# NC

### 1

#### Interpretation: private entities is a generic bare plural. The aff may not defend that the appropriation of outer space by a subset of private entities is unjust.

Nebel 19 Jake Nebel [Jake Nebel is an assistant professor of philosophy at the University of Southern California and executive director of Victory Briefs.] , 8-12-2019, "Genericity on the Standardized Tests Resolution," Briefly, https://www.vbriefly.com/2019/08/12/genericity-on-the-standardized-tests-resolution/ SM

Both distinctions are important. Generic resolutions can’t be affirmed by specifying particular instances. But, since generics tolerate exceptions, plan-inclusive counterplans (PICs) do not negate generic resolutions. Bare plurals are typically used to express generic generalizations. But there are two important things to keep in mind. First, generic generalizations are also often expressed via other means (e.g., definite singulars, indefinite singulars, and bare singulars). Second, and more importantly for present purposes, bare plurals can also be used to express existential generalizations. For example, “Birds are singing outside my window” is true just in case there are some birds singing outside my window; it doesn’t require birds in general to be singing outside my window. So, what about “colleges and universities,” “standardized tests,” and “undergraduate admissions decisions”? Are they generic or existential bare plurals? On other topics I have taken great pains to point out that their bare plurals are generic—because, well, they are. On this topic, though, I think the answer is a bit more nuanced. Let’s see why. 1.1 “Colleges and Universities” “Colleges and universities” is a generic bare plural. I don’t think this claim should require any argument, when you think about it, but here are a few reasons. First, ask yourself, honestly, whether the following speech sounds good to you: “Eight colleges and universities—namely, those in the Ivy League—ought not consider standardized tests in undergraduate admissions decisions. Maybe other colleges and universities ought to consider them, but not the Ivies. Therefore, in the United States, colleges and universities ought not consider standardized tests in undergraduate admissions decisions.” That is obviously not a valid argument: the conclusion does not follow. Anyone who sincerely believes that it is valid argument is, to be charitable, deeply confused. But the inference above would be good if “colleges and universities” in the resolution were existential. By way of contrast: “Eight birds are singing outside my window. Maybe lots of birds aren’t singing outside my window, but eight birds are. Therefore, birds are singing outside my window.” Since the bare plural “birds” in the conclusion gets an existential reading, the conclusion follows from the premise that eight birds are singing outside my window: “eight” entails “some.” If the resolution were existential with respect to “colleges and universities,” then the Ivy League argument above would be a valid inference. Since it’s not a valid inference, “colleges and universities” must be a generic bare plural. Second, “colleges and universities” fails the upward-entailment test for existential uses of bare plurals. Consider the sentence, “Lima beans are on my plate.” This sentence expresses an existential statement that is true just in case there are some lima beans on my plate. One test of this is that it entails the more general sentence, “Beans are on my plate.” Now consider the sentence, “Colleges and universities ought not consider the SAT.” (To isolate “colleges and universities,” I’ve eliminated the other bare plurals in the resolution; it cannot plausibly be generic in the isolated case but existential in the resolution.) This sentence does not entail the more general statement that educational institutions ought not consider the SAT. This shows that “colleges and universities” is generic, because it fails the upward-entailment test for existential bare plurals. Third, “colleges and universities” fails the adverb of quantification test for existential bare plurals. Consider the sentence, “Dogs are barking outside my window.” This sentence expresses an existential statement that is true just in case there are some dogs barking outside my window. One test of this appeals to the drastic change of meaning caused by inserting any adverb of quantification (e.g., always, sometimes, generally, often, seldom, never, ever). You cannot add any such adverb into the sentence without drastically changing its meaning. To apply this test to the resolution, let’s again isolate the bare plural subject: “Colleges and universities ought not consider the SAT.” Adding generally (“Colleges and universities generally ought not consider the SAT”) or ever (“Colleges and universities ought not ever consider the SAT”) result in comparatively minor changes of meaning. (Note that this test doesn’t require there to be no change of meaning and doesn’t have to work for every adverb of quantification.) This strongly suggests what we already know: that “colleges and universities” is generic rather than existential in the resolution. Fourth, it is extremely unlikely that the topic committee would have written the resolution with the existential interpretation of “colleges and universities” in mind. If they intended the existential interpretation, they would have added explicit existential quantifiers like “some.” No such addition would be necessary or expected for the generic interpretation since generics lack explicit quantifiers by default. The topic committee’s likely intentions are not decisive, but they strongly suggest that the generic interpretation is correct, since it’s prima facie unlikely that a committee charged with writing a sentence to be debated would be so badly mistaken about what their sentence means (which they would be if they intended the existential interpretation). The committee, moreover, does not write resolutions for the 0.1 percent of debaters who debate on the national circuit; they write resolutions, at least in large part, to be debated by the vast majority of students on the vast majority of circuits, who would take the resolution to be (pretty obviously, I’d imagine) generic with respect to “colleges and universities,” given its face-value meaning and standard expectations about what LD resolutions tend to mean.

#### It applies to private entities:

#### Upward entailment test – spec fails the upward entailment test because saying that China’s appropriation is bad does not entail that all countries’ is bad

#### Vote neg:

#### 1] Precision –any deviation justifies the aff arbitrarily jettisoning words in the resolution at their whim which decks negative ground and preparation because the aff is no longer bounded by the resolution.

#### 2] Limits—specifying a country offers huge explosion in the topic since they get permutations of hundreds of governments, companies, and sectors in the world.

#### Drop the debater to preserve fairness and education – use competing interps –reasonability invites arbitrary judge intervention and a race to the bottom of questionable argumentation

#### Hypothetical neg abuse doesn’t justify aff abuse + theory checks cheaty CPs

#### No RVIs—it’s their burden to be topical.

### 2

#### Text: People’s Republic of China (PRC) should commit to continuing research and development of the appropriation of outer space by private entities in the PRC. The PRC should give all information and developed products regarding the appropriation of outer space to the United States.

#### Chinese info control regime solves any risk of circumvention

AP ’19 (Associated Press, 12-14-2019, “China tightens up on info after Xinjiang leaks.” https://apnews.com/article/c1d08873154907be8a3dd93562d6785c)//USC-HR

The Xinjiang regional government in China’s far west is deleting data, destroying documents, tightening controls on information and has held high-level meetings in response to leaks of classified papers on its mass detention camps for Uighurs and other predominantly Muslim minorities, according to four people in contact with government employees there. Top officials deliberated how to respond to the leaks in meetings at the Chinese Communist Party’s regional headquarters in Urumqi, Xinjiang’s capital, some of the people said. They spoke on condition of anonymity because of fears of retribution against themselves, family members and the government workers. The meetings began days after The New York Times published last month a cache of internal speeches on Xinjiang by top leaders including Chinese President Xi Jinping. They continued after the International Consortium of Investigative Journalists worked with news organizations around the world including The Associated Press to publish secret guidelines for operating detention centers and instructions on how to use technology to target people. The Chinese government has long struggled with its 11-million-strong Uighur population, an ethnic Turkic minority native to Xinjiang, and in recent years has detained 1 million or more Uighurs and other minorities in the camps. Xinjiang officials and the Chinese foreign ministry have not directly denied the authenticity of the documents, though Urumqi Communist Party chief Xu Hairong called reports on the leaks “malicious smears and distortions.” The Xinjiang government did not respond to a fax for comment on the arrests, the tightened restrictions on information and other measures responding to the leaks. The Chinese Foreign Ministry did not have an immediate comment. Xinjiang’s government had already mandated stricter controls on information in October, before the news reports, according to three of the people, all Uighurs outside Xinjiang. They include orders for community-level officials to burn paper forms containing sensitive personal details on residents in their area such as their detention status, and for various state offices to throw away computers, tighten management of classified information, and ensure all information related to the camps is now stored on databases disconnected from the internet in special, restricted-access rooms to bar hackers, the Uighurs said. “They became much more serious about the transfer of information,” one said. Publication of the classified documents prompted the central government in Beijing to put more pressure on Xinjiang officials, several of the Uighurs said. Restrictions on information appear to be tightening further. Some university teachers and district-level workers in Urumqi have been ordered to clean out sensitive data on their computers, phones and cloud storage, and to delete work-related social media groups, according to one Uighur with direct knowledge of the situation. In other cases, the state appears to be confiscating evidence of detentions. Another Uighur who had been detained in Xinjiang years before said his ex-wife called him two weeks ago and begged him to send his release papers to her, saying eight officers had come to her home to search for the papers, then threatened she’d be jailed for life if she couldn’t produce the papers. “It’s an old matter, and they’ve know I’ve been abroad for a long time,” he said. “The fact that they suddenly want this now must mean the pressure on them is very high.” Some government workers have been rounded up as the state investigates the source of the leaks. In one case an entire family in civil service was arrested. Abduweli Ayup, a Uighur linguist in exile, said his wife’s relatives in Xinjiang – including her parents, siblings, and in-laws – were detained shortly after the leaks were published, although Ayup said they had no relation to the leaks as far as he was aware. Some people in touch with relatives outside China were also investigated and seized, Ayup said. It is unknown how many have been detained since the leaks. Earlier this week, a Uighur woman in the Netherlands told a Dutch daily, de Volkskrant, that she was the source of the documents published by the International Consortium of Investigative Journalists. The woman, Asiye Abdulaheb, said that after she posted one page on social media in June, Chinese state agents sent her death threats and tried to recruit her ex-husband to spy on her. The leaked documents lay out the Chinese government’s deliberate strategy to lock up ethnic minorities even before they commit a crime, and to rewire their thoughts and the language they speak. They reveal that facilities Beijing calls “vocational training schools” are forced ideological and behavioral re-education centers run in secret. The papers also show how Beijing is pioneering a new form of social control using data and artificial intelligence. Drawing on data collected by mass surveillance technology, computers issued the names of tens of thousands of people for interrogation or detention in just one week.

#### The CP solves the AFF – It stops China from deploying space weaponization which solves the whole advantage, BUT it solves the AFF better, even if they win a circumvention argument, because it means the US will always have their tech + its own.

#### It avoids the NB – the US getting their own tech + China’s tech means they can beat them

#### No perms – we mandate the appropriation of space – the plan bans the CP, so perms are mutually exclusive or severance

### 3

#### CP: The United States and the People’s Republic of China ought to increase bilateral engagement on space issues by resuming the Civil Space Dialogue and the Space Security Exchange.

KAFURA 2/10 [CRAIG KAFURA (Assistant director for public opinion and foreign policy at the Chicago Council on Global Affairs, a security fellow with the Truman National Security Project), “RENEW SPACE DIALOGUE WITH CHINA” War on the Rocks, 2/10/2022. Accessed 2/11/2022. <https://warontherocks.com/2022/02/renew-space-dialogue-with-china/>] CT

In 2013, the United States needed to warn the People’s Republic of China about a potential satellite collision in low Earth orbit. Washington’s only way of doing so: sending a close approach notification to a fax number in China, which they hoped would be received, read, and acted upon in time to avoid disaster.

Fortunately, at the 2014 U.S.-China Strategic and Economic Dialogue, the United States and China were able to discuss the problem and find a better solution: email. Things improved further the following year, with the two sides establishing a direct link for both sides to share information about potential satellite collisions. That success was followed by launch of the U.S.-China Civil Space Dialogue in 2015 and two Space Security Exchanges chaired by the U.S. Department of State and the Chinese Ministry of Foreign Affairs in May and December of 2016. However, despite the increasing relevance of space to broader issues in the Sino-American relationship, neither group has met since 2017.

Renewing these space dialogues is an urgent priority because the stakes for strategic drift are catastrophic. Next time a potentially dangerous issue arises in space — and there will be a next time — in the absence of these regular points of contact, the two countries might not be so lucky. It’s thus high time to re-launch both the Civil Space Dialogue and the Space Security Exchange to prevent space accidents from inadvertently escalating into conflict.

Both the Civil Space Dialogue and the Space Security Exchange were born out of the Strategic and Economic Dialogue, the Obama administration’s flagship effort to engage China. The annual multi-day dialogue ran from 2008 to 2016, consisted of both economic and strategic dialogue tracks, and brought together American and Chinese heads of state and top policymakers from a wide range of departments across the U.S. and Chinese governments. And it was through the Strategic and Economic Dialogue that the United States and China were able to move from the fax era into the age of email.

As a recent report on the Strategic and Economic Dialogue from the National Committee on American Foreign Policy and the American Friends Service Committee shows, dialogue mechanisms like the Space Security Exchange and Civil Space Dialogue are key to managing the significant asymmetries in the relationship between the United States and China. The differences in the American and Chinese governance systems can easily create unintentional misunderstandings of both policy and intent. The substantive content of these dialogues can help reduce misperceptions and identify areas of potential cooperation, while consistent, repeated dialogues provide regular points of contact that can persist through the ups and downs inherent in Sino-American relations. With both sides seeking to put guardrails on the relationship, and with a tentative agreement to engage in dialogue on strategic issues, the Biden administration should propose — and Beijing should accept — a renewal of the U.S.-China Civil Space Dialogue and Space Security Exchange. After years of silence, there is certainly a lot to talk about.

Military Uses of Space: Seizing the High Ground

China’s space security developments are long in the making. Beijing designated space as a new domain of warfare in its 2015 defense white paper, arguing that outer and cyber space had “become new commanding heights in strategic competition.” And as the Department of Defense’s 2021 report to Congress on China’s military and security developments highlights, space and counterspace operations are increasingly important for the People’s Liberation Army. Run out of the Strategic Support Force, the Space Systems Department is responsible for nearly all of China’s military operations in space, including launch, surveillance, and warfare. While many of their space capabilities are focused on command, control, and intelligence functions, others have more offensive aims. That includes the ground-based anti-satellite weapon demonstrated very publicly in 2007, which destroyed a Chinese weather satellite and created a massive space debris field that continues to endanger other objects in low-earth orbit.

The Financial Times’ 2021 reporting on a purported Chinese nuclear-capable hypersonic missile test — in which a platform launched from China circled the globe before diving to attack a target — fixed Washington’s attention on these emerging space-adjacent technologies and revived Cold War memories of similar Soviet systems as well as the nuclear arms race. While Chinese officials have denied the military applications of the test, hypersonic gliders like the DF-17 are hardly the only new technology in development. As the most recent report from the U.S. Office of the Director of National Intelligence notes, Beijing is deeply involved in the development of space and counterspace capabilities, with such capabilities “intended to target U.S. and allied satellites” and “integral to potential military campaigns by the [People’s Liberation Army].”

Nor is China the only one with eyes fixed on the heavens. News reports claim that the United States is poised to unveil a previously secret space weapon. Key targets of this unveiling: policymakers in Moscow and Beijing. Gen. John Hyten, vice chairman of the Joint Chiefs of Staff, has pushed for greater transparency around American military capabilities in space, arguing that “deterrence does not happen in the classified world.” But as with nuclear arms, deterrence and reassurance go hand in hand. And just as analysts have noted the need to avoid a nuclear arms race with China, the United States should seek to avoid sparking an arms race in space. A space arms race — particularly further testing of destructive anti-satellite weapons — puts the peaceful use of space at risk for the whole of humanity.

Space Issues Are Strategic Issues

Given both the U.S. and Chinese footprints in outer space, space issues are also strategic issues. And recent reports that the Chinese military is moving to a launch-on-warning footing for its nuclear forces makes a resumption of bilateral space security exchanges with China all the more urgent. As the 2021 Department of Defense report on Chinese capabilities notes, part of China’s early warning system to detect ballistic missile launches is space-based, as is the U.S. system. At the same time, the Department of Defense reports that Chinese experts focus on the need to “cripple or destroy the enemy’s information system … by making it blind, deaf or paralyzed.” Both the United States and China expect the other to target space-based assets, such as early-warning satellites, with just this goal in mind. This is a deadly combination. It would be all too easy for either side to interpret a satellite accident — either a collision with debris or a simple system failure — as an attempt to take out its early-warning network and thus the first strike in a potentially nuclear war.

At the time of the June 2021 Biden-Putin summit, Chinese Foreign Ministry spokesman Zhao Lijian noted China’s willingness “to have bilateral dialogue with relevant sides with mutual respect and on an equal footing” on issues of strategic stability. The United States should take them up on their offer in a renewed Space Security Exchange.

The initial U.S.-China Space Security Exchanges, held in May and December of 2016, were led by the U.S. Department of State and the Chinese Ministry of Foreign Affairs, with additional participants from the Chinese Ministry of Defense and the China National Space Agency. Frank Rose, then assistant secretary of state for arms control, verification, and compliance, chaired the talks for the U.S. side, saying they were “a very good dialogue … a real discussion rather than just an exchange of talking points.” However, those dialogue processes lapsed after 2016 and have not been renewed.

Reviving the U.S.-China Space Security Exchange would bring bilateral discussions on space security in line with how Washington engages other countries on space issues — at present, the United States has over a dozen dialogues on space security with countries like Japan, India, and Russia. Moreover, a regular, repeated dialogue on space security issues would bring together U.S. and Chinese officials working on space security, establish common understandings of one another’s national policy, and allow them to build working relationships that could help defuse a crisis before it escalates.

Civil Space: It’s Getting Crowded Up Here

But it’s not just the military use of space that Washington and Beijing need to discuss. Civilian space issues, too, are part of the geostrategic landscape. And with low Earth orbit getting increasingly crowded, both sides have issues that need to be addressed.

In 2021, China’s Tiangong space station twice had to maneuver to avoid colliding with StarLink satellites put into orbit by Elon Musk’s SpaceX corporation. In response, China submitted a formal complaint through the United Nations, pointing to the responsibilities of all countries party to Outer Space Treaty. Ratified in 1967, the treaty bans nuclear weapons in space, establishes that space and celestial bodies will be freely explored for peaceful purposes, and precludes claims of sovereignty over non-Earth territories — though it does not go so far as to ban military activities in space. The treaty also states that countries are responsible for the actions of their nations’ commercial actors — and thus the United States is responsible for the actions of SpaceX.

This isn’t the first time SpaceX has been criticized for its behavior in outer space. And the problem is only going to grow more serious: The 2,000 StarLink satellites currently deployed are only a fraction of the planned total of 30,000 as part of SpaceX’s second-generation low Earth orbit broadband constellation. Of course, America’s SpaceX is not the only one interested in building massive satellite constellations. The newly-created state-owned (and independent of existing telecoms) China Satellite Network Group has been tasked with launching China’s own broadband satellite constellation, with plans for roughly 13,000 satellites. With so many satellites heading into low Earth orbit in the coming years, experts fear additional near-misses — or even collisions — between orbiting satellites.

Why the concern over satellite collisions? In a word, debris. Whether produced by an anti-satellite weapons test or an accidental collision, any collision in low Earth orbit creates additional orbiting space debris, which in turn increases the probability of additional collisions — and more debris. In the worst-case scenario, this could lead to a catastrophic cascade of collisions (“Kessler Syndrome”) of the type featured in Alfonso Cuarón’s 2013 Academy Award-winning film Gravity. Such a cascade event would leave low Earth orbit an inhospitable place for human spaceflight. With the United States and China both launching thousands of satellites into orbit in the coming years, bilateral dialogue between the two will be critical to reining in the growth of space debris. A formal dialogue process such as the Civil Space Dialogue would provide officials on both sides an arena to identify critical problems, connect the appropriate authorities to one another, and address issues of common concern.

Making Space to Keep Outer Space an Open Space

Resuming the U.S.-China Civil Space Dialogue is also an easier to bar to clear than other, broader forms of civil cooperation between the United States and China on space issues. One barrier to that cooperation is the Wolf amendment, which limits engagement with China on space issues. Named for former Rep. Frank Wolf, the language has been included in the annual appropriations bill since 2011 and puts a number of obstacles in front of the National Aeronautics and Space Administration(as well as the White House Office of Science and Technology Policy and the National Space Council) for any efforts to coordinate or collaborate with China or any Chinese company. While not a ban on interactions with China on space issues, the amendment has certainly chilled past efforts at engaging China in these areas. The U.S.-China Civil Space Dialogue, hosted by the U.S. Department of State, provided an easier path to get American and Chinese space experts in the same room (though officials from the National Aeronautics and Space Administration were still required to submit advanced certification to Congress that the meeting would not violate the Wolf restrictions in order to participate in the dialogue).

Resuming a pair of dialogues might not seem like enough given the stakes and the scope of issues at hand. Space policy experts have proposed a range of potential policies for the United States to pursue, including a voluntary moratorium on anti-satellite weapons tests, legally binding agreements on space security as part of a broader space arms control agenda, and even a global ban on anti-satellite testing.

These proposals all have their merits. But the United States is a long way from engaging China in an arms control framework for space. At present, U.S.-Chinese relations are still in rough shape, with limited engagement on most issues. While officials from the Biden administration have stated their desire to engage China in discussions of nuclear arms control, the United States and China are not currently engaged in any such talks. Nor have the United States and China ever concluded a bilateral nuclear arms control agreement, though the United States has far more experience negotiating over nuclear weapons than on space arms control.

The U.S.-Chinese relationship also now lacks the overarching framework for discussion once provided by the Strategic and Economic Dialogue, which, though oft maligned in Washington, D.C., produced many successful outcomes for the United States. If the United States and China cannot manage to sustain a basic level of dialogue on space issues, grander proposals — no matter their policy rigor — will never take off.

These two dialogue processes can also focus and motivate internal policy discussions in Washington and Beijing. As space experts have pointed out, one obstacle to the United States promoting a common set of space norms in its own behavior is that the United States itself does not have a shared understanding across agencies of what those norms should be. One of the conclusions from our investigation of the U.S.-China Strategic and Economic Dialogue was the role that the annual dialogue process served in forcing both sides — American and Chinese alike — to engage in interagency negotiations back home over issues of common concern.

A call for engagement and dialogue with China might seem quaint given the public funeral for the era of engagement. Yet the Biden administration has continued to seek a dialogue process with Beijing, as indicated by the repeated engagements between high-level U.S. officials and their Chinese counterparts and by President Joe Biden’s own direct dialogues with Chinese leader Xi Jinping. Per Secretary of State Anthony Blinken, the Biden administration’s approach to China is “competitive when it should be, collaborative when it can be, and adversarial when it must be” — a line oft repeated by administration officials. Space issues, both civil and security, are and will continue to be a mixture of collaboration and competition. But both the United States and China should engage with one another to ensure that that competition does not lead to space becoming an adversarial arena. Given the outstanding space issues in the Sino-American relationship, it’s time to re-launch both the Civil Space Dialogue and the Space Security Exchange.

### 4

#### The People’s Republic of China should ban the appropriation of outer space by private entities except for asteroid mining.

#### The private sector is essential for asteroid mining – competition is key and gov development is not effective, efficient, or cheap enough. Thiessen 21:

Marc Thiessen, 6-1, 21, Washington Post, Opinion: SpaceX’s success is one small step for man, one giant leap for capitalism, https://www.washingtonpost.com/opinions/2020/06/01/spacexs-success-is-one-small-step-man-one-giant-leap-capitalism/

It was one small step for man, one giant leap for capitalism. Only three countries have ever launched human beings into orbit. This past weekend, SpaceX became the first private company ever to do so, when it sent its Crew Dragon capsule into space aboard its Falcon 9 rocket and docked with the International Space Station. This was accomplished by a company Elon Musk started in 2002 in a California strip mall warehouse with just a dozen employees and a mariachi band. At a time when our nation is debating the merits of socialism, SpaceX has given us an **incredible testament to the power of American free enterprise.** While the left is advocating unprecedented government intervention in almost every sector of the U.S. economy, from health care to energy, **today Americans are celebrating the successful privatization of space travel.** If you want to see the difference between what government and private enterprise can do, consider: It took a private company to give us the first space vehicle with touch-screen controls instead of antiquated knobs and buttons. It took a private company to give us a capsule that can fly entirely autonomously from launch to landing — including docking — without any participation by its human crew. It also took a private company to invent a reusable rocket that can not only take off but land as well. When the Apollo 11 crew reached the moon on July 20, 1969, Neil Armstrong declared “the Eagle has landed.” On Saturday, SpaceX was able to declare that the Falcon had landed when its rocket settled down on a barge in the Atlantic Ocean — ready to be used again. That last development will save the taxpayers incredible amounts of money. The cost to NASA for launching a man into space on the space shuttle orbiter was $170 million per seat, compared with just $60 million to $67 million on the Dragon capsule. The cost for the space shuttle to send a kilogram of cargo into to space was $54,500; with the Falcon rocket, the cost is just $2,720 — a decrease of 95 percent. And while the space shuttle cost $27.4 billion to develop, the Crew Dragon was designed and built for just $1.7 billion — making it the lowest-cost spacecraft developed in six decades. SpaceX did it in six years — far faster than the time it took to develop the space shuttle. ***The private sector does it better, cheaper, faster and more efficiently than government***.

#### Chinese private companies are specifically key. Cohen 21:

Ariel Cohen, 21 - ("China’s Space Mining Industry Is Prepping For Launch – But What About The US?," Forbes, 10-26-2021, https://www.forbes.com/sites/arielcohen/2021/10/26/chinas-space-mining-industry-is-prepping-for-launch--but-what-about-the-us/?sh=6d03b9072ae0)//marlborough-wr/

In April of this year, China’s Shenzen [Origin Space](https://www.washingtontimes.com/news/2020/oct/1/china-determined-to-dominate-future-mining-with-or/) Technology Co. Ltd. [launched the NEO-1](https://origin.space/#/detail?id=27), the first commercial spacecraft dedicated to the mining of space resources – from asteroids to the lunar surface. Falling costs of space launches and spacecraft technology alongside existing infrastructure provides a unique opportunity to explore extraterrestrial resource extraction. Current technologies are equipped to analyze and categorize asteroids within our solar system with a limited degree of certainty. One of the accompanying payloads to the NEO-1 was the Yuanwang-1, or “little hubble” satellite, which searches the stars for possible asteroid mining targets. The NEO-1 launch marks another milestone in private satellite development, adding a new player to space based companies which include Japan’s [Astroscale](https://astroscale.com/space-debris_/). Private asteroid identification via the Sentinel Space Telescope was [supported by NASA until 2015](https://b612foundation.org/b612-official-statement-nasa-following-canceled-space-agreement-act/). As private investment in space grows, the end goal is to be capable of harvesting resources to bring to Earth. According to Shenzen [Origin Space](https://www.washingtontimes.com/news/2020/oct/1/china-determined-to-dominate-future-mining-with-or/) Technology company website: “Through the development and launch of the spacecraft, Origin Space is able to carry out low-Earth orbit space junk cleanup and prototype technology verification for space resource acquisition, and at the same time demonstrate future asteroid defense related technologies.” In the end, it will come down to progressively lowering the cost of launched unit of weight and booster rocket reliability – before fundamentally new engines may drive the launch costs even further down. The April launch demonstrates that China is already succeeding while the West is spinning its wheels. The much touted Planetary Resources and Deep Space Industries (DSI) [DSI](https://www.forbes.com/investment-funds/dsi/) [-1.6%](https://www.forbes.com/investment-funds/dsi/) were [supposed to be](https://www.technologyreview.com/2019/06/26/134510/asteroid-mining-bubble-burst-history/) the vanguard of extra-terrestrial resource acquisition with major backers including Google’s [GOOG](https://www.forbes.com/companies/google) [-2.6%](https://www.forbes.com/companies/google) Larry Page. But both have since been acquired, the former by block chain company [ConsenSys](https://consensys.net/) and the latter by [Bradford Space](https://www.bradford-space.com/), neither of which are prioritizing asteroid mining.

#### Asteroid mining can happen with private sector innovation and is key to solve a laundry list of impacts--climate change, economic decline and asteroid collisions. Taylor 19

Chris Taylor [journalist], 19 - ("How asteroid mining will save the Earth — and mint trillionaires," Mashable, 2019, accessed 12-13-2021, https://mashable.com/feature/asteroid-mining-space-economy)//ML

How much, exactly? We’re only just beginning to guess. [Asterank](http://www.asterank.com/), a service that keeps track of some 6,000 asteroids in NASA’s database, prices out the estimated mineral content in each one in the current world market. More than 500 are listed as “>$100 trillion.” The estimated profit on just the top 10 asteroids judged “most cost effective” — that is, the easiest to reach and to mine, subtracting rocket fuel and other operating costs, is around $1.5 trillion.¶ Is it ours for the taking? Well, here’s the thing — we’re taking it already, and have been doing so since we started mining metals thousands of years ago. Asteroid strikes are the only reason rare metals exist in the Earth’s crust; the native ones were all sucked into our planet’s merciless iron core millions of years ago. Why not go to the source?¶ As a side project, space mining can grab water from the rocks and comets — water which, with a little processing makes rocket fuel. Which in turn makes even more currently unimaginable space operations possible, including ones that could give the planet all the energy it needs to avert climate catastrophe. Cislunar space — the bit around us and the moon, the local neighborhood, basically — is about to get very interesting.¶ It’s hard, even for the most asteroid-minded visionaries, to truly believe the full scope of this future space economy right now. Just as hard as it would have been in 1945, when an engineer named Vannevar Bush first proposed [a vast library of shared knowledge that people the world over would access via personal computers](https://en.wikipedia.org/wiki/Memex), to see that mushroom into a global network of streaming movies and grandmas posting photos and trolls and spies who move the needle on presidential elections. ¶ No technology’s pioneer can predict its second-order effects.¶ The space vision thing is particularly difficult in 2019. Not only do we have plenty of urgent problems with democracy and justice to keep us occupied, but the only two companies on the planet to have gone public with asteroid-mining business plans, startups that seemed to be going strong and had launched satellites already, were just bought by larger companies that are, shall we say, less comfortable executing on long-term visions.¶ Planetary Resources was founded in 2012 in a blaze of publicity. Its funding came from, among others, Larry Page, Eric Schmidt, Ross Perot, and the country of Luxembourg. It had inked an orbital launch deal with Virgin Galactic. And it was sold last October to a blockchain software company. (To 21st century readers, this paragraph would look like I’m playing tech world mad libs.)¶ In January, the other company, Deep Space Industries, also partly funded by Luxembourg (way to get in the space race, Luxembourg!), was sold to Bradford Space, owned by a U.S. investment group called the American Industrial Acquisition Corporation. Maybe these new overlords plan on continuing their acquisitions' asteroid mining endeavors rather than stripping the companies for parts. Both companies have been notably silent on the subject. “The asteroid mining bubble has burst,” [declared The Space Review](http://www.thespacereview.com/article/3633/1), one of the few online publications to even pay attention.¶ That’s also to be expected. After all, anyone trying to build Google in 1945 would go bankrupt. Just as the internet needed a half-dozen major leaps forward in computing before it could even exist, space industry needs its launch infrastructure.¶ Currently, the world’s richest person and its most well-known entrepreneur, Jeff Bezos and Elon Musk, respectively, are working on the relatively cheap reusable rockets asteroid pioneers will need. (As I was writing this, Bezos announced in an email blast that one of his New Shepherd rockets had flown to space and back five times like it was nothing, delivering 38 payloads for various customers while remaining entirely intact.) ¶ Meanwhile, quietly, Earth’s scientists are laying the groundwork of research the space economy needs. Japan’s Hayabusa 2 spacecraft has been in orbit around asteroid Ryugu for the last year and a half, learning everything it can. (Ryugu, worth $30 billion according to Asterank, is the website's #1 most cost-effective target.) The craft dropped [tiny hopping robot rovers](https://www.space.com/41941-hayabusa2-asteroid-rovers-hopping-tech.html) and a [small bomb](https://www.space.com/japan-hayabusa2-asteroid-bomb-video.html) on its target; pictures of the small crater that resulted were released afterwards.¶ Officially, the mission is to help us figure out how the solar system formed. Unofficially, it will help us understand whether all those useful metals clump together at the heart of an asteroid, as some theorize. If so, it’s game on for asteroid prospectors. If not, we can still get at the metals with other techniques, such as optical mining (which basically involves sticking an asteroid in a bag and drilling with sunlight; sounds nuts to us, but [NASA has proved it in the lab](https://www.nasa.gov/directorates/spacetech/niac/2017_Phase_I_Phase_II/Sustainable_Human_Exploration/)). It’ll just take more time.¶ Effectively, we’ve just made our first mark at the base of the first space mineshaft. And there’s more to come in 2020 when Hayabusa 2 returns to Earth bearing samples. If its buckets of sand contain a modicum of gold dust, tiny chunks of platinum or pebbles of compressed carbon — aka diamonds — then the Duchy of Luxembourg won’t be the only deep-pocketed investor to sit up and take notice.¶ The possibility of private missions to asteroids, with or without a human crew, is almost here. The next step in the process that takes us from here to where you are? Tell us an inspiring story about it, one that makes people believe, and start to imagine themselves mining in space. How would you explain the world-changing nature of the internet to 1945? How would you persuade them that there was gold to be mined in Vannevar Bush’s idea? You’d let the new economy and its benefits play out in the form of a novel.¶ As Hayabusa dropped a bomb on Ryugu, Daniel Suarez was making the exact same asteroid the target of his fiction. Suarez is a tech consultant and developer turned New York Times bestselling author. His novels thus far have been techno-thrillers: his debut, [Daemon](https://www.amazon.com/dp/B003QP4NPE/ref=dp-kindle-redirect?_encoding=UTF8&btkr=1), a novel of Silicon Valley’s worst nightmare, AI run rampant, made more than a million dollars.¶ So it was a telling shift in cultural mood that Suarez’s latest thriller is also a very in-depth description of — and thinly-disguised advocacy for — asteroid mining. In [Delta-v](https://www.amazon.com/Delta-v-Daniel-Suarez-ebook/dp/B07FLX8V84/ref=sr_1_1?crid=UMNUUSR3NCBX&keywords=delta-v&qid=1556930756&s=digital-text&sprefix=delta-v%2Cdigital-text%2C204&sr=1-1), published in April, a billionaire in the 2030s named Nathan Joyce recruits a team of adventurers who know nothing about space — a world-renowned cave-diver, a world-renowned mountaineer — for the first crewed asteroid mission.¶ Elon Musk fans might expect this to be Joyce’s tale, but he soon fades into the background. The asteroid-nauts are the true heroes of Delta-v. Not only are they offered a massive payday — $6 million each for four years’ work — they also have agency in key decisions in the distant enterprise. Suarez deliberately based them on present-day heroes. The mission is essential, Joyce declares, to save Earth from its major problems. First of all, the fictional billionaire wheels in a fictional Nobel economist to demonstrate the actual truth that the entire global economy is sitting on a [mountain of debt](https://www.washingtonpost.com/opinions/the-247-trillion-global-debt-bomb/2018/07/15/64c5bbaa-86c2-11e8-8f6c-46cb43e3f306_story.html?noredirect=on&utm_term=.5fb3ff1155d9). It has to keep growing or it will implode, so we might as well take the majority of the industrial growth off-world where it can’t do any more harm to the biosphere.¶ Secondly, there’s the climate change fix. Suarez sees asteroid mining as the only way we’re going to build [solar power satellites](https://en.wikipedia.org/wiki/Space-based_solar_power). Which, as you probably know, is a form of uninterrupted solar power collection that is theoretically more effective, inch for inch, than any solar panels on Earth at high noon, but operating 24/7. (In space, basically, it’s always double high noon). ¶ The power collected is beamed back to large receptors on Earth with large, low-power microwaves, which researchers think will be harmless enough to let humans and animals pass through the beam. A space solar power array like [the one China is said to be working on](https://www.forbes.com/sites/scottsnowden/2019/03/12/solar-power-stations-in-space-could-supply-the-world-with-limitless-energy/#2d3f78a54386) could reliably supply 2,000 gigawatts — or over 1,000 times more power than the largest solar farm currently in existence. ¶ “We're looking at a 20-year window to completely replace human civilization's power infrastructure,” Suarez told me, citing the report of the Intergovernmental Panel on Climate Change on the coming catastrophe. Solar satellite technology “has existed since the 1970s. What we were missing is millions of tons of construction materials in orbit. Asteroid mining can place it there.

#### Warming causes extinction.

Bill McKibben 19, Schumann Distinguished Scholar at Middlebury College; fellow of the American Academy of Arts and Sciences; holds honorary degrees from 18 colleges and universities; Foreign Policy named him to their inaugural list of the world’s 100 most important global thinkers. "This Is How Human Extinction Could Play Out." Rolling Stone. 4-9-2019. https://www.rollingstone.com/politics/politics-features/bill-mckibben-falter-climate-change-817310/

Oh, it could get very bad. In 2015, a study in the Journal of Mathematical Biology pointed out that if the world’s oceans kept warming, by 2100 they might become hot enough to “stop oxygen production by phyto-plankton by disrupting the process of photosynthesis.” Given that two-thirds of the Earth’s oxygen comes from phytoplankton, that would “likely result in the mass mortality of animals and humans.” A year later, above the Arctic Circle, in Siberia, a heat wave thawed a reindeer carcass that had been trapped in the permafrost. The exposed body released anthrax into nearby water and soil, infecting two thousand reindeer grazing nearby, and they in turn infected some humans; a twelve-year-old boy died. As it turns out, permafrost is a “very good preserver of microbes and viruses, because it is cold, there is no oxygen, and it is dark” — scientists have managed to revive an eight-million-year-old bacterium they found beneath the surface of a glacier. Researchers believe there are fragments of the Spanish flu virus, smallpox, and bubonic plague buried in Siberia and Alaska. Or consider this: as ice sheets melt, they take weight off land, and that can trigger earthquakes — seismic activity is already increasing in Greenland and Alaska. Meanwhile, the added weight of the new seawater starts to bend the Earth’s crust. “That will give you a massive increase in volcanic activity. It’ll activate faults to create earthquakes, submarine landslides, tsunamis, the whole lot,” explained the director of University College London’s Hazard Centre. Such a landslide happened in Scandinavia about eight thousand years ago, as the last Ice Age retreated and a Kentucky-size section of Norway’s continental shelf gave way, “plummeting down to the abyssal plain and creating a series of titanic waves that roared forth with a vengeance,” wiping all signs of life from coastal Norway to Greenland and “drowning the Wales-sized landmass that once connected Britain to the Netherlands, Denmark, and Germany.” When the waves hit the Shetlands, they were sixty-five feet high. There’s even this: if we keep raising carbon dioxide levels, we may not be able to think straight anymore. At a thousand parts per million (which is within the realm of possibility for 2100), human cognitive ability falls 21 percent. “The largest effects were seen for Crisis Response, Information Usage, and Strategy,” a Harvard study reported, which is too bad, as those skills are what we seem to need most. I could, in other words, do my best to scare you silly. I’m not opposed on principle — changing something as fundamental as the composition of the atmosphere, and hence the heat balance of the planet, is certain to trigger all manner of horror, and we shouldn’t shy away from it. The dramatic uncertainty that lies ahead may be the most frightening development of all; the physical world is going from backdrop to foreground. (It’s like the contrast between politics in the old days, when you could forget about Washington for weeks at a time, and politics in the Trump era, when the president is always jumping out from behind a tree to yell at you.) But let’s try to occupy ourselves with the most likely scenarios, because they are more than disturbing enough. Long before we get to tidal waves or smallpox, long before we choke to death or stop thinking clearly, we will need to concentrate on the most mundane and basic facts: everyone needs to eat every day, and an awful lot of us live near the ocean. FOOD SUPPLY first. We’ve had an amazing run since the end of World War II, with crop yields growing fast enough to keep ahead of a fast-rising population. It’s come at great human cost — displaced peasant farmers fill many of the planet’s vast slums — but in terms of sheer volume, the Green Revolution’s fertilizers, pesticides, and machinery managed to push output sharply upward. That climb, however, now seems to be running into the brute facts of heat and drought. There are studies to demonstrate the dire effects of warming on coffee, cacao, chickpeas, and champagne, but it is cereals that we really need to worry about, given that they supply most of the planet’s calories: corn, wheat, and rice all evolved as crops in the climate of the last ten thousand years, and though plant breeders can change them, there are limits to those changes. You can move a person from Hanoi to Edmonton, and she might decide to open a Vietnamese restaurant. But if you move a rice plant, it will die. A 2017 study in Australia, home to some of the world’s highest-tech farming, found that “wheat productivity has flatlined as a direct result of climate change.” After tripling between 1900 and 1990, wheat yields had stagnated since, as temperatures increased a degree and rainfall declined by nearly a third. “The chance of that just being variable climate without the underlying factor [of climate change] is less than one in a hundred billion,” the researchers said, and it meant that despite all the expensive new technology farmers kept introducing, “they have succeeded only in standing still, not in moving forward.” Assuming the same trends continued, yields would actually start to decline inside of two decades, they reported. In June 2018, researchers found that a two-degree Celsius rise in temperature — which, recall, is what the Paris accords are now aiming for — could cut U.S. corn yields by 18 percent. A four-degree increase — which is where our current trajectory will take us — would cut the crop almost in half. The United States is the world’s largest producer of corn, which in turn is the planet’s most widely grown crop. Corn is vulnerable because even a week of high temperatures at the key moment can keep it from fertilizing. (“You only get one chance to pollinate a quadrillion kernels of corn,” the head of a commodity consulting firm explained.) But even the hardiest crops are susceptible. Sorghum, for instance, which is a staple for half a billion humans, is particularly hardy in dry conditions because it has big, fibrous roots that reach far down into the earth. Even it has limits, though, and they are being reached. Thirty years of data from the American Midwest show that heat waves affect the “vapor pressure deficit,” the difference between the water vapor in the sorghum leaf’s interior and that in the surrounding air. Hotter weather means the sorghum releases more moisture into the atmosphere. Warm the planet’s temperature by two degrees Celsius — which is, again, now the world’s goal — and sorghum yields drop 17 percent. Warm it five degrees Celsius (nine degrees Fahrenheit), and yields drop almost 60 percent. It’s hard to imagine a topic duller than sorghum yields. It’s the precise opposite of clickbait. But people have to eat; in the human game, the single most important question is probably “What’s for dinner?” And when the answer is “Not much,” things deteriorate fast. In 2010 a severe heat wave hit Russia, and it wrecked the grain harvest, which led the Kremlin to ban exports. The global price of wheat spiked, and that helped trigger the Arab Spring — Egypt at the time was the largest wheat importer on the planet. That experience set academics and insurers to work gaming out what the next food shock might look like. In 2017 one team imagined a vigorous El Niño, with the attendant floods and droughts — for a season, in their scenario, corn and soy yields declined by 10 percent, and wheat and rice by 7 percent. The result was chaos: “quadrupled commodity prices, civil unrest, significant negative humanitarian consequences . . . Food riots break out in urban areas across the Middle East, North Africa, and Latin America. The euro weakens and the main European stock markets lose ten percent.” At about the same time, a team of British researchers released a study demonstrating that even if you can grow plenty of food, the transportation system that distributes it runs through just fourteen major choke-points, and those are vulnerable to — you guessed it — massive disruption from climate change. For instance, U.S. rivers and canals carry a third of the world’s corn and soy, and they’ve been frequently shut down or crimped by flooding and drought in recent years. Brazil accounts for 17 percent of the world’s grain exports, but heavy rainfall in 2017 stranded three thousand trucks. “It’s the glide path to a perfect storm,” said one of the report’s authors. Five weeks after that, another report raised an even deeper question. What if you can figure out how to grow plenty of food, and you can figure out how to guarantee its distribution, but the food itself has lost much of its value? The paper, in the journal Environmental Research, said that rising carbon dioxide levels, by speeding plant growth, seem to have reduced the amount of protein in basic staple crops, a finding so startling that, for many years, agronomists had overlooked hints that it was happening. But it seems to be true: when researchers grow grain at the carbon dioxide levels we expect for later this century, they find that minerals such as calcium and iron drop by 8 percent, and protein by about the same amount. In the developing world, where people rely on plants for their protein, that means huge reductions in nutrition: India alone could lose 5 percent of the protein in its total diet, putting 53 million people at new risk for protein deficiency. The loss of zinc, essential for maternal and infant health, could endanger 138 million people around the world. In 2018, rice researchers found “significantly less protein” when they grew eighteen varieties of rice in high–carbon dioxide test plots. “The idea that food became less nutritious was a surprise,” said one researcher. “It’s not intuitive. But I think we should continue to expect surprises. We are completely altering the biophysical conditions that underpin our food system.” And not just ours. People don’t depend on goldenrod, for instance, but bees do. When scientists looked at samples of goldenrod in the Smithsonian that dated back to 1842, they found that the protein content of its pollen had “declined by a third since the industrial revolution — and the change closely tracks with the rise in carbon dioxide.” Bees help crops, obviously, so that’s scary news. But in August 2018, a massive new study found something just as frightening: crop pests were thriving in the new heat. “It gets better and better for them,” said one University of Colorado researcher. Even if we hit the UN target of limiting temperature rise to two degrees Celsius, pests should cut wheat yields by 46 percent, corn by 31 percent, and rice by 19 percent. “Warmer temperatures accelerate the metabolism of insect pests like aphids and corn borers at a predictable rate,” the researchers found. “That makes them hungrier[,] and warmer temperatures also speed up their reproduction.” Even fossilized plants from fifty million years ago make the point: “Plant damage from insects correlated with rising and falling temperatures, reaching a maximum during the warmest periods.”

#### An asteroid collision would ensure extinction – would fundamentally alter the biosphere, don’t underestimate its risk. Hudson 19

Wesley Hudson ’19, news reporter for Express, “Asteroid alert: NASA warning as kilometre long space rock set to skim Earth at 25,000mph”, 8/28/19, Express, https://www.express.co.uk/news/science/1170826/asteroid-news-NASA-latest-space-rock-asteroid-1998-HL1-earth-danger-apocalypse

AN ASTEROID almost a kilometre wide is currently barreling through space at more than 25,000mph and is due to skim the earth towards the end of October. NASA’s Jet Propulsion Laboratory (JPL) claim the space rock will shoot past the earth within a “close” proximity of the planet in the early hours of October 26. The asteroid, dubbed 1998 HL1, is a so-called Near-Earth Object (NEO) flying on a Close Approach Trajectory. NASA expects the 1998 HL1 to come flying by dangerously close around 1.21am BST (17.21pm PDT). The daunting moment will mark anther journey around the sun for the asteroid since it was discovered in 1998. The asteroid will be travelling at a staggering speed of over 25,000mph as it barrels past the Earth. The JPL predict the asteroid could be between 440m and 990m wide. At its largest an asteroid of this size is bigger than the tallest building in the world, the Burj Khalifa in Dubai. Even at it’s smallest, 1998 HL1 is still bigger than The Shard. Since it was discovered, 1998 HL1 has been seen up to 408 times. An NEO is an asteroid or comet which is on an orbital path intersecting that of the Earth's. This asteroid will miss the Earth by almost four million miles. If it were to strike the Earth, an asteroid of this size would cause catastrophic damage. The extinction of the dinosaurs in the Cretaceous-Tertiary event 65million years ago is famously believed to have been caused by a massive asteroid impact. The Chicxulub Crater in Mexico is the most commonly accepted point of impact, with the responsible body thought to be around 10km in diameter. A car-sized asteroid is estimated to hit the Earth roughly once a year. The majority of asteroids on track for the planet are usually burnt up as they enter the Earth's atmosphere. NASA administrator Jim Bridenstine has previously warned a potential asteroid collision is more likely then people realise.

#### Don’t write our impacts off as low probability – asteroid collision is complex and the existence of space keyholes exponentially increases the risk of collision. Vereš ’19

Peter Vereš ’19, Harvard-Smithsonian Center for Astrophysics, “Chapter 6 Vision of Perfect Observation Capabilities”, 2019, Planetary Defense, Space and Society, https://dl1.cuni.cz/pluginfile.php/634091/mod\_resource/content/1/Planetary%20Defence.pdf

Often, uncertain orbits are a source of elevated impact risks of some NEOs with the Earth. The impact probability of an asteroid with Earth is a complex problem. First, the orbits of Earth and the asteroid should be close enough or even intersect; second, the Earth and asteroid should meet at the intersection at the same time. If these conditions are met, then one can assess how close the asteroid flies around the Earth at a given time, or whether it will hit the Earth. One must remember that each asteroid orbit comes with uncertainties and therefore, instead of a single accurate solution where the asteroid will hit the Earth or miss it, there is always a realm of possible solutions within the orbit uncertainties. The tangent plane to the asteroid’s trajectory at the time of impact, or close approach, is called a b-plane. At a given time of a predicted impact, all possible closest distances to the Earth of possible orbits create an area on the tangent plane. If the area contains the Earth, then the impact probability for that epoch is non-zero and in a simple approximation can be denoted as a ratio of an area of Earth cross section and the entire area with possible orbits going through the b-plane. It happens that a newly discovered NEO with a short arc that is coming very close to the Earth has a non-zero impact probability, because its orbit is highly uncertain and the area on the b-plane is very large. Typically, further observations improve the orbit, and the impact risk for a given epoch falls to zero. Some objects, however, have orbits with low orbital uncertainty, but still have non-zero impact probability, such as Bennu. The non-zero impact probability is computed for a given time in the future, but even if the orbit is known very well today, small perturbations from planets and non-gravitational forces increase the uncertainty for future impacts. That is why NASA’s Sentry is providing predictions only for the next 100 years. A close flyby of a spacecraft around an asteroid may improve the asteroid’s orbit significantly, however, it does not fully mitigate its impact in the future, due to the presence of keyholes (Chodas 1999)—small areas in space near Earth. Keyholes are specific for asteroids flying very close to the Earth and are rather small, from a few to hundreds of kilometers across. If the keyhole is hit during the NEO flyby, the orbit of the NEO becomes resonant with Earth and the NEO will return to Earth regularly, increasing its impact probability. Thus, in case of a very near Earth flyby, the orbit needs to be known with such precision (~km) that keyhole avoidance is confirmed. NASA has even created the NEO Deflection App,1 where the public can try to change the orbit of a hypothesized NEO on direct impact trajectory. For Earth impact monitoring, the accuracy of orbits and orbital uncertainties is crucial and deserves more attention. The future of orbit determination and uncertainty mitigation will depend more and more on sophisticated software that will be able to handle orbital computation in detail; assess uncertainties and errors of measurements; coordinate a list of objects that are crucial for follow-up or orbit improvement, or even automatically point the telescopes in a network to observe those asteroids; measure their positions; and submit the data to MPC. This automated process is more or less implanted by several surveys (CSS, LCOGT) and agencies (ESA, MPC).

### Solvency

#### LINK FILTER – The affirmative does not stop Chinese commercialization of space. Barring appropriation only limits the ownership of real property, use is still allowed. 100% of aff harms result from use, like the claiming of resources in space, not ownership of real estate.

#### *The aff doesn’t have a single piece of solvency or link evidence that is actually about APPROPRIATION, or even says the word appropriation, so you should give it ZERO WEIGHT and presume neg on any risk of the DA. Go ahead, control F the doc. “Appropriation” appears once - in the resolution.*

Švec et al 20 [Martin Švec, Petr Boháček, and Nikola Schmidt, “Utilization of Natural Resources in Outer Space: Social License to Operate as an Alternative Source of Both Legality and Legitimacy,” Oil Gas Energy Law J, 2020. <https://planetary-defense.eu/wp-content/uploads/2020/11/ov18-1-article17-notitle.pdf>] CT

2.2.1. Is the Utilization of Space Resources Implicitly Prohibited by the OST?

When the OST was drafted, exploitation of space resources was not considered feasible. Thus, the treaty does not contain any specific reference to space resource activities. However, silence of the OST does not necessarily imply unlawfulness of these activities. On the contrary, the freedom of exploration, use and access is one of the most fundamental principles of international space law. Art I of the OST reads: “Outer space, including the Moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies.“25 It is worth mentioning that France already in 1966, during the negotiations of the OST, emphasised that it is important to know exactly what is meant by the term ‘use’, and whether it is an equivalent to the term ‘exploitation’. 26 While there is a general consensus on the interpretation of the term “exploration” as referring to discovery activities of the space environment for scientific reasons, a large disagreement exists concerning the term ‘use’.27 In this context the Board of Directors of the International Institute of Space Law (IISL) hold that there is no international agreement whether the right of “free use” includes the right to take and consume nonrenewable natural resources, including minerals and water on celestial bodies.28 The authors of this article are of the opinion that the term “use” seems to be broad enough to encompass the exploitation of natural resources. Pursuant to the Vienna Convention on the Law of Treaties, a treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose. First, the term “use” usually refers to both the non-economic and economic utilization and, thus, the use of outer space for economic ends can include exploitation with the objective of making economic profit.29 Second, the OST’s preamble reveals that the treaty does not aim to restrict the use of outer space, but rather to promote free exploration and use of outer space and the opposite interpretation would lead to an unnecessary impediment to the development of the uses of outer space.30 What is more, these conclusions may also be derived from the Moon Agreement. Although this agreement has been ratified only by 18 states, it may help understand the meaning of the international space law principles enshrined in the OST. The preamble of the Moon Agreement refers to the “benefits which may be derived from the exploitation of the natural resources of the moon and other celestial bodies,” and art 11 envisages the establishment of an international regime to govern the exploitation of natural resources of the Moon. In addition, Hobe argues, that specific uses are only excluded if they are explicitly excluded in other provisions of the OST, such as prohibition of certain military activities.31

2.2.2. Does the Utilization of Space Resources Contradict the Principle of NonAppropriation?

The principle of non-appropriation is one of the most fundamental rules regulating the exploration and use of outer space. Art II of the OST reads as follows: “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 any other means.” As a consequence, outer space is generally understood as a res communis omnium, 32 in its legal characterisation similar to the law governing the high seas or the deep seabed. An analysis of these already existing regimes based on the non-appropriation principle reveals that an exploitation of natural resources is perfectly compatible with the principle of nonappropriation.33 Additionally, even the Moon Agreement suggests that the exploitation of the natural resources of the moon does not constitute a means of appropriation. In particular, art 11 of the Moon Agreement reiterates that outer space is not subject to national appropriation and it explicitly envisages the establishment of an international legal regime to govern the exploitation of space resources.34

#### There is literally no reason to vote aff – vote on a 0.1% chance of the DA.

### Adv 1

#### No warrant for why whoever rules space rules the future.

#### No solvency - They cannot solve Chinese hegemony because the government can still appropriate space. Proven by the fact that they need ASATs for their adventurism – they’ll be willing to innovate and take the risk

#### c/a All the aff can do is ban appropriation- not prevent private companies from using OS---cant solve 4 their impacts.

#### Even if private is key, governments can fund private companies and exploration

#### Can’t solve – regulatory forum-shopping means Chinese companies just launch rockets from another country. Proven by all of their Chinese-companies-exporting-to-Russia warrants.

Dovey 21 [Ceridwen Dovey, “Space Exploration At What Price?,” Readers Digest Asia Pacific, 5/1/21. <https://www.pressreader.com/australia/readers-digest-asia-pacific/20210501/281487869174485>] CT

Lenient supervision. In 2017, Luxembourg – already a corporate tax haven, complicit in international investor tax avoidance and evasion – followed the US’s lead and passed a space-resources law that allows companies to claim resources they extract from space as private property. Guardian journalist Atossa Araxia Abrahamian recounted a chilling comment from an American space executive: “We just want to work with a government who won’t get in the way.” Companies anywhere in the world can stake resource claims in space under this new law; their only requirement is an office in Luxembourg. This sets a murky precedent of ‘regulatory forum-shopping’, where companies choose to incorporate in states where they’ll be most leniently supervised. In 2018, a Silicon Valley start-up called Swarm Technologies illegally launched four miniature satellites known as CubeSats into space from India. They’d been refused launch permission in the US due to safety concerns over whether the satellites could be tracked once in orbit. Fined US$900,000 by the US Federal Communications Commission, the company was subsequently given permission to start communicating with its satellites, and launched more CubeSats as part of a payload on a SpaceX rocket that November. In January 2019, the company raised $25 million in venture capital.

#### Peaceful transition to a Chinese-led order prevents international instability — US reassertion of a lead role fails and breaks down institutions

That’s Michael Mazarr, in February of 2017—Senior Political Scientist at the RAND Corporation and Associate Director of the Strategy, Doctrine, and Resources Program at the RAND Corporation's Arroyo Center (Michael, “The Once and Future Order: What Comes After Hegemony?,” Foreign Affairs (Jan/Feb 2017): 25-32, dml)

Few foreign policy issues have attracted more attention in recent years than the problem of sustaining the U.S.-led liberal international order. After World War II, the United States sponsored a set of institutions, rules, and norms designed to avoid repeating the mistakes of the 1930s and promote peace, prosperity, and democracy. The resulting system has served as the bedrock of U.S. national security strategy ever since. In everything from arms control to peacekeeping to trade to human rights, marrying U.S. power and international norms and institutions has achieved significant results. Washington continues to put maintaining the international order at the center of the United States' global role. Yet the survival of that order-indeed, of any ordering principles at all-now seems in question. Dissatisfied countries such as China and Russia view its operation as unjust, and people around the world are angry about the economic and social price they've had to pay for globalization. It's not clear exactly what Presidentelect Donald Trump's views are on the role of the United States in the world, much less the liberal order, but his administration will confront the most profound foreign policy task that any new administration has faced in 70 years: rethinking the role that the international order should play in U.S. grand strategy. Whatever Trump's own views, the instincts of many in Washington will be to attempt to restore a unified, U.S.-dominated system by confronting the rule breakers and aggressively promoting liberal values. This would be the wrong approach; in trying to hold the old order together, Washington could end up accelerating its dissolution. What the United States must learn to do instead is navigate and lead the more diversified, pluralistic system that is now materializing-one with a bigger role for emerging-market powers and more ways for countries other than the United States to lead than the current order provides. THE HOUSE THAT WE BUILT The creation of the current order, like that of its two modern predecessors-the Concert of Europe and the League of Nations-was an effort to design the basic architecture of international relations in the wake of a war among major powers. All three orders used a range of tools- organizations, treaties, informal meetings, and norms-to attain the goals of their creators. The current order's main institutions include the United Nations, nato, the World Trade Organization, the International Monetary Fund (imf), the World Bank, and the G-20. Together, these bodies have influenced almost every aspect of the modern world. The un has provided a forum for the international community to rally around shared interests and ratify joint action. The international financial institutions have boosted trade and stabilized the global economy during crises. Multilateral treaties and agreements brokered through various bodies have helped avoid chaotic arms races and uncontrolled nuclear proliferation. And dense global networks of experts, activists, businesses, and nonprofits, operating within the framework of the liberal order, have built consensus and taken action on hundreds of other issues. The rules of any such order are not self-enforcing. When combined with direct state power, however, they encourage governments to accept norms of conduct such as nonaggression, the avoidance of nuclear weapons, and respect for human rights. The United States would be wise to do what it can to sustain these norms in the future. The trick is figuring out how to do so-and what, given all the changes the world is now experiencing, the emerging order should look like. THE NOT-SO-LIBERAL ORDER The postwar liberal order has proved remarkably stable. But it has always incorporated two distinct and not necessarily reconcilable visions. One is a narrow, cautious view of the un and the core international financial institutions as guardians of sovereign equality, territorial inviolability, and a limited degree of free trade. The other is a more ambitious agenda: protecting human rights, fostering democratic political systems, promoting free-market economic reforms, and encouraging good governance. Until recently, the tension between these two visions did not pose a serious problem. For many decades, the Cold War allowed the United States and its allies to gloss over the gap in the name of upholding a unified front against the Soviets. After the collapse of the Soviet Union, Washington fully embraced the more ambitious approach by expanding nato up to Russia's doorstep; intervening to protect human rights in places such as the Balkans and Libya; supporting uprisings, at least rhetorically, in the name of democracy in countries including Egypt, Georgia, and Myanmar; and applying increasingly sophisticated economic sanctions to illiberal governments. In the newly unipolar international system, Washington often behaved as if the narrower concept of order had been superseded by the more ambitious one. At the same time, the United States often took advantage of its preeminence to sidestep the order's rules and institutions when it found them inconvenient. The problem with this approach, of course, is that international orders gain much of their potency by defining the sources of prestige and status within the system, such as participation in and leadership of international institutions. Their stability depends on leading members abiding-and being seen to abide-by key norms of behavior. When the leader of an order consistently appears to others to interpret the rules as it sees fit, the legitimacy of the system is undermined and other countries come to believe that the order offends, rather than sustains, their dignity. An extreme version of this occurred in the 1930s, when a series of perceived insults convinced Japan-once a strong supporter of the League of Nations-that the system was a racist, Anglo-American cabal designed to emasculate it. Partly as a result, Japan withdrew from the league and signed the Tripartite Pact with Germany and Italy before entering World War II. Today, a similar story is playing out as some countries see the United States as applying norms selectively and in its own favor, norms that are already tailored to U.S. interests. This is persuading them that the system's main function is to validate the United States' status and prestige at the expense of their own. For years now, a number of countries, including Brazil, India, South Africa, and Turkey, have found various ways to express their frustration with the current rules. But China and Russia have become the two most important dissenters. These two countries view the order very differently and have divergent ambitions and strategies. Yet their broad complaints have much in common. Both countries feel disenfranchised by a U.S.-dominated system that imposes strict conditions on their participation and, they believe, menaces their regimes by promoting democracy. And both countries have called for fundamental reforms to make the order less imperial and more pluralistic. Russian officials are particularly disillusioned. They believe that they made an honest effort to join Western- led institutions after the fall of the Soviet Union but were spurned by the West, which subjected them to a long series of insults: nato's attacks on Serbia in the Balkan wars of the 1990s; nato enlargement into eastern Europe; and Western support for "color revolutions" in the early years of the new century, which threatened or in some cases actually overthrew Russian-backed leaders in several eastern European countries. In a June 2016 speech to Russian diplomats, Russian President Vladimir Putin complained that certain Western states "continue stubborn attempts to retain their monopoly on geopolitical domination," arguing that this was leading to a "confrontation between different visions of how to build the global governance mechanisms in the 21st century." And Putin hasn't just limited himself to complaining. In recent years, Russia has taken a number of dramatic, sometimes violent steps-especially in Europe-to weaken the U.S.-led order. China also feels disrespected. The financial crisis at the end of the last decade convinced many Chinese that the West had entered a period of rapid decline and that China deserved a more powerful voice in the international system. Since then, Beijing has increased its influence in several institutions, including the imf and the World Bank. But the changes have not gone far enough for many Chinese leaders. They still chafe at Western domination of these bodies, perceive U.S. democracy promotion as a threat, and resent the regional network of U.S. alliances that surrounds China. Beijing has thus undertaken a range of economic initiatives to gain more influence within the current order, including increasing its development aid and founding the Asian Infrastructure Investment Bank, which it clearly intends to compete with the imf and the World Bank. China has also pursued its interests in defiance of global norms by building islands in contested international waters and harassing U.S. aircraftin the South China Sea. Worrisome as these developments are, it is important not to exaggerate the threats they represent. Neither China nor Russia has declared itself an enemy of the postwar order (although Russia is certainly moving in that direction). Both continue to praise the core un system and participate actively in a host of institutions, treaties, and diplomatic processes. Indeed, China has worked hard to embed itself ever more firmly in the current order. In a 2015 speech in Seattle, Chinese President Xi Jinping said that "China has been a participant, builder, and contributor" in, of, and to the system and that it stood "firmly for the international order" based on the purposes and principles outlined in the un Charter. China and Russia both rely on cross-border trade, international energy markets, and global information networks-all of which depend heavily on international rules and institutions. And at least for the time being, neither country seems anxious to challenge the order militarily. Many major countries, including China and Russia, are groping toward roles appropriate to their growing power in a rapidly evolving international system. If that system is going to persevere, their grievances and ambitions must be accommodated. This will require a more flexible, pluralistic approach to institutions, rules, and norms. ALL THE RAGE Another threat to the liberal order comes from the populist uprisings now under way in many countries around the world, which have been spurred on by outrage at increasing economic inequality, uneasiness with cultural and demographic changes, and anger at a perceived loss of national sovereignty. For the liberal order to survive, the populations of its member countries must embrace its basic social and political values. That embrace is now weakening. The postwar order has driven global integration and liberalization by encouraging free-trade agreements, developing international law, and fostering global communications networks. Such developments strengthened the order in turn by cementing public support for liberal values. But the populist rebellion against globalization now imperils that virtuous circle. The populist surge has featured outbursts in Europe and the United States against the perceived intrusions necessary of a globalizing order. Public support for new trade agreements has tumbled. Resentment toward supranational authorities, such as the European Union, has risen steadily, as has suspicion of and hostility toward immigrants and immigration. The uprising has already claimed one major casualty-the United Kingdom's eu membership-and is mutating into angry, xenophobic nationalism in countries as diverse as Austria, Denmark, France, Greece, Hungary, the Netherlands, Russia, Sweden, and the United States. So far, none of these countries has totally rejected the international order. Populism remains a minority trend in most electorates, and support for liberal principles remains robust in many countries. In a 2016 Gallup survey, for example, 58 percent of Americans polled indicated that they saw trade as an opportunity rather than a threat- the highest number since 1992. Similarly, a 2016 poll by the Pew Research Center found that support for the UN among Americans had grown by nine points since 2004, to a new peak of 64 percent. Reassuring as such findings are, however, if even a quarter or a third of citizens turn decisively against liberal values in a critical mass of nations, it can destabilize the entire system. In some cases, this happens because radical parties or individuals can come to power without ever achieving more than a plurality of support. More commonly, a rejectionist bloc can ~~cripple~~ [wreck] legislatures by obstructing steps, such as trade deals and arms treaties, that would strengthen the prevailing order. And sometimes, as happened with the British vote to leave the eu, committed opponents of the order are joined by a larger number of worried citizens in a successful effort to roll back elements of the system. MIX IT UP International orders tend to rest on two pillars: the balance of power and prestige among the leading members and some degree of shared values. Both of these pillars look shaky today. For many years, U.S. grand strategy has been based on the idea that the unitary U.S.-led order reflected universal values, was easy to join, and exercised a gravitational pull on other countries. Those assumptions do not hold as strongly as they once did. If Washington hopes to sustain an international system that can help avoid conflict, raise prosperity, and promote liberal values, it will have to embrace a more diverse order-one that operates in different ways for different countries and regions and on different issues. The United States will be tempted to resist such a change and to double down on the existing liberal order by following the Cold War playbook: rallying democracies and punishing norm breakers. But such a narrow order would create more embittered outcasts and thus imperil the most fundamental objective of any global order: keeping the peace among great powers. Dividing the world into defenders and opponents of a shared order is also likely to be less feasible than in the past. China's role in the global economy and its standing as a regional power mean that it cannot be isolated in the way the Soviet Union was. Many of today's rising powers, moreover, have preferences that are too diverse to gather into either a U.S.-led system or a bloc opposed to it.

### Adv 2

#### Competition in space increases cooperation and decreases conflict.

Cobb 20 [Whitman, Cobb, Wendy N.. Privatizing Peace : How Commerce Can Reduce Conflict in Space, Taylor & Francis Group, 2020. ProQuest Ebook Central, <http://ebookcentral.proquest.com/lib/marlboroughschool-ebooks/detail.action?docID=6228909>.] CT

The value of competition

As noted in the first chapter, a subsidiary argument offered here is that, even if a space race should break out, military or civilian in nature, competition is not necessarily a bad thing. Much of the technological development noted previously that arose from space investment came at the height of the space race as both the US and the USSR were pouring billions of dollars into a race to the moon. The race itself had a civilian face with a military undertone, but its benefits were on the whole, positive. No overt military conflict arose, there was a significant investment in research, development, and technology, and the two space powers realized that they needed some sort of international framework to preserve their ability to operate in space. Both of these elements continue to be present today.

First, the increased threat of conflict in space could, coming as it does with an increased number of public and private actors and a greater economic threat, impress upon space participants the need to reign in dangerous actions and rhetoric. While it took an atmospheric nuclear test on the part of the Soviets to encourage both the US and USSR to come to the table in the 1960s, increasing awareness of economic and military dependence and the consequences arising from conflict in space could increase the enthusiasm to pursue new international agreements. For its part, the US military increasingly recognizes the dangers and the need to mitigate them, however, mitigation efforts have largely concentrated on offensive rather than defensive capabilities. 59 A focus on offensive weapons can only aggravate the situation and there are still significant technological hurdles in developing on-orbit offensive weapons. As such, a move away from such rhetoric, like Johnson-Freese argues for, is necessary.

Competition can also increase technological capabilities and those technological capabilities can in turn enable cooperation. 60 China is a case in point. In the 1990s and early 2000s when they were beginning to restart a human spaceflight program, Chinese officials often stated their desire to work with other powers in space, particularly the United States. China did in fact forge ties with other countries via space, in particular Brazil. However, as Chinese spaceflight technology advanced, the rhetoric of cooperation was pulled back some over a desire to enter into a partnership on equal footing. Once the Chinese could establish their abilities in space, they would be able to cooperate with potential partners as an equal, rather than junior, partner. 61

As more countries develop space technologies, the ability to help one another out also increases. The Agreement on the Rescue of Astronauts obligates signatories to “take all possible steps to rescue and assist astronauts in distress and promptly return them to the launching state.” 62 More states with the ability to conduct crewed operations in space will only facilitate this type of help and cooperation. While fictional, this is just the type of scenario that played out in the book (and later movie) The Martian . When a supply rocket blows up on launch, NASA turns to China for a replacement that enables a Mars crew to return to Mars to rescue a stranded astronaut. These types of cooperative activities can in turn foster greater cooperation in areas other than space and science. In fact, one of the causal mechanisms through which the economic peace is hypothesized to act is via increased connections between people and private .