# 1NC

## 1

#### Interpretation: “appropriation” of outer space must be claims of sovereignty.

#### Ownership of extracted resources is NOT appropriation.

Wrench 19 [John G., J.D. Candidate, Case Western Reserve University School of Law, Cleveland, Ohio, May 2019; B.A., Philosophy & Religious Studies, Pace University, Pleasantville, New York, December 2015. Case Western Journal of International Law; Volume 51, Issue 1, Article 11, “Non-Appropriation, No Problem: The Outer Space Treaty Is Ready for Asteroid Mining” <https://scholarlycommons.law.case.edu/cgi/viewcontent.cgi?article=2546&context=jil>] brett

Secondly, even if nations, businesses, and individuals are equally bound by the non-appropriation principle, the scope of that restriction is not entirely clear from the text of Article II.59 It is unlikely, however, that the non-appropriation principle is an absolute ban on the ownership of resources extracted in outer space.

An interpretation of Article II supporting a blanket ban on resource ownership is unwarranted by the text of the OST and illfounded on account of the international community’s common practices. Scholars have noted that the international community has never questioned whether scientific samples harvested from celestial bodies belong to the extracting nation.60 Furthermore, space-faring members of the international community rejected the Moon Treaty precisely because it prohibited all forms of ownership in resources extracted from celestial bodies.61 The space-faring nations’ support for the OST, coupled with their rejection of an alternative set of rules governing extracted resources, is at the very least an indication of what those nations believe the non-appropriation principle to stand for.

#### Violation: The AFF defends property rights for extracted resources.

#### Negate:

#### 1] Precision: Pre-round prep is centered around DAs against formal sovereignty and case responses to it, their interp means the only basis for predictability becomes the wiki, which moots all pre-topic prep. Err towards common interpretation of international law spanning decades.

#### 2] Ground: They blow up the topic to include any resource extraction from outer space, allowing affs to rush to the margins to anything from moon water to mars rocks to any asteroid in outer space, and infinite permutations of these make the case-list too big to engage, mooting neg ground.

#### TVA solves - spec space col, lunar basing, etc. – still speccing places but gives us access to space col or alien links to Ks AND you can still read mining as an adv

#### CI bc reasonability is arbitrary and invites judge intervention

#### DTD – T indicts the whole aff

#### No RVIs: 1] illogical to win just for being fair 2] good debaters bait abusive advocacies 3] trades off with substance since we can’t kick out of T

#### Neg theory 1st bc aff abuse structured 1NC construction so any abuse we did was to get back in the game.

## 2

### T

#### “Appropriation” is a term of art that means ban, not regulate.

Thornburg 19 [Matthew, Associate Editor for the Michigan Journal of International Law; Vol 40; “Are the Non-appropriation Principle and the Current Regulatory Regime Governing Geostationary Orbit Equitable for All of Earth’s States?” <http://www.mjilonline.org/are-the-non-appropriation-principle-and-the-current-regulatory-regime-governing-geostationary-orbit-equitable-for-all-of-earths-states/>] brett

As the law currently stands, geostationary orbit – a constant orbital position above Earth’s equator – is governed by the OST and is therefore subject to the treaty’s attendant ban on national appropriation. Spaces, or slots, in geostationary orbit[2] are desired because they are exceedingly convenient for communicating with earth. They are highly limited and as a consequence, highly valuable. Moreover, these spaces are allotted on a first-come-first-served basis[3] making them virtually unattainable by less scientifically and economically advanced states[4], or those that are just plain late to the game.

The ban on national appropriation is enumerated in the Second Article of the OST, which states: “Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by other means.”[5] The geostationary orbital position is generally agreed upon by experts[6] as part of “outer space” and consequently, forbidden from appropriation.

#### Violation: The AFF “restricts asteroid mining”

#### Vote neg:

#### 1] Limits: Allowing regulations blows up the topic lit to include any means to regulate asteroids, the moon, etc. Outweighs -- a new aff every week dooms in-depth topic research and ensures an unmanageable caselist for the neg.

#### 2] Makes the topic bidirectional because the AFF can defend private industry good which means the what little prep is left for the neg can be stolen by the AFF with arguments like “regulations key to commercial growth” that multiply the prep burden and removing any stasis for prep. Outweighs -- clear divide between AFF and NEG literature is key to ensure each side always has access to core offense.

#### CA Paradigms

## 3

#### ACA passed the House, but PC is key to get bipartisan support through the Senate.

Gump 2-15 [Akin; 2-15-22; Strauss Hauer & Feld LLP; “America COMPETES Act v. US Innovation and Competition Act—Summary of Key Differences and Takeaways,” <https://www.jdsupra.com/legalnews/america-competes-act-v-us-innovation-8714158/>] brett

On Friday, February 4, 2022, the House passed the America COMPETES Act on nearly a straight party line vote to, among many other priorities, fund domestic semiconductor chip manufacturing, dramatically increase scientific research and development funding, revive lapsed trade programs and re-orient the United States’ international posture towards competition with China. In taking this step, the House is catching up to the Senate, which passed the United States Innovation and Competition Act (USICA) last July on a bipartisan vote of 68-32. This alert includes side-by-side summaries comparing the two bills in each of those areas, which can be found in the previous links. Over the coming weeks and months, leaders from the House and Senate will seek to negotiate a final bill that can meet approval of 60 Senators and a majority in the House. The bill likely represents one of the last opportunities for significant bipartisan legislative achievement this Congress. While the Biden-Harris administration and Democratic congressional leaders have a publicly stated goal of completing negotiations ahead of the State of the Union on March 1, it is far more likely that a final agreement is not reached until weeks or months after that speech. This timeline is dictated not just by the political incentives for each party, but also the wide policy gulfs that must be overcome between the two bills. To make clear the differences between these two bills, each totaling nearly 3,000 pages, Akin Gump is creating side-by-side tables comparing the major titles of the House-passed COMPETES Act and the Senate-passed USICA. In this alert, you will find comparison tables for the titles regarding CHIPS Act funding, funding for scientific research and development, trade policy, and foreign policy. Readers can use the table of contents to jump to different subject matters to see what the bills have in common and how they differ. A future Akin Gump policy alert will deliver the side-by-sides for the remaining titles. In addition, we are planning a series of webinars to discuss the various subject matters. The first one is scheduled for Wednesday, February 23 at 3 p.m. ET and will discuss a proposed outbound investment screen and export controls. A formal invite will be circulated shortly. The battle between the House and Senate on visions for improving America’s competitiveness is now joined, but whether a final bill will reach the President’s desk remains to be seen.

#### NewSpace companies will lobby for their survival against the plan.

GC 17 [GC Magazine; Autumn 2017; Business thinking, In-house management, Published by legal500; “The new space race,” <https://www.legal500.com/gc-magazine/feature/the-new-space-race/>] brett

The upshot is that the ability to engage with legislators and policymakers will be essential for the long-term viability of companies like Planetary Resources.

‘We’re seeing already that with a regulatory framework laid out for a very quickly growing and expanding sector, there’s a lot of opportunity for policy engagement. That’s equally true in other countries too, which are either enacting their first national space laws or overhauling them,’ says Israel.

Before Israel joined the company, Planetary Resources was heavily involved in lobbying the US Congress to support the Spurring Private Aerospace Competitiveness and Entrepreneurship Act – better known as the SPACE Act.

That piece of legislation explicitly granted permission to US entities to ‘engage in the commercial exploration and exploitation of “space resources”.’ But the international community remains divided over whether the SPACE Act runs contrary to the obligations imposed on the US under the Outer Space Treaty.

‘The Americans are a sovereign state and according to their international treaty commitments, it’s hard to say that their domestic law is compatible with international law,’ says Smith.

Lobbying, both at a domestic and international level, stands to become increasingly critical, particularly as the US is in the process of crafting a framework for supervising non-governmental space activities, while ensure conformity with the Outer Space Treaty.

image of cartoon Mars Rover

‘It is incumbent on Congress to use the 50-year anniversary of the Outer Space Treaty to properly determine our actual international obligations, decide if specific articles in the Treaty are self-executing or not, and ensure that our domestic policy moving forward creates an environment that provides certainty for industry while protecting our national security,’ said Senator Ted Cruz, earlier this year.

‘The design and objectives in doing this must not only be to implement the government’s obligations, but to do so in a way that is not unduly burdensome on emerging space activities,’ adds Israel.

‘This is particularly relevant when the exact contours of how the activity will be carried out are not known, which makes it imperative that the regulators do not get too far ahead of the technology and make guesses about how it will be done, what is feasible, then lock in standards that are ultimately irrelevant and unworkable.’

#### ACA prevents Chinese tech supremacy

Kreier 2-4 Freda Kreier, a science journalist who likes to write about the environment, climate and DNA. Freda completed her master's in science communication from UC Santa Cruz at the height of the COVID-19 pandemic. Before becoming a journalist, Freda studied molecular biology at Colorado College (2017). She discovered she had a passion for storytelling while working for a podcast production company in Denver. Her work to date appears in Nature, Science News, The Mercury News, Mongabay and more. She's also worked on the anthropology podcast SAPIENS and radio show Big Picture Science, 2-4-2022, "Huge boost for US science funding inches closer to reality," Nature, [https://www.nature.com/articles/d41586-022-00349-3 //](https://www.nature.com/articles/d41586-022-00349-3%20//) ella

Under pressure COMPETES is the House’s response to a Senate bill, called the US Innovation and Competition Act, that passed in June 2021 and similarly calls for more US science funding and includes provisions to protect foreign governments from benefitting from US research. Both bills will now head to a conference committee, in which lawmakers will reconcile differences between them to create a final version of the legislation As it stands, COMPETES would authorize a more than doubling of the NSF’s budget to about US$18 billion over the next five years, a goal that has long been on the wish list of US researchers. It would also authorize an increase to the budget of the Department of Energy’s (DOE) Office of Science to about $11 billion, which funds the physical sciences in areas such as fusion research. It also directly appropriates $52 billion for semiconductor manufacturing and research and development. Semiconductors are used in everything from cars to smart phones and are a foundational part of the modern world, but have been in short supply in the United States during the COVID-19 pandemic, in part because most are produced outside the country. For many researchers who spoke to Nature, however, the most exciting part of COMPETES is that it promises to alleviate some of the pressures faced by the scientific community. In 2020, only 28% of grant proposals to the NSF were funded. Rita Colwell, a microbiologist at the University of Maryland College Park who headed the NSF between 1998 and 2004, says that far more of the proposals submitted by researchers merit funding than the agency is able to provide. Colwell says that adding money to the NSF’s pool will benefit up-and-coming researchers, who often get passed over. “Right now, we have a lot of bright young people who are scrambling for funding,” Colwell says. “It’s clear to me that doubling the NSF budget is rational, reasonable and much needed.” Promises, promises Still, some are sceptical that the bulk of the funding provided in the bill will ever materialize, pointing to historical precedents. In 2007, US Congress passed similar legislation, signed into law by then-US president George W. Bush, intended to boost US science funding, also called the America COMPETES Act. But most of the promised money never made its way to science agencies. The 2007 economic recession in the United States left Congress scrambling to make cuts to federal funding. Money that had been earmarked for science agencies in the bill but not yet formally appropriated was one casualty. “We should not repeat the error of the 2007 COMPETES legislation, where funding in the name of enhancing US competitiveness was authorized, but never actually appropriated,” says Toby Smith, vice president for science policy and global affairs at the Association of American Universities in Washington, DC. “We need to do more than pay pure lip service to increasing support for US science and innovation. We need to actually do it.” Research security Not all parts of COMPETES are threatened by the ebb and flow of federal budgets. Some provisions are unattached to funding and are instead aimed at reducing the chance of US research benefitting foreign governments such as China’s. COMPETES would ban researchers who receive federal grants from also participating in “malign” talent programmes hosted outside the country. It also proposes lowering the value of foreign gifts that universities must disclose to US agencies from which they are receiving research funds. Stephen Ezell, vice president of Information Technology and Innovation Foundation, a think tank in Washington DC, says that measures such as these are warranted, to avoid technology developed in the United States from ending up in the hands of the Chinese military.

#### Chinese tech supremacy causes nuclear war.

Kroenig 18 [Matthew, Deputy Director for Strategy, Scowcroft Center for Strategy and Security; Associate Professor of Government and Foreign Service, Georgetown University, “Will disruptive technology cause nuclear war?” The Bulletin, 11/12/2018, https://thebulletin.org/2018/11/will-disruptive-technology-cause-nuclear-war/]

Recently, analysts have argued that emerging technologies with military applications may undermine nuclear stability (see here, here, and here), but the logic of these arguments is debatable and overlooks a more straightforward reason why new technology might cause nuclear conflict: by upending the existing balance of power among nuclear-armed states. This latter concern is more probable and dangerous and demands an immediate policy response. For more than 70 years, the world has avoided major power conflict, and many attribute this era of peace to nuclear weapons. In situations of mutually assured destruction (MAD), neither side has an incentive to start a conflict because doing so will only result in its own annihilation. The key to this model of deterrence is the maintenance of secure second-strike capabilities—the ability to absorb an enemy nuclear attack and respond with a devastating counterattack. Recently analysts have begun to worry, however, that new strategic military technologies may make it possible for a state to conduct a successful first strike on an enemy. For example, Chinese colleagues have complained to me in Track II dialogues that the United States may decide to launch a sophisticated cyberattack against Chinese nuclear command and control, essentially turning off China’s nuclear forces. Then, Washington will follow up with a massive strike with conventional cruise and hypersonic missiles to destroy China’s nuclear weapons. Finally, if any Chinese forces happen to survive, the United States can simply mop up China’s ragged retaliatory strike with advanced missile defenses. China will be disarmed and US nuclear weapons will still be sitting on the shelf, untouched. If the United States, or any other state acquires such a first-strike capability, then the logic of MAD would be undermined. Washington may be tempted to launch a nuclear first strike. Or China may choose instead to use its nuclear weapons early in a conflict before they can be wiped out—the so-called “use ‘em or lose ‘em” problem. According to this logic, therefore, the appropriate policy response would be to ban outright or control any new weapon systems that might threaten second-strike capabilities. This way of thinking about new technology and stability, however, is open to question. Would any US president truly decide to launch a massive, bolt-out-of-the-blue nuclear attack because he or she thought s/he could get away with it? And why does it make sense for the country in the inferior position, in this case China, to intentionally start a nuclear war that it will almost certainly lose? More important, this conceptualization of how new technology affects stability is too narrow, focused exclusively on how new military technologies might be used against nuclear forces directly. Rather, we should think more broadly about how new technology might affect global politics, and, for this, it is helpful to turn to scholarly international relations theory. The dominant theory of the causes of war in the academy is the “bargaining model of war.” This theory identifies rapid shifts in the balance of power as a primary cause of conflict. International politics often presents states with conflicts that they can settle through peaceful bargaining, but when bargaining breaks down, war results. Shifts in the balance of power are problematic because they undermine effective bargaining. After all, why agree to a deal today if your bargaining position will be stronger tomorrow? And, a clear understanding of the military balance of power can contribute to peace. (Why start a war you are likely to lose?) But shifts in the balance of power muddy understandings of which states have the advantage. You may see where this is going. New technologies threaten to create potentially destabilizing shifts in the balance of power. For decades, stability in Europe and Asia has been supported by US military power. In recent years, however, the balance of power in Asia has begun to shift, as China has increased its military capabilities. Already, Beijing has become more assertive in the region, claiming contested territory in the South China Sea. And the results of Russia’s military modernization have been on full display in its ongoing intervention in Ukraine. Moreover, China may have the lead over the United States in emerging technologies that could be decisive for the future of military acquisitions and warfare, including 3D printing, hypersonic missiles, quantum computing, 5G wireless connectivity, and artificial intelligence (AI). And Russian President Vladimir Putin is building new unmanned vehicles while ominously declaring, “Whoever leads in AI will rule the world.” If China or Russia are able to incorporate new technologies into their militaries before the United States, then this could lead to the kind of rapid shift in the balance of power that often causes war. If Beijing believes emerging technologies provide it with a newfound, local military advantage over the United States, for example, it may be more willing than previously to initiate conflict over Taiwan. And if Putin thinks new tech has strengthened his hand, he may be more tempted to launch a Ukraine-style invasion of a NATO member. Either scenario could bring these nuclear powers into direct conflict with the United States, and once nuclear armed states are at war, there is an inherent risk of nuclear conflict through limited nuclear war strategies, nuclear brinkmanship, or simple accident or inadvertent escalation. This framing of the problem leads to a different set of policy implications. The concern is not simply technologies that threaten to undermine nuclear second-strike capabilities directly, but, rather, any technologies that can result in a meaningful shift in the broader balance of power. And the solution is not to preserve second-strike capabilities, but to preserve prevailing power balances more broadly. When it comes to new technology, this means that the United States should seek to maintain an innovation edge. Washington should also work with other states, including its nuclear-armed rivals, to develop a new set of arms control and nonproliferation agreements and export controls to deny these newer and potentially destabilizing technologies to potentially hostile states. These are no easy tasks, but the consequences of Washington losing the race for technological superiority to its autocratic challengers just might mean nuclear Armageddon

## 4

#### Private property rights are key to economic investment in space

Jose A. Martin del **Campo 21**, Research Assistant @ School of Law, Doctor of Law, “Finders Keepers: Who Has Say Over Private Property in Space”, Texas A&M Journal of Property Law (2021) Available at: <https://doi.org/10.37419/JPL.V7.I2.3> //AAli

Current space law is unclear as to whether private entities may claim possession of resources extracted from their endeavors in outer space. The lack of certainty prevents private entities from entirely investing in infrastructure and capabilities to access new deposits of resources due to the depletion of minerals and resources on Earth. The establishment of a new space regime devoid of non-appropriation principles found in international law is necessary to motivate private entities to invest the capital in extracting and transporting space resources back to Earth. This Comment seeks to understand how the current framework of space law impacts the property rights of private entities and their claim to resources in space. The 1967 Outer Space Treaty prohibited the claiming of property by sovereign nations. However, the concept of private entities now having the capability to extract resources from outer space has reignited the issue of property rights in outer space. With resources becoming scarcer or priced out of the market, the solution of mining these resources from celestial bodies has caused a new space race. Past multilateral agreements have dealt with similar discoveries such as the polymetallic nodules on the ocean floor; however, these agreements led to disputes as to ownership and the rights to extract said resources. With little to no support from the industrialized nations, the structure of any new regime must ensure access for the benefit of humankind. The benefit of allowing these private entities the right to claim mined resources must be weighed against potential drawbacks in order to create a framework that balances the interest of the free market with that of the common heritage principle. In determining that a suitable framework fails to guide a new space regime, this Comment proposes that a new governing body comprising a rotation of space-faring and nonspacefaring nations act as a regulatory body for the interest of all of humankind.

I. INTRODUCTION On October 4, 1957, the Space Age officially began when the Soviet Union launched Sputnik into orbit, the first successful, human made satellite.1 A little more than a decade later, on July 20, 1969, American astronauts Neil Armstrong and Edwin “Buzz” Aldrin became the first humans to land and step foot on the moon.2 Neil Armstrong marked the completion of John F. Kenney’s national goal of landing an astronaut on the moon when he radioed back to Earth “[t]hat’s one small step for man, one giant leap for mankind.”3 The launch of Sputnik, the moon landing, and other endeavors achieved by the scientific community, kick-started a chain of events leading to the current ambition of exploring outer space and mining resources throughout the solar system. The push for unlocking low-cost space travel and space industrialization by entrepreneurs, like Elon Musk and Jeff Bezos, propels the search for extraterrestrial materials such as water and minerals.4 According to NASA, minerals found in the asteroid belt between Mars and Jupiter contain an estimated value of approximately $100 billion for every person on Earth.5 However, uncertainty lingers because private entities are unsure that they will possess property rights to their payload or the mined celestial body.6 Celestial bodies refer to naturally occurring objects in space. The United States Commercial Space Transportation Advisory Committee (“COMSTAC”), an advisory body to the Federal Aviation Administration’s (“FAA”) Office of Commercial Space Transportation (“FAA-AST”), has undertaken review regarding the granting of private property licenses.7 COMSTAC expressed a desire to confirm that private entity resource extractions may be owned and utilized as it deems appropriate.8

The current framework of space law is a combination of agreements with the foundation of space law consisting of the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (“Outer Space Treaty”).9 At the time of signing, the Outer Space Treaty hoped to foster cooperative and peaceful exploration of outer space without discrimination of any kind.10 However, Article II of the Outer Space Treaty contains the bane of private property rights in outer space, which forbids the national appropriation of the moon and other celestial bodies.11 While the Outer Space Treaty explicitly mentions the prohibition of public entities claiming celestial bodies, private enterprises risk failing to have their interest in property rights recognized by the global community. Private entities and investors grapple with the issues pertaining to their rights to mine and extract resources from outer space legally. Without further international recognition of their property rights, private entities may shy away from exploring the concept of celestial mining. The issue of not knowing what laws are applicable, or to whom private companies are accountable, impedes the progress private entities make in achieving their goal of harvesting extraterrestrial resources. Private entities fear that the non-appropriation clause of Article II of the Outer Space Treaty, the epicenter of the issue, will strip them of the right to transport their mined resources back to Earth. A new legal regime will likely need to be formed that facilitates the continuation of innovation and promotes the exploration of outer space. Whether or not past private and public international doctrines, i.e., the law of the sea, may provide guidance in creating a new doctrine of space law is yet to be determined.

The advancement in modern technology, along with the depletion of natural resources, creates a unique opportunity for private entities to resolve this issue through the exploitation of outer space. Space law is once again relevant due to its inadequacies in protecting the property rights of said entities in space. Part II will explore the different treaties and principles that gave rise to space law, and Part III will analyze whether the application of such principles should continue, or if the establishment of a new regime offers a more beneficial long-term solution. Part IV will then explore the structure of a new outer space regime and the enforcement of property rights. II. LEGAL PRINCIPLES INFLUENCING THE DEVELOPMENT OF SPACE LAW As the world continues to transform and evolve, lawmakers across the globe must adapt past laws or develop and ratify new laws to address current events and situations. The venture into outer space is similar to that of famous past explorations in which customary laws guided journeys, providing a framework of starting points for the crafting of the present-age space law. Space law must adapt and evolve as engineers and the science community make discoveries that past generations could only dream about. The United Nations General Assembly (“General Assembly”) maintains the view that “International Law” is not spatially restricted, and that its charter is relevant even in the outer reaches of outer space and to celestial bodies.12 When analogizing to present international treaties, the most applicable set of principles is that of the high seas.13 Based on the principle of res communis, issues arise because there is a lack of precise rules.14 Since the beginning of the space race in 1957, the United Nations facilitated general agreements on how space exploration should be conducted. However, an understanding of past and current laws is necessary to determine how to proceed in recognizing property rights in space for private entities.

A. History of the Current Space Law Framework Space law is the body of law applicable to and involved in governing space-related activities.15 Space law is “associated with the rules, principles, and standards of international law appearing in the five international treaties and five sets of principles governing outer space,” originating under the supervision of the United Nations Organization.16 The foundation of space law, similar to general international law, is composed of matters such as international agreements, treaties, conventions, rules and regulations of international organizations, General Assembly resolutions, national laws, executive and administrative orders, and judicial decisions.17 Following the launch of Sputnik in 1957, the General Assembly created an ad hoc committee concerned with identifying legal issues involving outer space activities.18 The Committee on the Peaceful Uses of Outer Space (“COPUOS”) was established in 1958 and was made permanent on December 12, 1959.19 COPUOS is intended to endorse peaceful international collaboration and establish the common interest of humankind in outer space.20 It is the preeminent body regarding the formation of international space law, drafting five international treaties and five sets of principles regarding space-related activities.21 Topics covered by the treaties include nonappropriation of outer space by any one country, arms control within space, and the freedom of exploration.22 The primary focus of the treaties being any and all activities performed in outer space be done so to enhance the well-being of humankind and the promotion of international cooperation.23 In 1966, COPUOS proposed the Outer Space Treaty, which was ratified soon after in 1967.24 The Outer Space Treaty forms the bedrock for international cooperation in the peaceful exploration of space and the development of new law.25 The Outer Space Treaty’s principles focus on exploration carried out for the benefit and in the interest of all countries (Art. I), preclusion of sovereign states from appropriating celestial bodies in outer space (Art. II), the performance of activities in outer space in accordance with international law (Art. III), and the prohibition of launching any kinds of objects or armaments into orbit that possess nuclear weapons or any other kinds of weapons of mass destruction (Art. IV).26 Of importance to this Comment is the language of Article II. Article II does not explicitly mention the property rights of private entities; the failure to do so led to a split regarding whether such rights breach the Outer Space Treaty.27 COPUOS concluded four more treaties following the ratification of the Outer Space Treaty.28 The second treaty was the Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space (“Rescue Agreement”), which entered into force in 1968.29 The Rescue Agreement elaborates on Articles V and VII of the Outer Space Treaty.30 It provides that nations rescue and assist distressed astronauts, which also includes returning them to their launching state.31 Also, states, upon request, are to provide assistance in recovering space objects that re-enter Earth outside of the territory of its proper owner.32 The Convention on International Liability for Damage Caused by Space Objects (“Liability Convention”), the third of the five COPUOS treaties, was under the scrutiny of the Legal Subcommittee of COPUOS for approximately nine years.33 The General Assembly ultimately reached an agreement in 1971, and the Liability Convention entered into force in 1972.34 The Liability Convention expounds on Article VII of the Outer Space Treaty providing “that a launching [s]tate shall be absolutely liable to pay compensation for damage caused by its space objects on the surface of the Earth or to aircraft, and liable for damage due to its faults in space.”35 The Liability Convention possesses the procedures regarding claim settlement for damages.36 The COPUOS Legal Subcommittee drafted the Convention on Registration of Objects Launched into Outer Space (“Registration Convention”), the fourth treaty, from 1962 until the General Assembly adopted the treaty in 1974.37 The convention entered into force in September 1976.38 This treaty builds upon desires in prior treaties to provide a mechanism to assist identifying space objects.39 The Registration Convention made a request for the Secretary-General to maintain the registration and provide open admittance to the information.40 The fifth and final treaty by COPUOS was the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (“Moon Agreement”).41 The General Assembly adopted the agreement in 1979; however, the Moon Agreement lacked widespread ratification, with only five countries signing by July 1984.42 The overall purpose of the Moon Agreement was to reinforce the principles highlighted in the provisions of the Outer Space Treaty and their application to the Moon and other celestial bodies.43 The Moon Agreement seeks to encourage peaceful exploration, avoid disruption of celestial environments, and alert the United Nations of the location and purpose of any construction of a station on a celestial body.44 In addition, the Moon and its natural resources are identified as belonging to the common heritage of humankind and, should exploitation of these resources become feasible, an international regime should be created to oversee such progress.45 Since its inception, the Moon Agreement, containing the resource limitation found within the common heritage principle, garnered little support internationally, particularly within the United States.46 With only fourteen signatories, none being spacefaring nations, the Moon Agreement lacks international recognition as law.47 However, the provisions of the Moon Agreement may block the full economic potential and development of space.48 A comprehension of international law aids in understanding the principle of the common heritage of humankind emphasized in the Moon Agreement

#### Commercial space innovation stops extinction

Charles Beames 18, Chairman of the SmallSat Alliance, Executive Chairman of York Space Systems, former Principal Director of Space and Intelligence in the Office of the Undersecretary of Defense for Acquisition, Technology, and Logistics (OUSD(AT&L)), Col. (ret.) in the USAF where he served 23 years in space & intelligence leadership positions around the world, 8/8/18, “Op-ed | SmallSat Alliance is on a path toward a new space horizon,” <https://spacenews.com/op-ed-smallsat-alliance-is-on-a-path-toward-a-new-space-horizon/>

We find ourselves still at the dawn of a new space century, mindful of the victories and setbacks of our past, eager to pass the torch to the next generation of space visionaries, scientists, engineers, and enthusiasts. We look to the future not just to see how much bigger, faster, or higher we can reach, but also how the United States, and specifically the U.S. space community, can again inspire the nations of the world to align with us, as it did in the 20th century.

The SmallSat Alliance is an alliance of companies developing, producing, and operating in all segments of the ‘next generation’ space economy; championing renewed U.S. leadership in the burgeoning commercial space economy, and advocating for the transformation of government-led space capabilities. We are experienced space professionals who have chosen to join with others leveraging our decades of hard-won experience, to develop smarter ways to explore space in the 21st century.

A wonderful outgrowth of the legacy space program is the commercial, entrepreneurial, and job-creating commercial space business that it bequeathed. These next-generation enterprises range from multi-million-dollar startups providing rideshare opportunities or components for small satellites to multi-billion-dollar space data-analytic platforms reinventing urban car service and agricultural production. The early returns of this economic revolution are already on our doorstep: space data capabilities are exponentially growing elements of the 21st century world economy.

Beginning with the dreams and funding by successful tech entrepreneurs, enormous venture investments are already delivering wondrous benefits to the world.

Commercial Space – Profit and Non-Profit

There are really two major categories in the commercial sector, the profit driven and the non-profit. The classic for-profit companies include not only those designing, building, launching, and operating satellites but also the tech sector that is turning that raw space data into gold through machine-learning analytics. Since for-profit companies are no longer dependent upon the revenues generated by the Cold War space race culture of a bygone era, this new generation of space companies is able to more efficiently capitalize on Moore’s Law, the nonstop exponential growth in chip density, and the associated networking technology co-evolving with it. This new generation is building profitable businesses helping to clean up our oceans of garbage and debris with satellite surveillance, reconnoitering to assist in enforcing laws that protect our oceans from illegal, unregulated, unlicensed fishing, something that is rapidly depleting the world’s most valuable and essential lifeforms. It’s leading in the innovative use of low-cost satellite constellations to produce ubiquitous remote-sensing data, enabling small business owners to be more profitable and less wasteful. For example, precise timing signals from space are already optimizing transportation of people, goods, and services, with even further gains anticipated with the introduction of artificial intelligence to assist drivers, perhaps even someday replacing them entirely.

The non-profit sector is the other side of commercial space, concerned more for the general welfare of society, but every bit as integral to this new space enterprise. Much like every century before it in human history, ours is not without its unique challenges, some of which have been a consequence of the last, and all of which the space data domain can be leveraged to help solve. Examples are endless, but one challenge that this new space community is uniquely well-adapted for is to further inform worldwide resource allocation for the 21st century and beyond. These two primary resources are sustainable water and the materials needed for adequate housing for an ever-increasing human population. As cities and urbanization continue to expand, governmental planning challenges such as transportation design optimization for goods and services are only the beginning. Additionally, through using inexpensive remote sensing technologies, some members are designing space data analytics to mitigate human suffering from plagues, contain outbreaks, and combating illegal poaching. Some are connecting with other non-profits to curtail human trafficking for the sex trade or forced labor for migrant debt repayment. Still others are helping non-governmental organizations in their work to expose the use of children as soldiers. Addressing these challenges has little to do with resuscitating dreams conceived by long deceased science-fiction writers and much more to do with turning “swords back into plowshares” to solve real threats to humanity.

Other non-profit initiatives include pursuing an even more foundational understanding of who we are and how to be the best custodians of our environment. Much as exploring and monitoring the world’s oceans has advanced civilization through a better understanding of human life and the planet, so too does exploring and monitoring from space. Low Earth orbit (LEO) provides a unique vantage point to look back on the planet and understand what is happening, anticipate what might happen and prepare for the future. In addition to better understanding Earth, responsible and rapid exploitation of the low Earth orbit domain will enhance the understanding of the solar system and the rest of the universe. Small satellites already offer low-cost platforms to study and explore what lies beyond the Earth. Other members are pioneering the use of zero-carbon, hydrogen-based reusable propulsion systems to ensure we don’t worsen our atmosphere using kerosene-fueled rockets for the coming tsunami of satellite launches. Finally, a mission ensuring the general welfare and planet survival for the next thousand years is finally confronting the existential threat that asteroids and comets pose to humanity. These extra-terrestrial, deep-space threats are passing dangerously close to our planet, and today we have no solar map of them and no defense.

# Case

## Adv 1

### T/L

#### They don’t solve – “restricting” means companies can just say they follow regulations because they don’t have a solvency mechanism – also means you should reject them on fairness – can’t read treaty CPs, CPs in general, and solvency deficits if they don’t have an author advocating for the specifics of it.

### AT Unsafe Mining

#### Scoles 15 assumes NASA’s mission -–rehighlighting in blue

1AC Sarah Scoles 15, “Dust from asteroid mining spells danger for satellites,” New Scientist, 5-27-2015, https://www.newscientist.com/article/mg22630235-100-dust-from-asteroid-mining-spells-danger-for-satellites/

NASA chose the second option for its Asteroid Redirect Mission, which aims to pluck a boulder from an asteroid’s surface 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 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). That may not have immediate consequences. But as Earth orbits get more crowded with spent rocket stages and satellites, we will have to worry about cascades of collisions like the one depicted in the movie Gravity. Handmer and Roa want to point out the problem now so that we can find a solution before any satellites get dinged. “It is possible to quantify and manage the risk,” says Handmer. “A few basic precautions will prevent harm due to stray asteroid material.”

#### That’s not the case

GMG 15 Glacier Media Group, 6-3-2015, "Safe and efficient asteroid mining," MINING, <https://www.mining.com/web/safe-and-efficient-asteroid-mining/> // ella

One of the most frequent questions I get is regarding how and where asteroid mining will happen. As in golf, asteroid miners “will play it as it lays.” Starting with the water-rich carbonaceous asteroids, every precious liter of water will be extracted and purified on-site, right in the same orbit around the Sun that asteroid has been in for millions of years. Asteroid mining will make use of the abundant and free thermal energy from our Sun, the vacuum of space for vapor transport, and the cold dark sky to vaporize, purify and collect this material which costs 10s of millions per ton to launch into space. As we have discussed before, in space everything comes down to how much rocket fuel you need to do a job. It would be a waste of rocket power to bring back anything to the Earth-Moon system that we don’t need. That drives the need to make sure the extraction occurs at the asteroid, far from Earth. This is actually the same way that traditional mining works. In many cases tons of ore are reduced to mere grams of profitable minerals (sometimes by a mass ratio of a million to one). For many minerals, this is done as close to the mine-site as possible, in order to ensure the greatest profit, and reduce the extreme cost and energy of transporting vast quantities of heavy, useless material (the gangue). For the same transportation cost reasons, mining of asteroids will be motivated to do the same – mine and refine at the source. NASA’s Asteroid Retrieval Mission (ARM) has perhaps confused the issue, as NASA has chosen to capture and return up to 500 tons of a Near Earth asteroid, and bring it to a distant retrograde storage orbit around the Moon. NASA’s reasons for doing this are different than for us asteroid miners, as they are looking to demonstrate advanced high power propulsion systems, and provide astronauts an interesting destination and research opportunity for growing the capability for human exploration of deep space. While many of the technologies and approaches used in accomplishing this feat will advance the state of the art, this is not how we would propose to mine an asteroid.

### AT Debris

#### Control F “mining” in McKnight –it’s about other large objects like sats not mining clusters – proves a massive alt cause

#### Long time frame.

Burns Interviewing Kessler **’**13 Corrinne Burns, interviewing Donald Kessler, who made up the concept. [Space junk apocalypse: just like Gravity? 11-15-2013, https://www.theguardian.com/science/blog/2013/nov/15/space-junk-apocalypse-gravity]//BPS

Now? Are we in trouble? Not yet. Kessler syndrome isn't an acute phenomenon, as depicted in the movie – it's a slow, decades-long process. "It'll happen throughout the next 100 years – we have time to deal with it," Kessler says. "The time between collisions will become shorter – it's around 10 years at the moment. In 20 years' time, the time between collisions could be reduced to five years." Fortunately, communications satellites are, in the main, situated high up in geosynchronous orbit (GEO), whereas the risk of collisions lies mainly in the much lower, and more crowded, low Earth orbit (LEO). But that doesn't mean we can relax. "We've got to get a handle on it – we need to prevent the cascade process from speeding up." And the only way to do that is, he says, to begin actively removing junk from space. Charlotte Bewick agrees. She's a mission concepts engineer with the German space technology company OHB System, with special expertise in space junk – specifically, how we can capture it and bring it back to Earth. While agreeing with Kessler that the movie scenario is exaggerated, she remains concerned. "Fragments of junk can naturally re-enter the atmosphere [and so be removed from orbit]. But we're at the stage where the rate of creation of new debris fragments is higher than the rate of natural removal. The orbits most at risk harbour important space assets – satellites for weather forecasting, oil spill and bush fire detection, and polar ice monitoring." Bewick highlights the case of Envisat, a defunct 8,000kg spacecraft circling Earth in an orbit that is very popular with space agencies and, hence, pretty crowded. "If Envisat collides with a piece of debris or a micrometeorite, the fragments could render the whole orbital region unusable." So can we get the junk down, I asked Massimiliano Vasile, part of the Mechanical & Aerospace Department at the University of Strathclyde and co-ordinator of the Stardust network. He told me defunct satellites in the high GEO region have, for some time, been shifted to higher "graveyard orbits" to keep them out of the way. But that's not an option for items in low Earth orbit. For this, he tells me, researchers are looking seriously into active debris removal – in-orbit capture techniques like harpooning, netting and tethering, the use of contactless systems like ion-beams or lasers, and even onboard robotics to position the junk away from high-risk orbital regions. As for middle Earth orbit – well, ideas are welcome, he says. We're in no immediate danger from Kessler syndrome – but it's not a problem that's going away. Despite Gravity's artistic license, Donald Kessler is pleased to see the phenomenon represented on the big screen. "It is very improbable that events would play out as they did in the film," he says. "But if it raises awareness, then that's great."

#### Kessler says it won’t happen for at least 30 years

Paul Ratner, 18, 8-29-2018, "How the Kessler Syndrome can end all space exploration and destroy modern life", [https://bigthink.com/paul-ratner/how-the-kessler-syndrome-can-end-all-space-exploration-and-destroy-modern-life], AVD

If a chain reaction of exploding space junk did occur, filling the orbital area with such dangerous debris, the space program would indeed be in jeopardy. Travel that goes beyond the LEO, like the planned mission to Mars, would be made more challenging but still conceivably possible. What would, of course, be affected if the Kessler Syndrome’s worst predictions came to pass, are all the services that rely on satellites. Core aspects of our modern life—GPS, television, military and scientific research—all of that would be under threat. NASA experienced a small-scale Kessler Syndrome incident in the 1970s when Delta rockets that were left in orbit started to explode into shrapnel clouds. This inspired Kessler, an astrophysicist, to show that there is a point when the amount of debris in an orbit gets to critical mass. At that point, the collision cascading would start even if no more things are launched into space. And once the chain of explosions begins, it can keep going until the orbital space can no longer be used. In Kessler’s estimate, it would take 30 to 40 years to get to such a threshold.

#### Timeframe is *super long* even if they are right about everything

Ted Muelhaupt, 15, Fall 2015, "Understanding Space Debris Causes, Mitigations, and Issues", Fall 2015 Vol. 16 No. 1, [https://aerospace.org/sites/default/files/2019-04/Crosslink%20Fall%202015%20V16N1%20.pdf], AVD

Short-term debris cascades are impossible. This may seem like a contradiction to the statement above, but one must consider the timescale. The predictions of the Kessler syndrome are quite real and broadly based, but the timescale is in decades and centuries, not hours and days. Therefore, Kessler is right, but the movies are wrong. This is a slowmotion disaster, and the good news is that it can be stopped or slowed with immediate action by the space community.

#### Mega-constellations are a huge alt cause.

Boley & Byers 21 [Aaron C., Department of Physics and Astronomy @ The University of British Columbia\*, and Michael, Department of Political Science @ The University of British Columbia; Published: 20 May 2021; Scientific Reports; “Satellite mega-constellations create risks in Low Earth Orbit, the atmosphere and on Earth,” <https://www.nature.com/articles/s41598-021-89909-7>] brett

Companies are placing satellites into orbit at an unprecedented frequency to build ‘mega-constellations’ of communications satellites in Low Earth Orbit (LEO). In two years, the number of active and defunct satellites in LEO has increased by over 50%, to about 5000 (as of 30 March 2021). SpaceX alone is on track to add 11,000 more as it builds its Starlink mega-constellation and has already filed for permission for another 30,000 satellites with the Federal Communications Commission (FCC)1. Others have similar plans, including OneWeb, Amazon, Telesat, and GW, which is a Chinese state-owned company2. The current governance system for LEO, while slowly changing, is ill-equipped to handle large satellite systems. Here, we outline how applying the consumer electronic model to satellites could lead to multiple tragedies of the commons. Some of these are well known, such as impediments to astronomy and an increased risk of space debris, while others have received insufficient attention, including changes to the chemistry of Earth’s upper atmosphere and increased dangers on Earth’s surface from re-entered debris. The heavy use of certain orbital regions might also result in a de facto exclusion of other actors from them, violating the 1967 Outer Space Treaty. All of these challenges could be addressed in a coordinated manner through multilateral law-making, whether in the United Nations, the Inter-Agency Debris Committee (IADC), or an ad hoc process, rather than in an uncoordinated manner through different national laws. Regardless of the law-making forum, mega-constellations require a shift in perspectives and policies: from looking at single satellites, to evaluating systems of thousands of satellites, and doing so within an understanding of the limitations of Earth’s environment, including its orbits.

Thousands of satellites and 1500 rocket bodies provide considerable mass in LEO, which can break into debris upon collisions, explosions, or degradation in the harsh space environment. Fragmentations increase the cross-section of orbiting material, and with it, the collision probability per time. Eventually, collisions could dominate on-orbit evolution, a situation called the Kessler Syndrome3. There are already over 12,000 trackable debris pieces in LEO, with these being typically 10 cm in diameter or larger. Including sizes down to 1 cm, there are about a million inferred debris pieces, all of which threaten satellites, spacecraft and astronauts due to their orbits crisscrossing at high relative speeds. Simulations of the long-term evolution of debris suggest that LEO is already in the protracted initial stages of the Kessler Syndrome, but that this could be managed through active debris removal4. The addition of satellite mega-constellations and the general proliferation of low-cost satellites in LEO stresses the environment further5,6,7,8.

Results

The overall setting

The rapid development of the space environment through mega-constellations, predominately by the ongoing construction of Starlink, is shown by the cumulative payload distribution function (Fig. 1). From an environmental perspective, the slope change in the distribution function defines NewSpace, an era of dominance by commercial actors. Before 2015, changes in the total on-orbit objects came principally from fragmentations, with effects of the 2007 Chinese anti-satellite test and the 2009 Kosmos-2251/Iridium-33 collisions being evident on the graph.

Figure 1

[Figure 1 omitted]

Cumulative on-orbit distribution functions (all orbits). Deorbited objects are not included. The 2007 and 2009 spikes are a Chinese anti-satellite test and the Iridium 33-Kosmos 2251 collision, respectively. The recent, rapid rise of the orange curve represents NewSpace (see "Methods").

Full size image

Although the volume of space is large, individual satellites and satellite systems have specific functions, with associated altitudes and inclinations (Fig. 2). This increases congestion and requires active management for station keeping and collision avoidance9, with automatic collision-avoidance technology still under development. Improved space situational awareness is required, with data from operators as well as ground- and space-based sensors being widely and freely shared10. Improved communications between satellite operators are also necessary: in 2019, the European Space Agency moved an Earth observation satellite to avoid colliding with a Starlink satellite, after failing to reach SpaceX by e-mail. Internationally adopted ‘right of way’ rules are needed10 to prevent games of ‘chicken’, as companies seek to preserve thruster fuel and avoid service interruptions. SpaceX and NASA recently announced11 a cooperative agreement to help reduce the risk of collisions, but this is only one operator and one agency.

Figure 2

[Figure 2 omitted]

Orbital distribution and density information for objects in Low Earth Orbit (LEO). (Left) Distribution of payloads (active and defunct satellites), binned to the nearest 1 km in altitude and 1° in orbital inclination. The centre of each circle represents the position on the diagram, and the size of the circle is proportional to the number of satellites within the given parameter space. (Right) Number density of different space resident objects (SROs) based on 1 km radial bins, averaged over the entire sky. Because SRO objects are on elliptical orbits, the contribution of a given object to an orbital shell is weighted by the time that object spends in the shell. Despite significant parameter space, satellites are clustered in their orbits due to mission requirements. The emerging Starlink cluster at 550 km and 55° inclination is already evident in both plots (Left and Right).

Full size image

When completed, Starlink will include about as many satellites as there are trackable debris pieces today, while its total mass will equal all the mass currently in LEO—over 3000 tonnes. The satellites will be placed in narrow orbital shells, creating unprecedented congestion, with 1258 already in orbit (as of 30 March 2021). OneWeb has already placed an initial 146 satellites, and Amazon, Telesat, GW and other companies, operating under different national regulatory regimes, are soon likely to follow.

Enhanced collision risk

Mega-constellations are composed of mass-produced satellites with few backup systems. This consumer electronic model allows for short upgrade cycles and rapid expansions of capabilities, but also considerable discarded equipment. SpaceX will actively de-orbit its satellites at the end of their 5–6-year operational lives. However, this process takes 6 months, so roughly 10% will be de-orbiting at any time. If other companies do likewise, thousands of de-orbiting satellites will be slowly passing through the same congested space, posing collision risks. Failures will increase these numbers, although the long-term failure rate is difficult to project. Figure 3 is similar to the righthand portion of Fig. 2 but includes the Starlink and OneWeb mega-constellations as filed (and amended) with the FCC (see “Methods”). The large density spikes show that some shells will have satellite number densities in excess of n=10−6 km−3.

Figure 3

[Figure 3 omitted]

Satellite density distribution in LEO with the Starlink and OneWeb mega-constellations as filed (and amended) with the FCC. Provided that the orbits are nearly circular, the number densities in those shells will exceed 10–6 km−3. Because the collisional cross-section in those shells is also high, they represent regions that have a high collision risk whenever debris is too small to be tracked or collision avoidance manoeuvres are impossible for other reasons.

Full size image

Deorbiting satellites will be tracked and operational satellites can manoeuvre to avoid close conjunctions. However, this depends on ongoing communication and cooperation between operators, which at present is ad hoc and voluntary. A recent letter12 to the FCC from SpaceX suggests that some companies might be less-than-fully transparent about events13 in LEO.

Despite the congestion and traffic management challenges, FCC filings by SpaceX suggest that collision avoidance manoeuvres can in fact maintain collision-free operations in orbital shells and that the probability of a collision between a non-responsive satellite and tracked debris is negligible. However, the filings do not account for untracked debris6, including untracked debris decaying through the shells used by Starlink. Using simple estimates (see “Methods”), the probability that a single piece of untracked debris will hit any satellite in the Starlink 550 km shell is about 0.003 after one year. Thus, if at any time there are 230 pieces of untracked debris decaying through the 550 km orbital shell, there is a 50% chance that there will be one or more collisions between satellites in the shell and the debris. As discussed further in “Methods”, such a situation is plausible. Depending on the balance between the de-orbit and the collision rates, if subsequent fragmentation events lead to similar amounts of debris within that orbital shell, a runaway cascade of collisions could occur.

Fragmentation events are not confined to their local orbits, either. The India 2019 ASAT test was conducted at an altitude below 300 km in an effort to minimize long-lived debris. Nevertheless, debris was placed on orbits with apogees in excess of 1000 km. As of 30 March 2021, three tracked debris pieces remain in orbit14. Such long-lived debris has high eccentricities, and thus can cross multiple orbital shells twice per orbit. A major fragmentation event from a single satellite could affect all operators in LEO.

Even if debris collisions were avoidable, meteoroids are always a threat. The cumulative meteoroid flux15 for masses m > 10–2 g is about 1.2 × 10–4 meteoroids m−2 year−1 (see “Methods”). Such masses could cause non-negligible damage to satellites16. Assuming a Starlink constellation of 12,000 satellites (i.e. the initial phase), there is about a 50% chance of 15 or more meteoroid impacts per year at m > 10–2 g. Satellites will have shielding, but events that might be rare to a single satellite could become common across the constellation.

One partial response to these congestion and collision concerns is for operators to construct mega-constellations out of a smaller number of satellites. But this does not, individually or collectively, eliminate the need for an all-of-LEO approach to evaluating the effects of the construction and maintenance of any one constellation.

### AT Climate

#### No extinction---resilience.

Bailey ’20 [Ronald; August 1; Science Correspondent at Reason, Member of the Society of Environmental Journalists and the American Society for Bioethics and Humanities; Reason Magazine, “The Global Environmental Apocalypse Has Been Canceled,” <https://reason.com/2020/08/01/the-global-environmental-apocalypse-has-been-canceled/>]

According to these activists and politicians, humanity is beset on all sides by catastrophes that could kill off civilization, and maybe even our species. Are they right?

Absolutely not, answers the longtime environmental activist Michael Shellenberger in an engaging new book, Apocalypse Never: Why Environmental Alarmism Hurts Us All. "Much of what people are being told about the environment, including the climate, is wrong, and we desperately need to get it right," he writes. "I decided to write Apocalypse Never after getting fed up with the exaggeration, alarmism, and extremism that are the enemy of positive, humanistic, and rational environmentalism." While fully acknowledging that significant global environmental problems exist, Shellenberger argues that they do not constitute inexorable existential threats. Economic growth and technological progress, he says, can ameliorate them.

Shellenberger's analysis relies on largely uncontroversial mainstream science, including reports from the Intergovernmental Panel on Climate Change (IPCC) and the Food and Agriculture Organization. And as a longstanding activist, Shellenberger is in a good position to parse the motives behind the purveyors of doom.

Shellenberger's activism is the real deal. To raise a donation to the Rainforest Action Network, he charged his friends $5 to attend his 16th birthday party. At 17 he went to Nicaragua to experience the Sandinista revolution. In the 1990s he worked with the Landless Workers' Movement in Brazil.

In 2003, Shellenberger and allies launched the New Apollo Project to jumpstart a no-carbon energy revolution over the next 10 years. In 2008, Time named him "A Hero of the Environment." He co-founded the ecomodernist Breakthrough Institute, which advocates the use of advanced technologies such as nuclear power and agricultural biotechnology to decouple the economy from the ecology, allowing both humanity and the natural world to flourish. More recently, he founded Environmental Progress, which campaigns for, among other things, the deployment of clean modern nuclear power. He is an invited expert reviewer of the Intergovernmental Panel on Climate Change's next assessment report.

Ohio Passes Controversial Conscience Clause for Doctors

So what does he say about climate change? "On behalf of environmentalists everywhere, I would like to formally apologize for the climate scare we created over the last 30 years," he wrote in an essay to promote his new book. "Climate change is happening. It's just not the end of the world. It's not even our most serious environmental problem." Needless to say, there are environmentalists everywhere who do not believe they have anything to apologize for. A group of six researchers assembled by the widely respected Climate Feedback fact-checking consortium rated his article as having low scientific credibility.

Shellenberger doesn't devote much of Apocalypse Never to the science behind man-made climate change. He basically accepts the consensus that it's a significant problem and instead focuses on various claims about the harms it is supposedly already causing. In that promotional essay, he argues that (1) human[s] being are not causing a "sixth mass extinction," (2) the Amazon rainforests are not the "lungs of the world," (3) climate change is not making natural disasters worse, and (4) fires have declined 25 percent around the world since 2003.

Shellenberger isn't denying the reality of man-made climate change. He's arguing that humanity is already adapting to the ways climate change has been making weather patterns evolve, and that we will continue to adapt successfully in the future. His book is ultimately a sustained argument that poverty is world's most important environmental problem, and that rising prosperity and increasing technological prowess will ameliorate or reverse most deleterious environmental trends.

### AT Space Wars

#### No conflicts -- won’t run out of asteroids to mine.

Wojciechowski et al. 18 [Brittany\*; November 2018; Wichita State University PhD student in aerospace engineering; Lucas Webb\*\*, Aubrey Koonce\*\*, Molly Williams\*\*, Wichita State University; European Space Policy Institute; “The Need for Strict Regulation of Asteroid Mining,” <https://espi.or.at/publications/voices-from-the-space-community/category/3-voices-from-the-space-community>] brett

Many people may be concerned that there are not enough mining candidates to meet current and anticipated resource demands. However, there is an almost inexhaustible amount of asteroids in our solar system. Nearly 19,000 near-Earth asteroids have already been identified by NASA JPL. 8 John Lewis, a professor at the University of Arizona in the Lunar and Planetary laboratory says that, “The near-Earth asteroid population could easily support 10 to 40 times the population of Earth, with all the necessary resources to do that”.9 Beyond nearEarth asteroids, the Main Belt asteroids number in the hundreds of millions, potentially worth one billion dollars for every person on Earth.10

#### The fear of damaging their own infrastructure ensures states moderate themselves.

Bowen 18 [Bleddyn, Lecturer in International Relations at the University of Leicester; ELN; 20 Februrary 2018; “The Art of Space Deterrence,” <https://www.europeanleadershipnetwork.org/commentary/the-art-of-space-deterrence/>] brett

Fourth, the ubiquity of space infrastructure and the fragility of the space environment may create a degree of existential deterrence. As space is so useful to modern economies and military forces, a large-scale disruption of space infrastructure may be so intuitively escalatory to decision-makers that there may be a natural caution against a wholesale assault on a state’s entire space capabilities because the consequences of doing so approach the mentalities of total war, or nuclear responses if a society begins tearing itself apart because of the collapse of optimised energy grids and just-in-time supply chains. In addition, the problem of space debris and the political-legal hurdles to conducting debris clean-up operations mean that even a handful of explosive events in space can render a region of Earth orbit unusable for everyone. This could caution a country like China from excessive kinetic intercept missions because its own military and economy is increasingly reliant on outer space, but perhaps not a country like North Korea which does not rely on space. The usefulness, sensitivity, and fragility of space may have some existential deterrent effect. China’s catastrophic anti-satellite weapons test in 2007 is a valuable lesson for all on the potentially devastating effect of kinetic warfare in orbit.

#### No miscalc from satellite disruptions or space dust -- empirically denied.

Mazur 12 (Jonathan Mazur, Manager Engineering at Northrop Grumman, writing in Space & Defense, from the Eisenhower Center for Space and Defense Studies. Past U.S. Actions: Redlines in Space. Space & Defense, Volume 6, Number 1, Fall 2012. https://inss.ndu.edu/Portals/97/Space\_and\_Defense\_6\_1.pdf?ver=2018-09-06-135424-147)

U.S. Reactions To Foreign Disruption Of U.S. Capabilities

In the 1970s, it was suspected that a U.S. maritime communications satellite was turned off by the Soviets when it was outside of the range of U.S. tracking stations.25 There does not appear to be any documented U.S. reaction, and I suspect there was none. In the mid-1990s, satellite hackers in Brazil began hijacking U.S. military communication satellite signals to broadcast their own information, though it took until 2009 for Brazil to crack down on the illegal activity with the support of the DoD.26 In 1998, a U.S.-German satellite known as ROSAT was rendered useless after it turned suddenly toward the sun. NASA investigators later determined the accident was possibly linked to a cyber-intrusion by Russia.

The fallout? Though there was an ongoing criminal investigation as of 2008; NASA security officials have seemed determined to publicly minimize the seriousness of the threat.27 In 2003, a signal originating from Cuba—later determined to be coming from Iranian embassy property— was jamming a U.S. communications satellite that was transmitting Voice of America programming over Iran, which was publicly referred to as an “act of war” by a U.S. official. 28 Press reporting indicates the U.S. administration was [frozen]“paralyzed” about how to cope with the jamming that continued for at least a month, even after U.S. diplomatic protests to Cuba.29 In 2005, U.S. diplomats protested to the Libyan government after two international satellites were illegally jammed disrupting American diplomatic, military, and FBI communications.30 In 2006, press reporting indicates that China hit a U.S. spy satellite with a ground-based laser. This action was acknowledged by the then director of the NRO, though the DoD remained tight lipped about the incident.31

“We’re at a point where the technology’s out there, and the capability for people to do things to our satellites is there. I’m focused on it beyond any single event.” – Air Force Space Command Commander, General Chilton, 2006 32

In 2009, a U.S. commercial Iridium communications satellite—extensively used by the DoD—was accidently destroyed by a collision with a dead Russian satellite.33 The U.S. company, Iridium, was able to minimize any loss of service by implementing a network solution within a few days.34 As of early 2011, no legal action had been taken by the company either because it is not clear who was at fault or because it might be politically problematic for the United States, which is trying to enter into bi-lateral transparency and confidence-building measures (TCBM) with Russia regarding space activities.35 Since August of 2010, North Korea has been intermittently using GPS jamming equipment, which reportedly has been interfering with U.S. and South Korean military operations and civilian use south of the North Korean border.36 Reportedly, only South Korea and the United Nations International Telecommunications Union—at the request of South Korea—have issued letters to Pyongyang demanding the cessation of disruptive communications signals in South Korea.37

It appears that the only time the U.S. military has responded with force to a disruption in U.S. space capabilities was in 2003, a few days after the start of the Iraq war.38 According to U.S. officials, Iraq was using multiple GPS jammers—which supposedly did not affect military GPS functionality. However, the U.S. military bombed the jammers anyway after a diplomatic complaint to Russia.39 The use of military force against the GPS jamming threat was possibly because the United States was already intervening in Iraq, and the bombing probably would not have occurred if the United States was not at war.

### AT Terrorism

#### Their impact card is incoherent – assumes Trump 6 years ago but we have Biden

#### No nuke terror or escalation

Weiss 15 (Leonard, visiting scholar at the Center for International Security and Cooperation at Stanford University, and a member of the National Advisory Board of the Center for Arms Control and Non-Proliferation in Washington, DC, former professor of applied mathematics and engineering at Brown University and the University of Maryland, “On fear and nuclear terrorism,” *Bulletin of the Atomic Scientists*, March/April 2015, Vol. 71, No. 2, p. 75-87]

If the fear of nuclear war has thus had some positive effects, the fear of nuclear terrorism has had mainly negative effects on the lives of millions of people around the world, including in the United States, and even affects negatively the prospects for a more peaceful world. Although there has been much commentary on the interest that Osama bin Laden, when he was alive, reportedly expressed in obtaining nuclear weapons (see Mowatt-Larssen, 2010), and some terrorists no doubt desire to obtain such weapons, evidence of any terrorist group working seriously toward the theft of nuclear weapons or the acquisition of such weapons by other means is virtually nonexistent. This may be due to a combination of reasons. Terrorists understand that it is not hard to terrorize a population without committing mass murder: In 2002, a single sniper in the Washington, DC area, operating within his own automobile and with one accomplice, killed 10 people and changed the behavior of virtually the entire populace of the city over a period of three weeks by instilling fear of being a randomly chosen shooting victim when out shopping. Terrorists who believe the commission of violence helps their cause have access to many explosive materials and conventional weapons to ply their “trade.” If public sympathy is important to their cause, an apparent plan or commission of mass murder is not going to help them, and indeed will make their enemies even more implacable, reducing the prospects of achieving their goals. The acquisition of nuclear weapons by terrorists is not like the acquisition of conventional weapons; it requires significant time, planning, resources, and expertise, with no guarantees that an acquired device would work. It requires putting aside at least some aspects of a group’s more immediate activities and goals for an attempted operation that no terrorist group has previously accomplished. While absence of evidence does not mean evidence of absence (as then-Secretary of Defense Donald Rumsfeld kept reminding us during the search for Saddam’s nonexistent nuclear weapons), it is reasonable to conclude that the fear of nuclear terrorism has swamped realistic consideration of the threat. As Brian Jenkins, a longtime observer of terrorist groups, wrote in 2008: Nuclear terrorism … turns out to be a world of truly worrisome particles of truth. Yet it is also a world of fantasies, nightmares, urban legends, fakes, hoaxes, scams, stings, mysterious substances, terrorist boasts, sensational claims, description of vast conspiracies, allegations of coverups, lurid headlines, layers of misinformation and disinformation. Much is inconclusive or contradictory. Only the terror is real. (Jenkins, 2008: 26) The three ways terrorists might get a nuke To illustrate in more detail how fear has distorted the threat of nuclear terrorism, consider the three possibilities for terrorists to obtain a nuclear weapon: steal one; be given one created by a nuclear weapon state; manufacture one. None of these possibilities has a high probability of occurring. Stealing nukes. Nothing is better protected in a nuclear weapon state than the weapons themselves, which have multiple layers of safeguards that, in the United States, include intelligence and surveillance, electronic locks (including so-called “permissive action links” that prevent detonation unless a code is entered into the lock), gated and locked storage facilities, armed guards, and teams of elite responders if an attempt at theft were to occur. We know that most weapon states have such protections, and there is no reason to believe that such protections are missing in the remaining states, since no weapon state would want to put itself at risk of an unintended nuclear detonation of its own weapons by a malevolent agent. Thus, the likelihood of an unauthorized agent secretly planning a theft, without being discovered, and getting access to weapons with the intent and physical ability to carry them off in the face of such layers of protection is extremely low—but it isn’t impossible, especially in the case where the thief is an insider. The insider threat helped give credibility to the stories, circulating about 20 years ago, that there were “loose nukes” in the USSR, based on some statements by a Soviet general who claimed the regime could not account for more than 40 “suitcase nukes” that had been built. The Russian government denied the claim, and at this point there is no evidence that any nukes were ever loose. Now, it is unclear if any such weapon would even work after 20 years of corrosion of both the nuclear and non-nuclear materials in the device and the radioactive decay of certain isotopes. Because of the large number of terrorist groups operating in its geographic vicinity, Pakistan is frequently suggested as a possible candidate for scenarios in which a terrorist group either seizes a weapon via collaboration with insiders sympathetic to its cause, or in which terrorists “inherit” nuclear weapons by taking over the arsenal of a failed nuclear state that has devolved into chaos. Attacks by a terrorist group on a Pakistani military base, at Kamra, which is believed to house nuclear weapons in some form, have been referenced in connection with such security concerns (Nelson and Hussain, 2012). However, the Kamra base contained US fighter planes, including F-16s, used to bomb Taliban bases in tribal areas bordering Afghanistan, so the planes, not nuclear weapons, were the likely target of the terrorists, and in any case the mission was a failure. Moreover, Pakistan is not about to collapse, and the Pakistanis are known to have received major international assistance in technologies for protecting their weapons from unauthorized use, store them in somewhat disassembled fashion at multiple locations, and have a sophisticated nuclear security structure in place (see Gregory, 2013; Khan, 2012). However, the weapons are assembled at times of high tension in the region, and, to keep a degree of uncertainty in their location, they are moved from place to place, making them more vulnerable to seizure at such times (Goldberg and Ambinder, 2011). (It should be noted that US nuclear weapons were subject to such risks during various times when the weapons traveled US highways in disguised trucks and accompanying vehicles, but such travel and the possibility of terrorist seizure was never mentioned publicly.) Such scenarios of seizure in Pakistan would require a major security breakdown within the army leading to a takeover of weapons by a nihilistic terrorist group with little warning, while army loyalists along with India and other interested parties (like the United States) stand by and do not intervene. This is not a particularly realistic scenario, but it’s also not a reason to conclude that Pakistan’s nuclear arsenal is of no concern. It is, not only because of an internal threat, but especially because it raises the possibility of nuclear war with India. For this and other reasons, intelligence agencies in multiple countries spend considerable resources tracking the Pakistani nuclear situation to reduce the likelihood of surprises. But any consideration of Pakistan’s nuclear arsenal does bring home (once again) the folly of US policy in the 1980s, when stopping the Pakistani nuclear program was put on a back burner in order to prosecute the Cold War against the Soviets in Afghanistan (which ultimately led to the establishment of Al Qaeda). Some of the loudest voices expressing concern about nuclear terrorism belong to former senior government officials who supported US assistance to the mujahideen and the accompanying diminution of US opposition to Pakistan’s nuclear activities. Acquiring nukes as a gift. Following the shock of 9/11, government officials and the media imagined many scenarios in which terrorists obtain nuclear weapons; one of those scenarios involves a weapon state using a terrorist group for delivery of a nuclear weapon. There are at least two reasons why this scenario is unlikely: First, once a weapon state loses control of a weapon, it cannot be sure the weapon will be used by the terrorist group as intended. Second, the state cannot be sure that the transfer of the weapon has been undetected either before or after the fact of its detonation (see Lieber and Press, 2013). The use of the weapon by a terrorist group will ultimately result in the transferring nation becoming a nuclear target just as if it had itself detonated the device. This is a powerful deterrent to such a transfer, making the transfer a low-probability event. Although these first two ways in which terrorists might obtain a nuclear weapon have very small probabilities of occurring (there is no available data suggesting that terrorist groups have produced plans for stealing a weapon, nor has there been any public information suggesting that any nuclear weapon state has seriously considered providing a nuclear weapon to a sub-national group), the probabilities cannot be said to be zero as long as nuclear weapons exist. Manufacturing a nuclear weapon. To accomplish this, a terrorist group would have to obtain an appropriate amount of one of the two most popular materials for nuclear weapons, highly enriched uranium (HEU) or plutonium separated from fuel used in a production reactor or a power reactor. Weapon-grade plutonium is found in weapon manufacturing facilities in nuclear weapon states and is very highly protected until it is inserted in a weapon. Reactor-grade plutonium, although still capable of being weaponized, is less protected, and in that sense is a more attractive target for a terrorist, especially since it has been produced and stored in prodigious quantities in a number of nuclear weapon states and non-weapon states, particularly Japan. But terrorist use of plutonium for a nuclear explosive device would require the construction of an implosion weapon, requiring the fashioning of an appropriate explosive lens of TNT, a notoriously difficult technical problem. And if a high nuclear yield (much greater than 1 kiloton) is desired, the use of reactor-grade plutonium would require a still more sophisticated design. Moreover, if the plutonium is only available through chemical separation from some (presumably stolen) spent fuel rods, additional technical complications present themselves. There is at least one study showing that a small team of people with the appropriate technical skills and equipment could, in principle, build a plutonium-based nuclear explosive device (Mark et al., 1986). But even if one discounts the high probability that the plan would be discovered at some stage (missing plutonium or spent fuel rods would put the authorities and intelligence operations under high alert), translating this into a real-world situation suggests an extremely low probability of technical success. More likely, according to one well-known weapon designer,4 would be the death of the person or persons in the attempt to build the device. There is the possibility of an insider threat; in one example, a team of people working at a reactor or reprocessing site could conspire to steal some material and try to hide the diversion as MUF (materials unaccounted for) within the nuclear safeguards system. But this scenario would require intimate knowledge of the materials accounting system on which safeguards in that state are based and adds another layer of complexity to an operation with low probability of success. The situation is different in the case of using highly enriched uranium, which presents fewer technical challenges. Here an implosion design is not necessary, and a “gun type” design is the more likely approach. Fear of this scenario has sometimes been promoted in the literature via the quotation of a famous statement by nuclear physicist Luis Alvarez that dropping a subcritical amount of HEU onto another subcritical amount from a distance of five feet could result in a nuclear yield. The probability of such a yield (and its size) would depend on the geometry of the HEU components and the amount of material. More likely than a substantial nuclear explosion from such a scenario would be a criticality accident that would release an intense burst of radiation, killing persons in the immediate vicinity, or (even less likely) a low-yield nuclear “fizzle” that could be quite damaging locally (like a large TNT explosion) but also carry a psychological effect because of its nuclear dimension. In any case, since the critical mass of a bare metal perfect sphere of pure U-235 is approximately 56 kilograms, stealing that much highly enriched material (and getting away without detection, an armed fight, or a criticality accident) is a major problem for any thief and one significantly greater than the stealing of small amounts of HEU and lower-enriched material that has been reported from time to time over the past two decades, mostly from former Soviet sites that have since had their security greatly strengthened. Moreover, fashioning the material into a form more useful or convenient for explosive purposes could likely mean a need for still more material than suggested above, plus a means for machining it, as would be the case for HEU fuel assemblies from a research reactor. In a recent paper, physics professor B. C. Reed discusses the feasibility of terrorists building a low-yield, gun-type fission weapon, but admittedly avoids the issue of whether the terrorists would likely have the technical ability to carry feasibility to realization and whether the terrorists are likely to be successful in stealing the needed material and hiding their project as it proceeds (Reed, 2014). But this is the crux of the nuclear terrorism issue. There is no argument about feasibility, which has been accepted for decades, even for plutonium-based weapons, ever since Ted Taylor first raised it in the early 1970s5 and a Senate subcommittee held hearings in the late 1970s on a weapon design created by a Harvard dropout from information he obtained from the public section of the Los Alamos National Laboratory library (Fialka, 1978). Likewise, no one can deny the terrible consequences of a nuclear explosion. The question is the level of risk, and what steps are acceptable in a democracy for reducing it. Although the attention in the literature given to nuclear terrorism scenarios involving HEU would suggest major attempts to obtain such material by terrorist groups, there is only one known case of a major theft of HEU. It involves a US government contractor processing HEU for the US Navy in Apollo, Pennsylvania in the 1970s at a time when security and materials accounting were extremely lax. The theft was almost surely carried out by agents of the Israeli government with the probable involvement of a person or persons working for the contractor, not a sub-national terrorist group intent on making its own weapons (Gilinsky and Mattson, 2010). The circumstances under which this theft occurred were unique, and there was significant information about the contractor’s relationship to Israel that should have rung alarm bells and would do so today. Although it involved a government and not a sub-national group, the theft underscores the importance of security and accounting of nuclear materials, especially because the technical requirements for making an HEU weapon are less daunting than for a plutonium weapon, and the probability of success by a terrorist group, though low, is certainly greater than zero. Over the past two decades, there has been a significant effort to increase protection of such materials, particularly in recent years through the efforts of nongovernmental organizations like the International Panel on Fissile Materials6 and advocates like Matthew Bunn working within the Obama administration (Bunn and Newman, 2008), though the administration has apparently not seen the need to make the materials as secure as the weapons themselves. Are terrorists even interested in making their own nuclear weapons? A recent paper (Friedman and Lewis, 2014) postulates a scenario by which terrorists might seize nuclear materials in Pakistan for fashioning a weapon. While jihadist sympathizers are known to have worked within the Pakistani nuclear establishment, there is little to no evidence that terrorist groups in or outside the region are seriously trying to obtain a nuclear capability. And Pakistan has been operating a uranium enrichment plant for its weapons program for nearly 30 years with no credible reports of diversion of HEU from the plant. There is one stark example of a terrorist organization that actually started a nuclear effort: the Aum Shinrikyo group. At its peak, this religious cult had a membership estimated in the tens of thousands spread over a variety of countries, including Japan; its members had scientific expertise in many areas; and the group was well funded. Aum Shinrikyo obtained access to natural uranium supplies, but the nuclear weapon effort stalled and was abandoned. The group was also interested in chemical weapons and did produce sarin nerve gas with which they attacked the Tokyo subway system, killing 13 persons. Aum Shinrikyo is now a small organization under continuing close surveillance. What about highly organized groups, designated appropriately as terrorist, that have acquired enough territory to enable them to operate in a quasi-governmental fashion, like the Islamic State (IS)? Such organizations are certainly dangerous, but how would nuclear terrorism fit in with a program for building and sustaining a new caliphate that would restore past glories of Islamic society, especially since, like any organized government, the Islamic State would itself be vulnerable to nuclear attack? Building a new Islamic state out of radioactive ashes is an unlikely ambition for such groups. However, now that it has become notorious, apocalyptic pronouncements in Western media may begin at any time, warning of the possible acquisition and use of nuclear weapons by IS. Even if a terror group were to achieve technical nuclear proficiency, the time, money, and infrastructure needed to build nuclear weapons creates significant risks of discovery that would put the group at risk of attack. Given the ease of obtaining conventional explosives and the ability to deploy them, a terrorist group is unlikely to exchange a big part of its operational program to engage in a risky nuclear development effort with such doubtful prospects. And, of course, 9/11 has heightened sensitivity to the need for protection, lowering further the probability of a successful effort.

### AT Resource wars

#### No correlation between resources and war

Atkins, 16—PhD Candidate in Energy, Environment & Resilience at the University of Bristol (Ed, “Environmental Conflict: A Misnomer?,” <http://www.e-ir.info/2016/05/12/environmental-conflict-a-misnomer/>, dml)

The economic and strategic importance of oil and other non-renewable resource is indisputable. Yet the globalised character of international commerce has resulted in many nations ceasing to perceive resource dependency as a threat to autonomy or survival (Deudney, 1990). This interdependence has resulted in the decreased likelihood of inter-state conflict over control of resources, due to the price shocks these actions could propel across the system and the increasingly technological developments (Lipschutz and Holdren, 1990). Such dynamics are well illustrated by the 1973 oil crisis (Dabelko and Dabelko, 1993). Although the move by the Organisation of Arab Petroleum Exporting Countries (OAPEC) to restrict exports resulted in record price rises and the transformation of the international sphere, thus illustrating the economic relevance of resources, it did not result in international violent conflict. Furthermore, Le Billon (2001) has stated that the spectre of resource scarcity has resulted in the escalation of socioeconomic innovation and economic diversification – with the market mechanisms of contemporary capitalism creating an important impediment to conflict. In Botswana and Norway, minerals and oil, respectively, have been mobilised to ensure peaceful development rather than violent confrontation (Le Billon, 2001). Furthermore, in many cases potential scarcity has resulted in increased inter-state cooperation due to the shared interest in continued supply. The continued sanctity of the 1960 Indus Waters Treaty, between Pakistan and India, is an important example, with the spirit of cooperation over water resources enduring despite increased political tensions between the two nations (Wolf, 1998).

## Adv 2

### AT: Wall

#### No link - Wall is about the Artemis accords which is not appropriation and the article negates

- international feedback solves

- Artemis is about NASA aka public

- solves for any “different national regulations”

1AC Mike Wall 20, Senior Space Writer, “US policy could thwart sustainable space development, researchers say,” Space, 10-8-2020, <https://www.space.com/us-space-policy-mining-artemis-accords> // ella

\*\*\*WHERE THEIR CARD CUTS OFF\*\*\*

Not everyone agrees with Boley and Byers' assessment of U.S. space policy and its possible consequences. For instance, Mike Gold, the acting associate administrator for NASA's Office of International and Interagency Relations, takes serious issue with the duo's characterization of the Artemis Accords. For starters, Gold said, that characterization is based on incomplete information, because the Artemis Accords haven't been released yet. NASA is still evaluating and incorporating feedback on the text from its international partners. "The Accords are a far better document because of the international feedback," Gold told Space.com. Gold also said that Boley and Byers' description of the planned bilateral agreements is wrong in multiple ways. As an example, he pointed to the following passage in the new "Policy Forum" piece: "The Artemis Accords are to include recognition of a right to commercial space mining subject to national regulation only (i.e., no need for a new multilateral agreement), as well as the right of companies to declare 'safety zones' around their operations to exclude other actors." The Accords do make clear that the extraction and use of space resources are permitted, Gold said. But that's basically all they say on the topic, he stressed; there's nothing in the agreements about recognizing a right to commercial mining subject to national regulation only. And the Artemis Accords will be government-to-government agreements, so the part about companies declaring safety zones doesn't make much sense, Gold said. In addition, "safety zones are simply an area where there should be notification as to what a country is doing and where it's conducting activities, and an obligation to coordinate to avoid harmful interference, as required by the Outer Space Treaty," he said. "To exclude actors from any zone of operation would be a violation of the Outer Space Treaty. And it's certainly not in the Artemis Accords, which is grounded in the Outer Space Treaty." The coming agreements will give some much-needed teeth to the mostly unenforceable Outer Space Treaty, which proponents of multilateral agreements should appreciate, Gold added. "The Artemis Accords, for the first time, actually create consequences for not following the Outer Space Treaty — that any nation that violates the principles of the Outer Space Treaty would not be able to participate in the Artemis program," he said. The Accords do go beyond the Outer Space Treaty in some areas, Gold said. For example, the agreements will require participating nations to publicly release scientific data and ensure the interoperability of their hardware with that of NASA and other partners. But overall, the Accords will reinforce and implement the 1967 treaty's principles, he added, stressing that they're "intended to establish a peaceful, transparent, safe and prosperous future not only for NASA and its partners but for all of humanity." All of us should get a chance to see the Artemis Accords before too much longer; Gold said NASA aims to release them "soon."

### 1NC---No Mining

#### Mining is prohibitively expensive and too far off.

---only a risk of neg offense --- no incentive for public actors and it’ll create complex beauracracies that multiply costs further

O’Neill 12 (Dr. Ian O’Neill holds a phd in solar physics; Mining Asteroids: Not Mankind's Silver Bullet; <https://www.seeker.com/mining-asteroids-not-mankinds-silver-bullet-1765750275.html> )

Countering the "Gee Whiz" factor, as my cohort and business/space analyst Greg Fish would put it, there's a thick forest of formidable red tape an asteroid mining company would have to wade through. For starters, mining and refining materials on Earth is a costly and risky endeavor. Can you imagine trying to insure an extraterrestrial mining outfit? If the refinery is totally automated, at least you don't have to worry about workers' benefits, health and safety. But humanity would need to have mastered our solar system to an incredible degree to assure the safety of in-space assets. Losing a multi-billion dollar robotic mining operation wouldn't look so good at the end of the next quarter's budget report. But the biggest selling point for asteroid mining is, of course, all the gazillions of dollars we stand to make from sucking precious metals like platinum from asteroids. As Diamandis kept emphasizing, by exploiting the solar system we would enrich the entire planet with huge wealth. How a profit-making industry became a world-wide charity, I'm not too sure. Last time I checked, BP wasn't busy enriching the world with the profits from their oil drilling. And, as Fish has pointed out countless times, flooding the world's economy with much-fabled trillions of dollars-worth of "cheap" platinum and other rare minerals could kill global markets. On the basis of supply and demand, the price of platinum group metals could collapse as supply routes from asteroids become common. However, to set up and maintain an asteroid mining industry, it would be unimaginatively expensive - perhaps the price of asteroid material would be naturally high due to the sheer risk and overheads required. In short, we have no idea about how an influx of asteroid resources could impact the world. But to say it would benefit mankind as a whole? That's as speculative as predicting the world's economy in 50 years time. In short, the only thing that seems unique about today's announcement is that a group of very well respected and smart entrepreneurs and billionaires have clubbed together and thought asteroid mining seemed cool. Sadly, the plan is deliberately vague (who knows how many technological iterative steps are needed before a sustainable mining operation can begin anyway?), there is no realistic timescale and as far as I can tell, there's been only limited analysis as to how much investment will be needed.

### 1NC---Mining TURN

#### Pelton 17 is about about mining being good in general, not “Cooperative space governance” – it doesn’t prescribe any agreements

#### Appropriation is the key motive for asteroid mining to scale up.

Gilbert 21 [Alex Gilbert is a complex systems researcher and a PhD student in space resources at the Colorado School of Mines. Milken Institute, “Mining in Space Is Coming”; <https://www.milkenreview.org/articles/mining-in-space-is-coming>] kelvin

Space exploration is back. after decades of disappointment, a combination of better technology, falling costs and a rush of competitive energy from the private sector has put space travel front and center. indeed, many analysts (even some with their feet on the ground) believe that commercial developments in the space industry may be on the cusp of starting the largest resource rush in history: mining on the Moon, Mars and asteroids.

While this may sound fantastical, some baby steps toward the goal have already been taken. Last year, NASA awarded contracts to four companies to extract small amounts of lunar regolith by 2024, effectively beginning the era of commercial space mining. Whether this proves to be the dawn of a gigantic adjunct to mining on earth — and more immediately, a key to unlocking cost-effective space travel — will turn on the answers to a host of questions ranging from what resources can be efficiently.

As every fan of science fiction knows, the resources of the solar system appear virtually unlimited compared to those on Earth. There are whole other planets, dozens of moons, thousands of massive asteroids and millions of small ones that doubtless contain humungous quantities of materials that are scarce and very valuable (back on Earth). Visionaries including Jeff Bezos imagine heavy industry moving to space and Earth becoming a residential area. However, as entrepreneurs look to harness the riches beyond the atmosphere, access to space resources remains tangled in the realities of economics and governance.

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

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

What’s Out There

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

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

The Moon is a prime space mining target. 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.

The Moon may look parched — and by comparison to Earth, it is. But recent probes have confirmed substantial amounts of water ice lurking in permanently shadowed craters at the lunar poles. Further, it seems that solar winds have implanted significant deposits of helium-3 (a light stable isotope of helium) across the equatorial regions of the Moon. Helium-3 is a potential fuel source for second and third-generation fusion reactors that one hopes will be in service later in the century. The isotope is packed with energy (admittedly hard to unleash in a controlled manner) that might augment sunlight as a source of clean, safe energy on Earth or to power fast spaceships in this century. Between its water and helium-3 deposits, the Moon could be the resource stepping-stone for further solar system exploration.

Asteroids are another near-term mining target. 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.

Even the surface of celestial bodies pose a challenge to mining machinery since they consist of unconsolidated rocky materials called regolith instead of more familiar soil.

Wannabe asteroid miners will thus be looking at smaller near-Earth asteroids. While they are much further away than the Moon, many of them could be reached using less energy — and some are even small enough to make it technically possible to tow them to Earth orbit for mining.

Space mining may be essential to crewed exploration missions to Mars. Given the distance and relatively high gravity of Mars (twice that of the Moon), extraction and export of minerals to Earth seems highly unlikely. Rather, most resource extraction on Mars will focus on providing materials to supply exploration missions, refuel spacecraft and enable settlement.

Technology Is the Difference

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. Once limited to government contract missions and the delivery of telecom satellites to orbit, private firms are now emerging as leaders in developing “NewSpace” 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 by 2040 as private investment soars.

But despite the high-profile commercial advances, governments still call the shots on the leading edge of space resource technologies. The United States extracted the first extraterrestrial materials in space from the Moon during the Apollo missions, followed by the Soviet Union’s recoveries from crewless Luna missions. President Biden recently borrowed one of the Apollo lunar rocks for display in the Oval Office, highlighting the awe that deep space can still summon.

For the time being, scientific samples remain the goal of mining. Last October, NASA’s OSIRIS-REx mission — due to return to Earth in 2023 — collected a small amount of material from the asteroid Bennu. In December, Japan returned a sample of the asteroid Ryugu with the Hayabusa2 spacecraft. And several weeks later, China’s Chang’e 5 mission returned the first lunar samples since the 1970s.

Sample collection is accelerating, with recent missions targeting Mars. Japan is planning to visit the two moons of Mars and extract a sample from one. NASA’s robotic Perseverance rover will collect and cache drilled samples on Mars that could later be returned to Earth. Perseverance also carries gear for the unique MOXIE experiment on Mars — an attempt to produce oxygen on the planet with technologies that could eventually extract oxygen for astronauts to breath and refuel spacecraft.It’s about as wide as the Eiffel Tower is tall and it could be where we obtain the elements needed to power bases on the moon, Mars or in orbit one day.

#### Investors, profitability, and market demand.

Krishnan 20 [C A Krishnan, 8-6-2020, "Space mining: Just around the corner?," Week, <https://www.theweek.in/news/sci-tech/2020/08/06/Space-mining-Just-around-the-corner.html> [accessed 12-6-21] lydia

A Mars mission carrying 100 metric tons cargo in 2022 followed by a manned mission by 2024 are the immediate milestones of Elon Musk’s SpaceX plan which aims to create a self sustaining Mars city by 2050. Just a few decades back this would have sounded as fantasy, but today it looks as if this time frame may actually be bettered. Space missions are set to undergo revolutionary changes and Elon Musk’s vision and timelines are indicators of this. Space is increasingly being seen as a treasure trove of precious minerals and also a place for future human habitation beyond the earth. Global private space industry investors believe that space mining has the potential to shape and define the 21st Century. NASA estimates that the 'Asteroid belt’ holds minerals worth quintillion of dollars. American astrophysicist Neil Degrasse Tyson believes, “The first trillioners will be those who mine asteroids”. The “Main Asteroid Belt” is located between the orbits of Mars and Jupiter, about 450 to 650 million Kilometers from earth, with million asteroids in it. Over the decades, apart from Moon and Mars, governments and private agencies have been carrying out extensive research and studying asteroids for their composition, possibility of mining them and their mining value —Asteriod ‘Bennu’ has been assessed at $670 million and asteroid ‘2011 UW158’ at $ 5.7 trillion. Transportation of the mined resources for utilisation, however, poses major hurdles. A ‘BBC Future’ report by Sarah Cruddas puts the cost of shipping a ton of water into space at about $ 50 million. As per Chris Lewicki, president of Planetary Resources, an asteroid mining company, it takes more energy to escape the first 300 kilometers from the Earth than the next 300 million kilometers. Similarly, bringing back anything more than a few kilograms of samples from space to the Earth would be even more complex in terms of logistics. To start with, therefore, global space industry investors are focusing on keeping mined space resources in space itself for ‘in situ resource utilisation’. Availability of water on the Moon, Mars and asteroids offer very attractive prospects; apart from being crucial for supporting life and growing food, it also opens the possibility of using its constituents, hydrogen and oxygen, for making rocket fuel. Today, the possibility of manufacturing tools and even building habitats on Moon or Mars with the help of 3D printers using iron, nickel, cobalt, gold, platinum, and iridium etc which are available on the Moon, Mars and asteroids seem within reach. Researchers are working on using regolith, the weathered rock particles found on lunar surface for making moon bricks using 3D printers. These bricks will form the basic construction material for the first moon station and even the first moon hotel. Space industry players believe that an investment of $ 4 billion in water mining in space can generate annual revenue worth about $2.4 billion. Similarly, there is a new community of customers who are already looking for buying propellant in space. American space launch provider, United Launch Alliance (ULA), a Lockheed Martin and Boeing joint venture that provides launch rockets, has made it known that, ULA is willing to pay about $ 3000 a Kg for propellant in low earth orbit. Fast paced developments are taking place in the field of space mining technology with private players in the lead. Optical mining using concentrated sunlight, robotics, automated mining applications, advanced drilling machines etc are just a few examples. Participation of private players has reduced the investment burden and greatly enhanced the width and pace of innovation. It is believed that launch of the first asteroid mining vehicle as well as setting up of the first fuelling stations on the Moon and in low earth orbit could become a reality within a decade. Japanese mission ‘Hayabusa’ was the first to bring samples from an asteroid to earth in 2010. ‘Hayabusa - 2’ made its rendezvous with the near earth asteroid ‘162173 RYUGU’ in June 2018, left the asteroid after collecting samples in November 2019 and will be back on earth on December 6, 2020. Similarly the NASA mission OSIRIS-REx, costing about $ 1 billion, launched in 2016 is due to return to earth with samples of asteroid ‘101955 Bennu’ on September 24, 2023. The latest US space mission, ‘Perseverance’ launched on July 30, 2020 will land on Mars on February 18, 2021. It will be using a helicopter on Mars, set to be the first use of a helicopter outside the earth. Apart from collecting samples from Mars and search for signs of habitable conditions on Mars, it will also test the possibility of manufacturing molecular oxygen from the carbon dioxide-rich Mars atmosphere. Beyond the technological capability, there are, however, complex legal issues. While making fuel and water in space and its ‘in situ resource utilisation’ may pass the scrutiny, commercial exploitation of space through minerals mining, tourism, real estate etc may prove hugely contentious in terms of international legal framework for space. The current legal frameworks were adopted when space activities were entirely within the domain of national governments and were confined to research alone. But with the nature of space activities moving from purely research activities to military applications to commercial activities and with the entry of private players and a new community of consumers in space, the vintage outer space treaty has been rendered grossly inadequate; vagueness of the treaty does not cater for the ‘new types of uses’ or the ‘new users’ of space. Louis de Gouyon Matignon, in a thesis on the subject observed that “some states have already taken the absence of express prohibition as a sign that the utilisation of space resources is permissible, and both the USA and Luxembourg recently adopted national legislations expressly allowing it”. This has, however, triggered a response from the international community denouncing such unilateral initiatives and recommending a collective approach on the lines of the laws for high seas and deep sea bed. Whether a widely acceptable new space treaty comes through or not, Space mining is a reality and the early entrants are likely to retain monopoly and huge economic advantages for a very long time.