washington Post](https://www.washingtonpost.com/science/2022/02/03/nasa-international-space-station-decommission-2031-ocean/). NASA plans to act as a customer, paying to send its own astronauts to use private space outposts. "The private sector is technically and financially capable of developing and operating commercial low-Earth orbit destinations, with NASA's assistance," says Phil McAlister, director of commercial space at NASA Headquarters, in a [press release](https://www.nasa.gov/feature/nasa-provides-updated-international-space-station-transition-plan). "We look forward to sharing our lessons learned and operations experience with the private sector to help them develop safe, reliable, and cost-effective destinations in space.”

## Advantage

#### Ahadi doesn’t say private – also about the lunar economy, companies probably wont try to move the moon

#### Howe isn’t about commercial mining

#### Public sector thumps mining – turns all internal links

NASA 19 [“NASA Invests in Tech Concepts Aimed at Exploring Lunar Craters, Mining Asteroids,” NASA, June 11, 2019, <https://www.nasa.gov/press-release/nasa-invests-in-tech-concepts-aimed-at-exploring-lunar-craters-mining-asteroids>] TDI

NASA Invests in Tech Concepts Aimed at Exploring Lunar Craters, Mining Asteroids Robotically surveying lunar craters in record time and mining resources in space could help NASA establish a sustained human presence at the Moon – part of the agency’s broader [Moon to Mars exploration](https://www.nasa.gov/specials/moon2mars/) approach. Two mission concepts to explore these capabilities have been selected as the first-ever Phase III studies within the [NASA Innovative Advanced Concepts](https://www.nasa.gov/niac) (NIAC) program. “We are pursuing new technologies across our development portfolio that could help make deep space exploration more Earth-independent by utilizing resources on the Moon and beyond,” said Jim Reuter, associate administrator of NASA’s Space Technology Mission Directorate. “These NIAC Phase III selections are a component of that forward-looking research and we hope new insights will help us achieve more firsts in space.” The Phase III proposals outline an aerospace architecture, including a mission concept, that is innovative and could change what’s possible in space. Each selection will receive as much as $2 million. Over the course of two years, researchers will refine the concept design and explore aspects of implementing the new technology. The inaugural Phase III selections are: Robotic Technologies Enabling the Exploration of Lunar Pits William Whittaker, Carnegie Mellon University, Pittsburgh This mission concept, called Skylight, proposes technologies to rapidly survey and model lunar craters. This mission would use high-resolution images to create 3D model of craters. The data would be used to determine whether a crater can be explored by human or robotic missions. The information could also be used to characterize ice on the Moon, a crucial capability for the sustained surface operations of NASA’s Artemis program. On Earth, the technology could be used to autonomously monitor mines and quarries. [Mini Bee Prototype to Demonstrate the Apis Mission Architecture and Optical Mining Technology](https://www.nasa.gov/directorates/spacetech/niac/2019_Phase_I_Phase_II/Mini_Bee_Prototype). Joel Sercel, TransAstra Corporation, Lake View Terrace, California  This flight demonstration mission concept proposes a method of asteroid resource harvesting called optical mining. Optical mining is an approach for excavating an asteroid and extracting water and other volatiles into an inflatable bag. Called Mini Bee, the mission concept aims to prove optical mining, in conjunction with other innovative spacecraft systems, can be used to obtain propellant in space. The proposed architecture includes resource prospecting, extraction and delivery.

### A2 ! debris

#### Nasa funding commerical space means that it’ll be safe – that’s the circumvention ev

#### 2] the aff doesn’t solve existing debris and it’s inevitable – squo proves collisions don’t cascade but we need solutions

David 21, Leonard David, 4-14-2021, "Space Junk Removal Is Not Going Smoothly," Scientific American, https://www.scientificamerican.com/article/space-junk-removal-is-not-going-smoothly/ //wr tanya

Consider the February 2009 run-in between a dead Russian Cosmos satellite and a commercial Iridium spacecraft, which produced an enormous amount of debris. Finding ways to remove at least some of all that space junk should be a top global priority, says Donald Kessler, a retired NASA senior scientist for orbital debris research. In the late 1970s he foretold the possibility of a scenario that has been dubbed the Kessler syndrome: as the density of space rubbish increases, a cascading, self-sustaining runaway cycle of debris-generating collisions can arise that might ultimately make low-Earth orbit too hazardous to support most space activities. “There is now agreement within the community that the debris environment has reached a ‘tipping point’ where debris would continue to increase even if all launches were stopped,” Kessler says. “It takes an Iridium-Cosmos-type collision to get everyone’s attention. That’s what it boils down to.... And we’re overdue for something like that to happen.” As for the Kessler syndrome, “it has already started,” the debris expert says. “There are collisions taking place all the time—less dramatic and not at the large size scale,” Kessler adds. A new entrant in grappling with this worrisome state of affairs is the just launched End-of-Life Services by Astroscale Demonstration (ELSA-d) mission. ELSA-d is a two-satellite mission developed by Astroscale, a Japan-based satellite services company: it consists of a “servicer” satellite designed to safely remove debris from orbit and a “client” one that doubles as an object of interest. The project aims to showcase a magnetic system that can capture stable and even tumbling objects, whether for disposal or servicing in orbit. Following a multiphase test agenda, the servicer and client will then deorbit together, disintegrating during their fiery plunge into Earth’s atmosphere. ELSA-d is now circling in Earth orbit. The mission was lofted on March 22 via a Russian Soyuz rocket that tossed scads of other hitchhiking satellites into space. Following the liftoff, Astroscale’s founder and CEO Nobu Okada said ELSA-d will prove out debris-removal capabilities and “propel regulatory developments and advance the business case for end-of-life and active debris removal services.” The launch is a step toward realizing “safe and sustainable development of space for the benefit of future generations,” he said. The most serious risks, she says, come from debris particles between one and 10 centimeters in size. “There’s far more of them than whole defunct spacecraft, and there is a far greater probability of collision,” Gorman says. “While debris this size might not cause a catastrophic breakup, collision with it can certainly damage working satellites and create new debris particles.” Turning her attention to satellite mega constellations, Gorman worries about their effects in a low-Earth orbital environment that is already congested. “We also know that orbital dynamics can be unpredictable,” she says. “I want to see some of these mega constellation operators releasing their long-term modeling for collisions as more and more satellites are launched.”

#### 3] private companies are key

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.

#### 4] 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.

#### 5] No 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.

#### No timeline on johnson.. it’s from 9 years ago and 2009 satellite collisions prove probability is rly low

### A2 ! deflection

#### t/l: the plan does not affect commercial mining writ large which is what all of their link ev is about -- dont grant them solvency offense

#### No Astro-terror – no one will use deflection technology.

Wall 11 Mike Wall 11-4-2011 “Why Asteroids Make Lousy Space Weapons” <https://www.space.com/13515-asteroid-deflection-space-weapons.html> (Ph.D. in evolutionary biology from the University of Sydney, Australia)//Elmer

If you lie awake at night worrying about some supervillain steering giant asteroids toward your hometown, you really should relax, experts say. It's not going to happen anytime soon. Humanity does indeed have the technical skills to move space rocks around, and we may employ this know-how at some point to avoid a catastrophic impact like the one that killed the dinosaurs 65 million years ago. But the odds of any rogue state using asteroids to rain death down on its enemies are minuscule, experts say. "It's a lousy weapon," said former astronaut Rusty Schweickart, chairman of the B612 Foundation, a group dedicated to predicting and preventing cataclysmic asteroid impacts on Earth. "You get a chance to use one once every several hundred years," Schweickart said during a recent panel discussion called "Moving an Asteroid" at the California Institute of Technology in Pasadena. "And even then, you can only deflect it to hit someplace along a sort of arbitrary line across the Earth." [Top 10 Space Weapons] Serious spaceflight skills Changing the orbit of a massive asteroid hurtling through deep space sounds like a daunting task, but our species knows how to do it. For example, we could launch a spacecraft that would rendezvous with an asteroid, then travel alongside it for months or years. Over time, the probe's modest gravity would tug on the space rock, pulling it into a different orbit, Schweickart said. Given enough time to act, this so-called "gravity tractor" method could work in quite precise and predictable ways. And we've demonstrated the skills necessary to make it happen. Multiple missions have met up with asteroids in deep space. For example, NASA's Dawn spacecraft is currently in orbit around Vesta, the second-largest object in the main asteroid belt between Mars and Jupiter. And in 2005, Japan's Hayabusa probe rendezvoused with a space rock called Itokawa. The craft even scraped some samples off Itokawa and sent them back to Earth for analysis. It's a good thing we possess these potential asteroid-moving skills, Schweickart said, for they may save our bacon someday. Earth has been pummeled by many dangerous asteroids throughout its history, and there's no reason to think the barrage will stop in the future. Space rocks big enough to cause major damage and disruption to the global economy and society (were they to strike a populated area today) have hit Earth, on average, every 200 or 300 years, Schweickart said. Firing a weapon once every 300 years That bombardment rate is scarily frequent to anyone worried about the long-term survival of human civilization. But it's not nearly frequent enough t

o make asteroids good weapons of mass destruction, according to Schweickart. [5 Reasons to Care About Asteroids] "You're going to have an opportunity once every two or three hundred years to go up and have a weapon to hit Baghdad," Schweickart said. "Of course, the problem is that by that time, the Zambian space program is the world's premier space program, and Baghdad is a buddy of yours." Potential asteroid wranglers also wouldn't be able to direct a space rock just anywhere on Earth, he added. For the foreseeable future, we'll be able only to speed up or slow down an asteroid, moving it in an "east-west" direction along its trajectory. Moving it in the "north-south" plane is not an option. "If you do anything other than speed up or slow down the asteroid, it has almost no effect," Schweickart said. "You've got to go along that line; it's the only way physics lets you do it." So anyone wishing to asteroid-bomb the United States would have to manipulate a space rock whose trajectory already crossed American territory. The trick would be tweaking its velocity enough to ensure an impact on American soil. In practice, therefore, the wait for a suitable asteroid weapon could be considerably longer than 200 or 300 years. Protecting Earth Schweickart and other panelists argued that humanity will need to deflect a killer asteroid away from Earth someday. It would be a shame, they said, if unfounded fears about possible nefarious uses of asteroid-moving technology impeded its development. "The public perception of asteroids can be pretty scary," Schweickart said. "There's going to be a lot of scare stuff. It's already out there, it's going to get worse and that is going to be a very serious challenge that we on the technical side will have to deal with." People worried about death from above should focus their anxiety elsewhere, fellow panelist Bill Nye said. There are plenty of much more viable space weapons than asteroids already up there. "Space is already pretty weaponized," said Nye, executive director of the Planetary Society and former host of the science-themed TV show "Bill Nye the Science Guy." "The global positioning system that we all know and love was designed to guide weapons. So using an asteroid as a weapon is sort of coming late to the party."

#### Deundy literally cites two dudes from the 1990s but squo proves no link – nasa launched deflection tech but nothing happened

#### NASA also thumps

Stilwel 20, Blake Stilwell, We Are the Mighty, November 8th, 2019 “This is the weapon NASA will use to fight Earth-ending asteroids” [https://www.wearethemighty.com/gear-tech/asteroid-defense?rebelltitem=3#rebelltitem3] Accessed 2/10/20 // SS

It has nothing to do with oil-rig workers, but it has a lot to do with America's biggest nuclear weapon; NASA has a plan to deflect asteroids that could end all life on earth. It starts with an enormous, experimental, developing launch vehicle and ends with a massive six-shooter of America's largest nuclear weapons. The "Cradle," as it is called, is out to target any near-Earth object that might get too close. And the first test could come in 2029. Behold the quintessential devil in these matters, the asteroid Apophis. On Friday, Apr. 13, 2029, the 1,100-foot asteroid Apophis is going to pass just 19,000 miles away from the Earth. That may not seem very close, but in terms of space stuff, that's a hair's breadth away, uncomfortably close. Scientists are pretty sure it won't hit Earth, but it will be close enough to knock out some satellites. What the close call does bring into question is this: what if there are other near-Earth objects out there that definitely will hit Earth? That's where NASA started wargaming with the cosmos. Assuming the asteroid has a mass of a million kilograms and was headed directly for Earth's center mass, the National Aeronautics and Space Administration decided to figure out what it would take to deflect – not destroy – such a mass. That's where nukes come in to play, specifically these B83 nuclear weapons. Anywhere from two to five years before the projected impact, NASA would send a probe to the asteroid's surface to read the effects of a possible impact with the another object, test its possible trajectory, and determine the best method of rerouting the celestial projectile from Earth. When the best course of action was determined, the U.S. would launch a series of missiles aboard one of its spiffy new Ares V rockets. There would be three kinds: kinetic, nuclear and solar. The solar option would be fired into the asteroid's orbit with a parabolic collector membrane that would focus the sun's energy onto the object, acting as a kind of thruster to disrupt its path or destroy it into smaller, less destructive versions of itself. The kinetic war head would have an inert warhead on it, and would be designed to literally push the object away using force. The nuclear option would send the largest warhead America has, a 1.2 megaton device in a B83 warhead that can produce a mushroom cloud taller than Mount Everest. They would be detonated close to the object but not right on it or into it. The idea is to turn its surface into an expanding plasma to generate a force to deflect the asteroid. There's the boom. The reason NASA can't just outright destroy a near-Earth object was the discussion of a report from NASA and was explored in the early stages of developing this planetary defense. "The Hollywood scenario solution of shooting several intercontinental ballistic missiles at the incoming rock is fraught with danger. It probably would not be sufficient to prevent impact, raising the additional hazard of radioactive materials from the blast being introduced into the atmosphere," the report reads. Hence, the plan is to give it a little push instead.

#### No miscalc or war – their ev is bad

Matthew Crosston 18, Ph.D. in International Relations and Comparative Politics from Brown University, Senior Doctoral Faculty in the School of Security and Global Studies at the American Military University, 4/14/18, “No WWIII: The Odd Logic of the New Fake Cold War and the Curious Reality of Feather Pillow Proxy Wars,” https://moderndiplomacy.eu/2018/04/14/no-wwiii-the-odd-logic-of-the-new-fake-cold-war-and-the-curious-reality-of-feather-pillow-proxy-wars/

There has been an awful lot of noise and blowing wind of late across all forms of social media about an impending WWIII between the United States and Russia, most of which involves further involvement and an intensified escalation within Syria. With the US airstrikes (alongside its allied partners, the UK and France) on Friday night (American time), that crescendo is no doubt going to hit an all-time high of anticipation. To that I offer one small contrary warning: don’t hold your breath for the mushroom clouds just yet. There is still too much evidence of designed respectful interaction between the United States and Russia to even begin to suspect a major physical confrontation directly between the two will take place. And this includes last night’s airstrikes. While there is no doubt that current relations between America and Russia are not exactly glowing and positive, there are also numerous examples of restraint to show that both sides do not wish to pursue a war with each other. In some cases, the very evidence that has put people all over the world in a frothy orgasm of Cold War bloodlust is actually the evidence people should be noting for why war is unlikely.

#### Skibba is about mining writ large, not artificial asteroid captures – NEOs are massive thumpers that the plan doesn’t solve. also just theorizes abt war but squo proves no link

#### Concede asteroid collisions cause extinction – means 0 impact to limited deflection because any asteroid collision wipes out humanity regardless of where the collision is so no war could emerge afterward

#### Baum literally cites nuke war which thumps

#### Guerrilla motives thumps – if the link is true they’ll do it cuz you don’t ban mining and also don’t get rid of this tech

#### Lack of attribution means no retal

Schwarzer et al ’19 [Daniela, Eva-Marie McCormack, and Torben Schutz; Director, Editor, and Associate Fellow in the Security, Defense, and Armaments Program at the German Council of Foreign Relations; Deutsche Gesellschaft fur Auswartige Politik, “Technology and Strategy: The Changing Security Environment in Space Demands New Diplomatic and Military Answers,” [https://www.ssoar.info/ssoar/bitstream/handle/document/63288/ssoar-2019-schutz-Technology\_and\_Strategy\_the\_Changing.pdf](https://www.ssoar.info/ssoar/bitstream/handle/document/63288/ssoar-2019-schutz-Technology_and_Strategy_the_Changing.pdf?sequence=1&isAllowed=y&lnkname=ssoar-2019-schutz-Technology_and_Strategy_the_Changing.pdf);]

However, even a (misinterpreted) threat to space assets could start a chain reaction and quickly escalate an incident in space to a wider war. Successful deterrence, therefore, requires situational awareness, attribution capabilities and resilient assets. Especially the latter two are notoriously difficult to achieve in space. While it might be easy to attribute a kinetic attack executed with a missile, the same is not true for ASAT attacks by other satellites, and, especially, not for cyberattacks and electronic warfare measures. Without clear attribution, however, it is difficult to deter any adversary, since he could speculate that an attack cannot be traced back to him – making deterrence and retaliation more difficult. Although cross-domain deterrence, i.e. threatening an actor through potential retaliation attacks on or by other-than-space assets, is always possible, it also amplifies the problems involved in traditional deterrence: A response has to be timely and proportionate, and it should not further expand of the conflict.

#### Sat attacks don’t cause nuke war

Zarybnisky 18 [Eric J. Zarybnisky, MA in National Security Studies from the Naval War College, PhD in Operations Research from the MIT Sloan School of Management, Lt Col, USAF. Celestial Deterrence: Deterring Aggression in the Global Commons of Space. March 28, 2018. https://apps.dtic.mil/dtic/tr/fulltext/u2/1062004.pdf]

PREVENTING AGGRESSION IN SPACE While deterrence and the Cold War are strongly linked in the public’s mind through the nuclear standoff between the United States and the Soviet Union, the fundamentals of deterrence date back millennia and deterrence remains relevant. Thucydides alludes to the concept of deterrence in his telling of the Peloponnesian War when he describes rivals seeking advantages, such as recruiting allies, to dissuade an adversary from starting or expanding a conflict.6F 6 Aggression in space was successfully avoided during the Cold War because both sides viewed an attack on military satellites as highly escalatory, and such an action would likely result in general nuclear war.7F 7 In today’s more nuanced world, attacking satellites, including military satellites, does not necessarily result in nuclear war. For instance, foreign countries have used highpowered lasers against American intelligence-gathering satellites8F 8 and the United States has been reluctant to respond, let alone retaliate with nuclear weapons. This shift in policy is a result of the broader use of gray zone operations, to which countries struggle to respond while limiting escalation. Beginning with the fundamentals of deterrence illuminates how it applies to prevention of aggression in space