# 1nc r3

## Off

### 1

#### Interpretation: Topical affirmatives must defend the appropriation of outer space

#### Outer space starts 10k miles above the surface of earth – that’s where earth atmosphere ends

National Geographic No Date [National Geographic Society, "Atmosphere," <https://www.nationalgeographic.org/encyclopedia/atmosphere/>] Sachin

Earth’s atmosphere stretches from the surface of the planet up to as far as 10,000 kilometers (6,214 miles) above. After that, the atmosphere blends into space. Not all scientists agree where the actual upper boundary of the atmosphere is, but they can agree that the bulk of the atmosphere is located close to Earth’s surface—up to a distance of around eight to 15 kilometers (five to nine miles). While oxygen is necessary for most life on Earth, the majority of Earth’s atmosphere is not oxygen. Earth’s atmosphere is composed of about 78 percent nitrogen, 21 percent oxygen, 0.9 percent argon, and 0.1 percent other gases. Trace amounts of carbon dioxide, methane, water vapor, and neon are some of the other gases that make up the remaining 0.1 percent. The atmosphere is divided into five different layers, based on temperature. The layer closest to Earth’s surface is the troposphere, reaching from about seven and 15 kilometers (five to 10 miles) from the surface. The troposphere is thickest at the equator, and much thinner at the North and South Poles. The majority of the mass of the entire atmosphere is contained in the troposphere—between approximately 75 and 80 percent. Most of the water vapor in the atmosphere, along with dust and ash particles, are found in the troposphere—explaining why most of Earth’s clouds are located in this layer. Temperatures in the troposphere decrease with altitude. The stratosphere is the next layer up from Earth’s surface. It reaches from the top of the troposphere, which is called the tropopause, to an altitude of approximately 50 kilometers (30 miles). Temperatures in the stratosphere increase with altitude. A high concentration of ozone, a molecule composed of three atoms of oxygen, makes up the ozone layer of the stratosphere. This ozone absorbs some of the incoming solar radiation, shielding life on Earth from potentially harmful ultraviolet (UV) light, and is responsible for the temperature increase in altitude. The top of the stratosphere is called the stratopause. Above that is the mesosphere, which reaches as far as about 85 kilometers (53 miles) above Earth’s surface. Temperatures decrease in the mesosphere with altitude. In fact, the coldest temperatures in the atmosphere are near the top of the mesosphere—about -90°C (-130°F). The atmosphere is thin here, but still thick enough so that meteors will burn up as they pass through the mesosphere—creating what we see as “shooting stars.” The upper boundary of the mesosphere is called the mesopause. The thermosphere is located above the mesopause and reaches out to around 600 kilometers (372 miles). Not much is known about the thermosphere except that temperatures increase with altitude. Solar radiation makes the upper regions of the thermosphere very hot, reaching temperatures as high as 2,000°C (3,600°F). The uppermost layer, that blends with what is considered to be outer space, is the exosphere. The pull of Earth’s gravity is so small here that molecules of gas escape into outer space.

#### Violation: 340 miles is less than the 372 miles necessary to be considered outer space; all spacecraft that cause debris through constellations are below this height

#### Vote neg:

#### 1] Limits and ground: the aff interpretation explodes the topic to allow any aff about space generally which structurally alters the neg research burden because there’s a qualitative difference between outer space and the atmosohere. Means we get no ground bc of how unpredictable the AC could be from round to round – kills core neg generics like space col bad and mining that don’t link if you specify a part of space

#### 2] Precision – Justifies the aff arbitrarily doing away with words in the resolution which gives way to affs about anything which obliterates neg prep.

#### Private multi-actor fiat is a voter --- proven by them spiking out of the enforcement question in CX

#### Even if they win their interp pragmatically true, you only have jurisdiction to vote on topical advocacies, you can’t vote affirmative if they haven’t affirmed.

#### Fair and Ed

#### 1nc theory first, matter of sequentiality, we had to be abusive because aff was abusive

#### Use competing interps - Topicality is a binary question, you can’t be reasonably topical and it invites a race to the bottom of intervention

#### Drop the debater – dropping the argument doesn’t rectify abuse since winning T proves why we don’t have the burden of rejoinder against their aff.

#### No RVIS – it’s your burden to be topical

### 2

#### Interp: The affirmative must define “private entities” in a delimited text in the 1AC.

#### “Private Entities” are flexible and has too many interps – normal means shows no consensus and makes the round irresolvable since the judge doesn’t know how to compare between types of offense and o/w since it’s a side constraint on decision making.

UpCounsel ND [“Private Entity: Everything You Need to Know”. UpCounsel (interactive online service that makes it faster and easier for businesses to find and hire legal help). No Date. Accessed 12/17/21. <https://www.upcounsel.com/private-entity> //Xu]

A private entity can be a partnership, corporation, individual, nonprofit organization, company, or any other organized group that is not government-affiliated. Indian tribes and foreign public entities are not considered private entities.

Unlike publicly traded companies, private companies do not have public stock offerings on Nasdaq, American Stock Exchange, or the New York Stock Exchange. Instead, they offer shares privately to interested investors, who may trade among themselves.

Private Company vs. Private Entity

The Companies Act of 2013 governs the registration of private companies.

This type of company is formed by following the steps laid out by this law.

Private entities are determined not by this law but by ownership and holding. For example, sole proprietorships and partnerships are designed as private entities.

A private entity is not necessarily a private company, but all private companies are private entities.

How Private Entities Work

Although private companies can be of any size, they often include a small group of chosen investors who may include employees, colleagues, friends and family, and other interested parties. If this type of company needs funding to grow, it may seek it from venture capital firms or from large institutional investors. Some private companies eventually decide to go public with an initial public offering (IPO) of stock shares on a public exchange. Sometimes, public companies go private when a large investor buys a bulk of the outstanding stock shares and plans to remove them from public exchanges.

How FOIA Affects Private Entities

The Freedom of Information Act (FOIA) is a federal law that requires certain agencies to provide certain types of records to any person who asks. Major government bodies such as federal courts and Congress are exempt from FOIA. Some state agencies are also exempt depending on state laws governing public records. In general, FOIA applies to:

Federal, state, and local government agencies, such as the Federal Communications Commission.

Certain state legislatures depending on the laws in those states.

Most private entities are not bound by federal FOIA laws. However, these laws may apply to private entities involved in government business. This situation occurred in Colorado in 2000, when a nonprofit corporation was required by the state's Court of Appeals to share documents related to a project it was working on with the city of Denver.

#### Violation – you don’t.

#### Prefer –

#### 1] Stable Advocacy – they can redefine in the 1AR to wriggle out of DA’s which kills high-quality engagement. We lose access to Tech Race DA’s, Asteroid DA’s, basic case turns, and core process counter plans that have different definitions and 1NC pre-round prep.

#### 2] Real World – Policy makers will always define the entity that they are recognizing. It also means zero solvency, absent spec, private entities can circumvent since there is no delineated way to enforce the aff and means their solvency can’t actualize.

#### OSspec isn’t regressive or arbitrary – its core topic lit for what happens when the aff is implemented and cannot be discounted from policies that require enforcement to function.

### 3

#### Interp – “the” is a definite article that refers to one group. Affs must not specify a subset of appropriation by private entities and PICS don’t negate

**Rinnert et al 86,** Professor Emeritus at Hiroshima City University, Paper presented at the Japan Association of Language Teachers' International Conference on Language Teaching and Learning (Teaching the English Article System, Nov 1986, Speeches/Conference Papers (150) -- Reports - Descriptive (141) -- Tests/Evaluation Instruments (160)) KD

PRINCIPLE 4 MODIFIERS BEFORE AND AFTER THE NOUN Very often, the uniqueness of the thing being talked about is indicated by adding limiting modifiers to the noun being used to refer to that thing. This is why superlative noun phrases, for example, are always preceded by the. a. the best students in the class... b. the highest mountain in the world... c. the person that I love most... But uniqueness is not always indicated by superlatives; there are many other ways. In effect, **when the meaning of the modifier limits the meaning of the noun so that it can refer to just one thing or things**, then, as usual, **the is used in front of the noun**, e.g the only way to finish this assignment on time... e. the very same day... f. the girl that we met at the party yesterday In many cases, the use of the before a noun qualified by limiting modifiers can be seen as another "shortcut" for the writer. Instead of saying, "There are people. They live in China." the writer can simply say, "The people of China..." The following examples are similar: g. the student in the corner... (There is a student; the student is in the corner.) h. the man who came by... (There is a man; he came by.) i. the idea that you gave us... (There is an idea; you gave it to us.) j. the woman watching us... (There is a woman; she is watching us.) k. the people interested in economy... (There are people; they are interested in economy.) (See Appendix B, sample exercises 13 and 14.) **If a writer is talking about something** in general (i.e. non-unique), the indefinite article is used, no matter how many times it is referred to again. But if it is made **specific with limiting modifiers, then the definite aritcle is used**. For example, when the word curiosity in the following passage is used in a general sense, the indefinite article (0) is used; however, when curiosity is limited to a specific kind by the use of limiting modifiers, the definite article the is used. We all need 0 curiosity. 0 curiosity is important because it can stimulate us to look for new truths and learn new lessons. Unfortunately, much of education stifles 0 curiosity. **For example, the curiosity to know** how things work is often discouraged by adults who grow tired of children's constant questioning. These adults have long ago lost the curiosity they once felt as children. It sometimes takes furhter education to stimulate 0 curiosity again for such people. (See Appendix B, exercises 15-18.)

#### Vote neg—

#### 1] Limits— hundreds of types of appropriation that the aff can pick from and limitless combinations underlimits the topic and destroys neg prep since there’s no unifying DA against mining, space tourism, satellites, space col, and debris -- aff gets infinite prep and sets terms for debate so DAs and PICs are inherently reactive and its absurd to say potential neg abuse justifies the aff being flat-out non-T-- limits outweighs – reciprocal prep burden and allows for nuanced engagement

#### 2] Textuality is an independent voter—it determines which interps your ballot can endorse by providing the only salient focal point for debates

### 4

#### Interpretation – topical affirmatives defend the resolution as a general principle. To clarify, a general principle necessitates that you defend that the plan is a good idea in the abstract and don’t defend implementation and PICs don’t negate.

#### Violation – they spec

#### Negate –

#### (1) Jurisdiction – it’s NSDA rules

**NSDA 21** [2021-22 Lincoln-Douglas Ballot, https://www.speechanddebate.org/wp-content/uploads/Sample-Lincoln-Douglas-Debate-Ballot-Blank.pdf // JB]

Each **debater** has the burden to **prove** their **side** of the resolution **more valid** as a **general principle**. It is **unrealistic** to expect a debater to prove **complete validity or invalidity** of the resolution. The **better debater** is the one who, on the whole, proves their side of the resolution **more valid** as a general principle.

#### Outweighs – It’s literally on the LD ballot which means whenever a judge submits the ballot it’s what they contractually abide by – operating outside of the rules would forfeit the judge’s ability to submit a decision – that flips reasonability because rules are most predictable because they’re procedures to debating.

#### (2) Fairness – it prevents abusive PICs out of certain parts of the plan that are abusive because it steals aff ground by isolating a hyperspecific DA to the plan – solves topic education to read it as a DA and has the net benefit of critical thinking because you need to win the DA actually outweighs the plan

#### (3) Phil education – it encourages philosophical analysis and prevents messy enforcement and process debates where you just focus on the post-fiat implications – we’ll impact turn policy debate a) it’s nonunique through forums of CX and PF b) philosophical policy is better because you can find the best possible idea, not the most common c) phil education outweighs because it’s unique to LD and controls the internal link to other education through philosophical justification

### 5

#### Recent moves by NASA put Asteroid Mining solely in the hands of the private sector.

**Glester 18**, Andrew. [Andrew Glester is the host of the Physics World podcast and the Cosmic Shed podcast, which explores the way science and storytelling collide. He is also the co-ordinator of the Space Universities Network] “The Asteroid Trillionaires.” *PhysicsWorld*, 11 June 2018, <https://physicsworld.com/a/the-asteroid-trillionaires/>. [GHS-AA]

“I’ll make a prediction right now. The first trillionaire will be made in space.” So said Texas senator Ted Cruz, shortly after a bill was signed to increase NASA’s budget for 2018. To untrained ears, his claim would have sounded extraordinary. It might even have stretched credulity for those familiar with the challenges of space. But on closer inspection, Cruz was not being that revolutionary. Peter Diamandis – founder of the X Prize competition to encourage tech developments – made the same prediction back in 2008 and expanded on the theme in his 2015 book Bold. As for how those trillionaires will make their riches from space, both he and Neil DeGrasse Tyson – the US astrophysicist and TV host – reckon it will be done by mining asteroids. Progress is already under way. The first asteroid company, Planetary Resources, was founded in 2012 by Diamandis, Chris Lewicki and others in Washington. Within a year the US company Deep Space Industries was set up by Rick Tumlinson, Stephen Cover and a host of others. A handful more firms have since been established, and while some are admittedly are less serious than others, the race to the riches of space is on. Despite the existence of such firms and Cruz’s declaration, however, Donald Trump’s 2018 NASA budget cancelled the Asteroid Redirect Mission (ARM), which planned to bring an asteroid into an orbit around Earth where it could be studied and mined a lot more easily than one in the asteroid belt. A NASA spokesperson told me the ARM team is ensuring that the key knowledge from the mission so far is not lost, but NASA pulling out has left the asteroid-mining community without a valuable learning tool and places asteroid mining firmly in the realm of the private space sector. Nevertheless, the investment bank Goldman Sachs has reassured its clients about the financial benefits of investing in asteroid-mining companies. “The psychological barrier to mining asteroids is high, the actual financial and technological barriers are far lower,” it said in a report published last year. A Caltech study put the cost of an asteroid-mining mission at $2.6bn – perhaps not surprisingly the same estimated cost of NASA’s erstwhile ARM. It might sound a lot, but a rare-earth-metal mine has comparable set-up costs of up to $1bn and a football-field-sized asteroid could contain as much as $50bn of platinum.

#### Asteroid mining is key to solving water crises

Tillman 19 (Nola Taylor Tillman is a Freelance Science Writer at Redd Infinity. Graduate of Agnes Scott College.), “Tons of Water in Asteroids Could Fuel Satellites, Space Exploration”, Space, 9-29-19, <https://www.space.com/water-rich-asteroids-space-exploration-fuel.html> NT

When it comes to mining space for water, the best target may not be the moon: Entrepreneurs' richest options are likely to be asteroids that are larger and closer to Earth. **A recent study suggested that roughly 1,000 water-rich, or hydrated, asteroids near our planet are easier to reach than the lunar surface is.** While most of these space rocks are only a few feet in size, more than 25 of them should be large enough to each provide significant water. Altogether, the water locked in these asteroids should be enough to fill somewhere around 320,000 Olympics-size swimming pools — significantly more than the amount of water locked up at the lunar poles, the new research suggested. **Because asteroids are small, they have less gravity than Earth or the moon do, which makes them easier destinations to land on and lift off from**. If engineers can figure out how to mine water from these space rocks, they could produce a source of ready fuel in space that would allow spacecraft designers to build refuelable models for the next generation of satellites. Asteroid mining could also fuel human exploration, saving the expense of launching fuel from Earth. In both cases, would-be space-rock miners will need to figure out how to free the water trapped in hydrated minerals on these asteroids. "Most of the hydrated material in the near-Earth population is contained in the largest few hydrated objects," Andrew Rivkin, an asteroid researcher at Johns Hopkins University Applied Physics Research Laboratory in Maryland, told Space.com. Rivkin is the lead author on the paper, which estimated that near Earth asteroids could contain more easily accessible water than the lunar poles. "A sure thing" According to the United Nations Office for Outer Space Affairs, more than 5,200 of the objects launched into space are still in orbit today. While some continue to function, the bulk of them buzz uselessly over our heads every day. They carry fuel on board, and when they run out, they are either lowered into destructive orbits or left to become space junk, useless debris with the potential to cause enormous problems for working satellites. Refueling satellites in space could change that model, replacing it with long-lived, productive orbiters. "It's easier to bring fuel from asteroids to geosynchronous orbit than from the surface of the Earth," Rivkin said. "If such a supply line could be established, it could make asteroid mining very profitable." Hunting for space water from the surface of the Earth is challenging because the planet's atmosphere blocks the wavelength of light where water can be observed. The asteroid warming as it draws closer to the sun can also complicate measurements. Instead, Rivkin and his colleagues turned to a class of space rocks called Ch asteroids. Although these asteroids don't directly exhibit a watery fingerprint, they carry the telltale signal of oxidized iron seen only on asteroids with signatures of water-rich minerals, which means the authors felt confident assuming that all Ch asteroids carry this rocky water. Based on meteorite falls, a previous study estimated that Ch asteroids could make up nearly 10% of the near-Earth objects (NEOs). With this information, the researchers determined that there are between 26 and 80 such objects that are hydrated and larger than 0.62 miles (1 km) across. Right now, only three NEOs have been classified as Ch asteroids, although others have been spotted in the asteroid belt. Most NEOs are discovered and observed at wavelengths too short to reveal the iron band that marks the class. Carbon-rich asteroids, which include Ch asteroids and other flavors, are also darker than the more common stony asteroids, making them more challenging to observe. Although **Ch asteroids definitely contain water-rich minerals**, that doesn’t necessarily mean that they will always be the best bet for space mining. It comes down to risk. Would an asteroid-mining company rather visit a smaller asteroid that definitely has a moderate amount of water, or a larger one that could yield a larger payday but could also come up dry? "Whether getting sure things with no false positives, like the Ch asteroids, is more important or if a greater range of possibilities is acceptable with the understanding that some asteroids will be duds is something the miners will have to decide," Rivkin said.

#### Water Wars cause Indo-Pak War which goes Nuclear

Klare 20 — Five College professor emeritus of peace and world security studies, and director of the Five College Program in Peace and World Security Studies (PAWSS), holds a B.A. and M.A. from Columbia University and a Ph.D. from the Graduate School of the Union Institute. (Michael; Published: 2020; "Climate Change, Water Scarcity, and the Potential for Interstate Conflict in South Asia"; Journal of Strategic Security 13, No. 4, Pages 109-122; https://doi.org/10.5038/1944-0472.13.4.1826 Available at: https://scholarcommons.usf.edu/jss/vol13/iss4/8)//CYang

Interstate conflict over water might occur, the ICA indicated, when several states rely on a shared river system for much of their water supply and one or more of the riparian states sought to maximize the river’s flow for their own benefit at the expense of other states in the basin, amplifying any scarcities already present there. “We judge that as water shortages become more acute beyond the next ten years, water in shared basins will increasingly be used as leverage,” the ICA stated. An upstream state enjoying superior control over a river’s flow might exploit its advantage, say, to extract advantage in international negotiations or to attract international aid for infrastructure projects. As the ICA further noted, “…we assess that states will also use their inherent ability to construct and support major water projects to obtain regional influence or preserve their water interests.”16

The utilization of a state’s superior position in a shared river system to extract political or economic advantage can prove especially destabilizing, the ICA suggested, when weaker states in the system (typically the downstream countries) are especially vulnerable to water scarcity because of long-standing social, economic, and political conditions. Without identifying any particular states by name, the study suggested that this could occur when downstream states suffer from endemic corruption, poor water management practices, and systemic favoritism when it comes to the allocation of scarce water supplies. In such cases, any reduction in the flow of water by an upstream country could easily combine with internal factors in a downstream country to provoke widespread unrest and conflict. “Water shortages, and government failures to manage them, are likely to lead to social disruptions, pressure on national and local leaders, and potentially political instability,” the report noted.17

Although most discussion of the climate and water security nexus has continued to emphasize the risk of internal conflict arising from warming-related water scarcities, some analysts have pursued the line of inquiry introduced by the 2012 ICA, focusing on interstate tensions arising within shared river basins. This was a prominent theme, for example, of a 2013 study conducted by the National Research Council (NRC) on behalf of the IC. Entitled Climate and Social Stress: Implications for Security Analysis, the 2013 NRC report sought to better identify the links between global warming, pre-existing social vulnerabilities, and the likelihood of conflict. While it echoed earlier studies by the CNA and NIC in identifying internal factors like poverty, ethnic discord, and governmental ineptitude as likely pre-conditions for climate-related conflict, it also examined dangers arising from dependence on shared river systems, especially in cases where cooperation among the riparian powers in managing the system is limited and global warming is expected to reduce future water flows.18

For the NRC, the river systems of greatest concern in this respect were those that originate in the Himalayan Mountains and depend, for a significant share of the annual flow, on meltwater from the Himalayan glaciers. These glaciers are an important source of meltwater for many of Asia’s major rivers, including the Indus, Ganges, Brahmaputra, and

Mekong Rivers. These rivers originate in China but travel through India, Pakistan, Nepal, Bangladesh, Laos, Cambodia, Thailand, and Vietnam—countries with a combined population of over 3.4 billion people, or approximately 44 percent of the world’s total population.19 A large share of the population in these countries depends on agriculture for its livelihood, so ensuring access to adequate supplies of water is a prime local and national priority. During the monsoon season, heavy rains provide these rivers with abundant water, but during dry seasons they are dependent on glacial meltwater—and, with the rise in global temperatures, the Himalayan glaciers are melting, jeopardizing future water availability in these river basins. Given a history of ethnic and social discord within many of these countries and long-standing tensions among them, analysts fear that such shortages could aggravate both internal and external tensions and ignite interstate as well as intrastate conflict.20

As was the case of previous IC-initiated studies, the authors of the 2013 NRC report were reluctant to identify specific countries in their findings, referring again to “countries of security concern” or other such euphemisms. However, they did select one of these countries in particular: Pakistan. They chose that country for special analysis, the report indicated, because “Pakistan presents a clear example of a country where social dynamics and susceptibility to harm from climate events combine to create a potentially unstable situation.”21 Pakistan was said to suffer from multiple risk factors: Its economy is largely dependent on agriculture; much of the water used for irrigation purposes comes from just one source, the Indus River; control over the allocation of irrigation waters is often exercised by privileged elites, leaving millions of Pakistanis vulnerable to water shortages; and much of the water flowing into the Indus comes from China or from tributaries originating in India, leaving Pakistan in an unfavorable (downstream) position in the system. These conditions have led, in the past, to internal squabbles over water rights and to tensions with India over control of the Indus; now, with the likelihood of diminished meltwater from the Himalayan glaciers, the risk of water scarcity triggering violent conflict of one sort or another becomes that much greater.22

Pakistan, the Indus, and U.S. Security

There is no doubt that Pakistan is considered by U.S. security analysts as a “state important to U.S. national security interests,” the term used by the Defense Intelligence Agency to describe countries of concern in the 2012 ICA on water. Not only is Pakistan a critical—if not always wholehearted—partner in the global war on terror, but it also possesses a substantial arsenal of nuclear weapons whose security is a matter of enormous concern to American leaders.23 Should those munitions wind up with rogue elements of the Pakistani military (some of whose members are believed to maintain clandestine links to radical Islamic organizations), or even worse, should Pakistan descend into civil war and the weapons fall into untrustworthy or hostile hands, the safety of India and other US allies—as well as of American forces deployed in the region—would be at grave risk.24 Ensuring Pakistan’s stability therefore, has long been a major U.S. security objective, prompting regular deliveries of American arms and other military aid. Yet, despite billions of dollars in American aid, Pakistan remains vulnerable to social and ethnic internal strife.25

As noted, farming is the principal economic activity in Pakistan, and ensuring access to water is an overarching public and government concern. This means, above all, managing the use of the Indus—the country’s main source of water for irrigation and its major source of power for electricity generation. Pakistan’s rising population and growing cities, with their rings of factories, are placing an immense strain on the Indus, leading to competition between farmers, industrialists, and urban consumers. With water and power shortages becoming an increasingly frequent aspect of daily life, public protests—sometimes turning violent—have erupted across the country. In one particularly intense bout of rioting, following a prolonged power outage in June 2012, protestors burned trains, blocked roads, looted shops, and damaged banks and gas stations.26

However bad things might be in Pakistan today, climate change is likely to make conditions far worse in the years ahead. Prolonged droughts, climate scientists believe, will occur with increasing regularity, posing a severe threat to the nation’s agricultural sector and further reducing the supply of hydroelectric power. At the same time, warming is expected to increase the intensity of monsoon downpours, resulting in massive flooding (as occurred in 2010) and the loss of valuable topsoil, further adding to Pakistan’s woes. As the Himalayan glaciers melt, moreover, water flow through the Indus will diminish.27 With the competition for land and water resources bound to increase and with Pakistan already divided along ethnic and religious lines, widespread civil strife will become ever more likely, possibly jeopardizing the survival of the state.

It is impossible to predict exactly how the United States might respond to a systemic breakdown of state governance in Pakistan. One thing is clear, however: At the earliest sign that the country’s nuclear weapons are at risk of falling into the hands of hostile parties, the American military would respond with decisive force. In fact, research conducted by the nonpartisan Nuclear Threat Initiative (NTI) has revealed that the Joint Special Operations Command (JSOC) and specialized Army units have been training for such contingencies for some time and have deployed all the necessary gear to the region. In the event of a coup or crisis, the NTI revealed, “U.S. forces would rush into the country, crossing borders, rappelling down from helicopters, and parachuting out of airplanes, so they can secure known or suspected nuclear-storage sites.” Recognizing that any such actions by American forces could trigger widespread resistance by the Pakistani army and/or various jihadist groups, the U.S. Central Command, which has authority over all American forces in the region, has developed plans for backing up JSOC personnel with full-scale military support.28

Another scenario that has some analysts worried is the possibility that a time of sharply reduced water flow through the Indus will coincide with efforts by India to exploit its advantageous position as the upper riparian on three key tributaries of the Indus—the Ravi, the Beas, and the Sutlej—to divert water for its own use, thereby depriving downstream Pakistan of vital supplies and provoking a war between these two countries. India was granted control over the three tributaries under the Indus Water Treaty of 1960, and various Indian leaders have threatened at times to dam the rivers or otherwise reduce their flow into Pakistan as a reprisal for Pakistani attacks on Indian bases in the disputed territory of Kashmir (through which the tributaries flow); this, in turn, has provoked counter-threats from Pakistani leaders.29 What analysts fear most, in such a situation, is that India, possessing superior conventional forces, would overpower Pakistan’s equivalent armies, leading Pakistan’s leaders to order the use of nuclear weapons against India, igniting a regional nuclear war. Such a conflict, scientists have calculated, would result in 50 to 125 million fatalities, and produce a dust cloud covering much of the Earth, decimating global agriculture—an outcome with enormous implications for American national security.30

### 6

#### No RVIs:

#### a) Prep Skew - debaters running abusive positions will always be prepared for theory because they know coming into the round what they’ll need to defend. Allowing debaters to run RVIs and go all-in for theory solidifies the advantage of the one committing the abuse. Prep skew harms fairness – if one debater has more prep, then the round is structurally favors one debater

#### b) Denies the antecedent - you shouldn’t win because you’re fair – logic comes first – all arguments in debate must be logical to have weight

#### c) Norming – RVIs disincentivize the checking of abuse because we are deterred from reading theory if we know that we will lose on theory 75% of the time against someone who’s better at it – norming outweighs otherwise debate will die out because of abuse prolif

#### d) Substantive education – RVIs incentivize debaters going all-in on theory and ignoring substance – this directly decreases topic-specific education which outweighs because the topic only lasts two months and is the only portable knowledge we’ll gain from debate

#### e) [1AR counterinterp specific] – No RVIs for 2N counterinterps – devasting 4-6 time skew means that the aff will be behind on every theory debate – no RVIs means that we get to check 1N abuse while not having to be afraid of losing on theory and no 1AR I-meets they can spam untrue I meets and make 2nr impossible

## Case

### Disclosure:

#### extemp

### 1NC -- No !

#### 1. No Kessler effect.

von Fange 17 [Daniel Von Fange‏, Distributed systems engineer, “Kessler Syndrome is Over Hyped” May 21st 2017, <http://braino.org/essays/kessler_syndrome_is_over_hyped/>] [modified for readability]

The orbital area around earth can be broken down into four regions. Low LEO - Up to about 400km. Things that orbit here burn up in the earth’s atmosphere quickly - between a few months to two years. The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, Low LEO doesn’t matter for Kessler Syndrome. If Low LEO was ever full of space junk, we’d just wait a year and a half, and the problem would be over. High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue. Mid Orbit - GPS satellites and other navigation satellites travel here in lonely, long lives. The volume of space is so huge, and the number of satellites so few, that we don’t need to worry about Kessler here. GEO - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. Usually the geostationary orbit is used by big weather satellites and big TV broadcasting satellites. (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, all the satellites here are moving the same direction at the same speed - debris doesn’t get free velocity from the speed of the satellites. Also, it’s quite expensive to get a satellite here, and so there aren’t many, only about one satellite per [one thousand kilometers] of the ring. Kessler is not a problem here. How bad could Kessler Syndrome in High LEO be? Let’s imagine a worst case scenario. An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space? I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than [one in ten thousand]. So even in the worst case, we don’t lose access to space. Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits. In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment. Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely. Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner. Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided. The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler. Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting) So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect. I’m removing Kessler Syndrome from my list of things to worry about.

#### 2. No debris collision

Albrecht 16 [Mark Albrecht is chairman of the board of USSpace LLC. He was head of the White House National Space Council from 1989 to 1992. Paul Graziani is CEO and founder of Analytical Graphics, an Exton, Pennsylvania, company that develops software and provides mission assurance through the Commercial Space Operations Center (ComSpOC), “Op-ed | Congested space is a serious problem solved by hard work, not hysteria”, SpaceNews, May 9th 2016, <https://spacenews.com/op-ed-congested-space-is-a-serious-problem-solved-by-hard-work-not-hysteria/>] [modified for readability]

Popular culture has embraced the risks of collisions in space in films like Gravity. Some participants have dramatized the issue by producing graphics of Earth and its satellites, which make our planet look like a fuzzy marble, almost obscured by a dense cloud of white pellets meant to conceptualize space congestion. Unfortunately, for the sake of a good visual, satellites are depicted as if they were hundreds of miles wide, like the state of Pennsylvania (for the record, there are no space objects the size of Pennsylvania in orbit). Unfortunately, this is the rule, not the exception, and almost all of these articles, movies, graphics, and simulations are exaggerated and misleading. Space debris and collision risk is real, but it certainly is not a crisis. So what are the facts? On the positive side, space is empty and it is vast. At the altitude of the International Space Station, one half a degree of Earth longitude is almost 40 miles long. That same one half a degree at geostationary orbit, some 22,000 miles up is over 230 miles long. Generally, we don’t intentionally put satellites closer together than one-half degree. That means at geostationary orbit, they are no closer than 11 times as far as the eye can see on flat ground or on the sea: That’s the horizon over the horizon 10 times over. In addition, other than minute forces like solar winds and sparse bits of atmosphere that still exist 500 miles up, nothing gets in the way of orbiting objects and they behave quite predictably. The location of the smallest spacecraft can be predicated within a 1,000 feet, 24 hours in advance. Since we first started placing objects into space there have been [eleven] known low Earth orbit collisions, and three known collisions at geostationary orbit. Think of it: 135 space shuttle flights, all of the Apollo, Gemini and Mercury flights, hundreds of telecommunications satellites, [thirteen hundred] functioning satellites on orbit today, half a million total objects in space larger than a marble, and fewer than 15 known collisions. Why do people worry?

#### 3. Debris growth down

Wall 19 [Mike Wall, Ph.D, Space.com Senior Space Writer, “Space Junk Menace: New Guidelines Urged to Help Fight Orbital Debris Threat”, Space.com, Oct 15th 2019, https://www.space.com/space-junk-threat-satellites-guidelines-reduce-orbital-debris.html]

But we can stave off the Kessler syndrome — or at least minimize the odds that it happens anytime soon — if spacecraft builders and operators follow a few simple rules, according to the Space Safety Coalition (SSC). The SSC, a newly established group of space-industry stakeholders, laid out those proposed voluntary guidelines last month in a document called "Best Practices for the Sustainability of Space Operations." There are space-junk mitigation guidelines on the books already, which were drawn up by the Inter-Agency Space Debris Coordination Committee and the United Nations Committee on the Peaceful Uses of Outer Space. But those guidelines were last revised in 2007, the SSC noted. "Plans to increase our space population with more cubesats and other small satellites, as well as new, large constellations of satellites, were not envisioned when the above-mentioned guidelines and standards were established," the new "best practices" document states. "These new planned spacecraft and constellations, coupled with improvements in space situational awareness, space operations and spacecraft design, all provide an opportunity to expand upon established space operations and orbital debris mitigation guidelines and best practices." One of the key new recommendations is that all spacecraft that operate at an altitude above 250 miles (400 kilometers) should feature a propulsion system that allows them to maneuver their way out of potential collisions. That's a natural dividing line, Scott said; the International Space Station circles at about that altitude, and nobody wants out-of-control satellites falling back to Earth through the orbiting lab's path. Also, below 250 miles, there's enough atmosphere to create significant drag on spacecraft, causing them to deorbit relatively quickly when their operational lives are over. (The space community could designate the below-250-mile region an "experimental zone," Scott wrote in a recent blog post. Such a move would keep space "affordable for operators of the growing number of inexpensive, experimental or educational cubesats," he wrote.) The SSC also recommends that satellite designers consider building encryption into their command and control systems, so that spacecraft cannot be hijacked by hackers intent on causing havoc in orbit. And the best practices include anti-littering guidelines. For example, the handlers of satellites that operate in low-Earth orbit should include in their launch contracts a requirement that rocket upper stages be disposed of promptly, via a controlled reentry into Earth's atmosphere. As of today (Oct. 15), 31 space-industry stakeholders have endorsed the new guidelines. And there are some big names in that group, including Maxar (the parent company of satellite operator DigitalGlobe and the spacecraft manufacturer SSL, among other subsidiaries), OneWeb, Rocket Lab, Iridium, SES and Intelsat. "You don't want to wait for a disaster before you take action," Scott said. "It really is time, and you're seeing operators like Maxar and OneWeb being proactive."

#### 4. Double-Bind --- either (a) SSA is sufficient now

Koplow 18 [David A. Koplow, Professor of Law, Georgetown University Law Center, “The Fault Is Not in Our Stars: Avoiding an Arms Race in Outer Space”, Harvard International Law Journal, Volume 59, Number 2, Summer 2018, https://harvardilj.org/wp-content/uploads/sites/15/HLI205\_crop-1.pdf]

The United States has long maintained the world’s best capability for monitoring space, and it is continuously improving the network—at a cost of approximately $1 billion per year. The current upgrade effort, designated as erecting an enhanced “space fence,” is intended to observe even quite small, obscure, and remote space traffic—reportedly, it will enhance the current observational power by ten times. The U.S. sensor grid is unusually farflung; it receives (or will soon receive) input from facilities in Australia, the Marshall Islands, the Indian Ocean, and elsewhere.160 The current system is generally capable of detecting objects larger than ten centimeters in diameter, depending upon the item’s altitude and reflectivity.161 In 2016, the United States lofted two new sensors into the geosynchronous orbit, in order to provide more proximate and detailed watchfulness over that precious zone.162 The U.S. SSA network has identified an inventory of some 23,000 space objects and has catalogued over 17,000 of them.163 But many orbital items are so small as to remain essentially invisible; experts estimate that there are some 500,000 additional uncontrolled objects in space between one and ten centimeters in diameter and untold scores of millions smaller than that (but still capable of inflicting serious harm on a satellite in a collision).164

#### OR --- (b) you can’t solve --- debris too small

Letizia 15 [Francesca Letizia et al, PhD Candidate, Astronautics Research Group, “Collision probability due to space debris clouds through a continuum approach”, Submitted to Journal of Guidance, Control and Dynamics on April 1st 2015, Accepted on July 29th 2015, <https://pdfs.semanticscholar.org/0618/c727d453a75f8d5efbe23c777a6055fffd6a.pdf>] [modified for readability]

Past space missions left millions of non-operative objects in orbit and also current missions, despite mitigation measures, continue to increase the number of debris objects because, quoting Chobotov [1], `space debris is a self-perpetuating issue as any new space mission generates new objects'. Currently, the focus is mostly on the largest objects of the debris population, which are the 22 000 objects larger than 10 cm that are constantly tracked from the Earth to avoid collisions with operational spacecraft [2, 3]. Objects smaller than [ten centimeters] cannot be tracked with current radar technologies and, as a result, the contribution of small fragments to the collision probability is often neglected. Objects larger than 10 cm have also been the main scope for the evolutionary studies on the space debris population, which analyze the long term response to the variation of some parameters such as launch frequency, percentage of compliance with regulations, and implementation of active removal missions. However, White and Lewis [4] showed that the eect of remediation measures is not the same for the population of objects larger than 10 cm compared to the population between 5 and 10 cm. The latter may still increase even when the former is expected to decrease. In other words, focusing only on the large fragments may lead to an underestimation of the collision risk. In fact, also small fragments can pose a relevant hazard to spacecraft. In particular, objects larger than 1 mm are yet able to interfere with operational spacecraft causing anomalies and objects larger than 1 cm can even destroy a satellite in case of collision [5]. Recently, McKnight et al. [6] highlighted how the so-called lethal non-trackable objects may become the leading factor in the decrease of ight safety.

#### 5. No satellite collisions --- distance and orbit mechanics

O’Callaghan 14 [Jonathan O'Callaghan, space journalist with more than a decade of experience, having worked for a number of media organisations around the world., “Why don’t objects collide often in Earth orbit?”, Space Answers, Feb 20th 2014, https://www.spaceanswers.com/space-exploration/why-dont-objects-collide-often-in-earth-orbit/]

The distance between things in orbit is vast, and Earth orbit is a huge place. Put simply, the chances of any two things colliding is very, very slim despite there being thousands of active satellites in orbit and many more pieces of smaller space debris because there is just so much space between everything. However, another reason is that most of our manmade satellites travel in similar orbital bands at similar speeds within those bands. This means they’re moving in the same direction at specific heights, sort of like an imaginary conveyor belt moving around Earth. There’s not really much chance of one satellite catching up to another and, even then, the chances of a collision are low. The only major risk to something like the ISS, which is 420 kilometres (260 miles) high in Low Earth Orbit (LEO), would be if someone decided to launch a satellite into orbit in the opposite direction to the space station at the same height, which isn’t really possible thanks to orbital mechanics; most things (aside from satellites in polar orbits) move the same way Earth rotates to get an added speed boost at launch.

#### 6. It’s long term---intervening actors solve

Lewis 15 [Hugh Lewis Senior Lecturer in Aerospace Engineering, “Space debris, Kessler Syndrome, and the unreasonable expectation of certainty”, Room, Issue #3(5) 2015, <https://room.eu.com/article/Space_debris_Kessler_Syndrome_and_the_unreasonable_expectation_of_certainty>] [modified for readability]

There is now widespread awareness of the space debris problem amongst policymakers, scientists, engineers and the public. Thanks to pivotal work by J.C. Liou and Nicholas Johnson in 2006 we now understand that the continued growth of the debris population is likely in the future even if all launch activity is halted. The reason for this sustained growth, and for the concern of many satellite operators who are forced to act to protect their assets, are collisions that are expected to occur between objects – satellites and rocket stages – already in orbit. In spite of several commentators warning that these collisions are just the start of a collision cascade that will render access to low Earth orbit all but impossible – a process commonly referred to as the ‘Kessler Syndrome’ after the debris scientist Donald Kessler – the reality is not likely to be on the scale of these predictions or the events depicted in the film Gravity. Indeed, results presented by the Inter-Agency Space Debris Coordination Committee (IADC) at the Sixth European Conference on Space Debris show an expected increase in the debris population of only [thirty percent] after [two hundred] years with continued launch activity. Collisions are still predicted to occur, but this is far from the catastrophic scenario feared by some. Constraining the population increase to a modest level can be achieved, the IADC suggested, through widespread and good compliance with existing space debris mitigation guidelines, especially those relating to passivation (whereby all sources of stored energy on a satellite are depleted at the end of its mission) and post-mission disposal, such as de-orbiting the satellite or re-orbiting it to a graveyard orbit. Nevertheless, the anticipated growth of the debris population in spite of these robust efforts merits the investigation of additional measures to address the debris threat, according to the IADC.

### 1NC -- No ! -- Kessler Effect

**Probability – 0.1% chance of a collision.**

**Salter 16** [(Alexander William, Economics Professor at Texas Tech) “SPACE DEBRIS: A LAW AND ECONOMICS ANALYSIS OF THE ORBITAL COMMONS” 19 STAN. TECH. L. REV. 221 \*numbers replaced with English words] TDI

The probability of a collision is currently low. Bradley and Wein estimate that the maximum probability in LEO of a collision over the lifetime of a spacecraft remains below one in one thousand, conditional on continued compliance with NASA’s deorbiting guidelines.3 However, the possibility of a future “snowballing” effect, whereby debris collides with other objects, further congesting orbit space, remains a significant concern.4 Levin and Carroll estimate the average immediate destruction of wealth created by a collision to be approximately $30 million, with an additional $200 million in damages to all currently existing space assets from the debris created by the initial collision.5 The expected value of destroyed wealth because of collisions, currently small because of the low probability of a collision, can quickly become significant if future collisions result in runaway debris growth.

**Time frame – Kessler effect 200 years away**

**Stubbe 17** [(Peter, PhD in law @ Johann Wolfgang Goethe University Frankfurt) “State Accountability for Space Debris: A Legal Study of Responsibility for Polluting the Space Environment and Liability for Damage Caused by Space Debris,” Koninklijke Brill Publishing, ISBN 978-90-04-31407-8, p. 27-31] TDI

The prediction of possible scenarios of the future evolution of the debris p o p ulation involves many uncertainties. Long-term forecasting means the prediction of the evolution of the future debris environment in time periods of decades or even centuries. Predictions are based on models84 that work with certain assumptions, and altering these parameters significantly influences the outcomes of the predictions. Assumptions on the future space traffic and on the initial object environment are particularly critical to the results of modeling efforts.85 A well-known pattern for the evolution of the debris population is the so-called Kessler effect’, which assumes that there is a certain collision probability among space objects because many satellites operate in similar orbital regions. These collisions create fragments, and thus additional objects in the respective orbits, which in turn enhances the risk of further collisions. Consequently, the num ber of objects and collisions increases exponentially and eventually results in the formation of a self-sustaining debris belt aroundthe Earth. While it has long been assumed that such a process of collisional cascading is likely to occur only in a very long-term perspective (meaning a time 1 n of several hundred years),87 a consensus has evolved in recent years that an uncontrolled growth of the debris population in certain altitudes could become reality much sooner.88 In fact, a recent cooperative study undertaken by various space agencies in the scope of i a d c shows that the current l e o debris population is unstable, even if current mitigation measures are applied. The study concludes:

Even with a 90% implementation of the commonly-adopted mitigation measures [...] the l e o debris population is expected to increase by an average of 30% in the next 200 years. The population growth is primarily driven by catastrophic collisions between 700 and 1000 km altitudes and such collisions are likely to occur every 5 to 9 years.89

#### Solar flares will end satellites inevitably – no defense

Wild 15 (Jim Wild, Professor of Space Physics at Lancaster University, “With So Much Vested In Satellites, Solar Storms Could Bring Life To A Standstill,” July 30, 2015, https://theconversation.com/with-so-much-vested-in-satellites-solar-storms-could-bring-life-to-a-standstill-45204)

These can disrupt satellite operations by depositing electrical charge within the on-board electronics, triggering phantom commands or overloading and damaging sensitive components. The effects of space weather on the Earth’s upper atmosphere disrupts radio signals transmitted by navigation satellites, potentially introducing positioning errors or, in more severe cases, rendering them unusable.

These are not theoretical hazards: in recent decades, solar storms have caused outages for a number of satellites services – and a handful of satellites have been lost altogether. These were costly events – satellite operator losses have run into hundreds of millions of dollars. The wider social and economic impact was relatively limited, but even so it’s unclear how our growing amount of space infrastructure would fare against the more extreme space weather that we might face.

When Space Weather Becomes A Hurricane

The largest solar storm on record was the Carrington event in September 1859, named after the British astronomer who observed it. Of course there were no Victorian satellites to suffer the consequences, but the telegraph systems of the time were crippled as electrical currents induced in the copper wires interfered with signals, electrocuted operators and set telegraph paper alight. The geomagnetic storm it triggered was so intense that the northern lights, usually a polar phenomenon, were observed as far south as the Bahamas.

Statistical analysis of this and other severe solar storms suggests that we can expect an event of this magnitude once every few hundred years – it’s a question of “when” rather than “if”. A 2007 study estimated a Carrington event today would cause US$30 billion in losses for satellite operators and threaten vital infrastructure in space and here on the ground. It’s a risk taken sufficiently seriously that it appears on the UK National Risk Register and has led the government to draw up its preparedness programme.

### 1NC -- Alt Causes

#### Alt cause – broad space privatization and existing debris.

Muelhapt et al 19 [(Theodore J., Center for Orbital and Reentry Debris Studies, Center for Space Policy and Strategy, The Aerospace Corporation, 30 year Space Systems Analyst and Operator, Marlon E. Sorge, Jamie Morin, Robert S. Wilson), “Space traffic management in the new space era,” Journal of Space Safety Engineering, 6/18/19, <https://doi.org/10.1016/j.jsse.2019.05.007>] TDI

The last decade has seen rapid growth and change in the space industry, and an explosion of commercial and private activity. Terms like NewSpace or democratized space are often used to describe this global trend to develop faster and cheaper access to space, distinct from more traditional government-driven activities focused on security, political, or scientific activities. The easier access to space has opened participation to many more participants than was historically possible. This new activity could profoundly worsen the space debris environment, particularly in low Earth orbit (LEO), but there are also signs of progress and the outlook is encouraging. Many NewSpace operators are actively working to mitigate their impact. Nevertheless, NewSpace represents a significant break with past experience and business as usual will not work in this changed environment. New standards, space policy, and licensing approaches are powerful levers that can shape the future of operations and the debris environment.

2. Characterizing NewSpace: a step change in the space environment

In just the last few years, commercial companies have proposed, funded, and in a few cases begun deployment of very large constellations of small to medium-sized satellites. These constellations will add much more complexity to space operations. Table 1 shows some of the constellations that have been announced for launch in the next decade. Two dozen companies, when taken together, have proposed placing well over ~~20,000~~ [twenty thousand] satellites in orbit in the next ~~10~~ [10]years. For perspective, fewer than ~~8100~~[eight thousand one hundred] payloads have been placed in Earth orbit in the entire history of the space age, only 4800 [1] remain in orbit and approximately 1950 [2] of those are still active. And it isn't simply numbers – the mass in orbit will increase substantially, and long-term debris generation is strongly correlated with mass.

[Table 1 Omitted]

This table is in constant flux. It is based largely on U.S. filings with the Federal Communications Commission (FCC) and various press releases, but many of the companies here have already altered or abandoned their original plans, and new systems are no doubt in work. Although many of these large constellations may never be launched as listed, the traffic created if just half are successful would be more than double the number of payloads launched in the last 60 years and more than 6 times the number of currently active satellites.

Current space safety, space surveillance, collision avoidance (COLA) and debris mitigation processes have been designed for and have evolved with the current population profile, launch rates and density of LEO space.

By almost any metric used to measure activity in space, whether it is payloads in orbit, the size of constellations, the rate of launches, the economic stakes, the potential for debris creation, the number of conjunctions, NewSpace represents a fundamental change.

3. Compounding effects of better SSA, more satellites, and new operational concepts

The changes in the space environment can be seen on this figurative map of low Earth orbit. Fig. 1 shows the LEO environment as a function of altitude. The number of objects found in each 10 km “bin” is plotted on the horizontal axis, while the altitude is plotted vertically. Objects in elliptical orbits are distributed between bins as partial objects proportional to the time spent in each bin. Some notable resident systems are indicated in blue text on the right to provide an altitude reference. The (dotted) red line shows the number of objects in the current catalog tracked by the U.S. Space Surveillance Network (SSN). All the COLA alerts and actions that must be taken by the residents are due to their neighbors in the nearby bins, so the currently visible risk is proportional to the red line.



The red line of the current catalog does not represent the complete risk; it indicates the risk we can track and perhaps avoid. A rule of thumb is that the current SSN LEO catalog contains objects about 10 cm or larger. It is generally accepted that an impact in LEO with an object 1 cm or larger will cause damage likely to be fatal to a satellite's mission. Therefore, there is a large latent risk from unobserved debris. While we cannot currently track and catalog much smaller than 10 cm, experiments have been performed to detect and sample much smaller objects and statistically model the population at this size [3]. The (solid) blue line represents the model of the 1 cm and larger debris that is likely mission-ending, usually called lethal but not trackable. If LEO operators avoid collisions with all the objects in the red line, they are nonetheless inherently accepting the risk from the blue line. This risk is already present.

The (dashed) orange line is an estimate of the population at 5 cm and larger and is thus an estimate of what the catalog might conservatively be a few years after the Space Fence, a new radar system being built by the Air Force, comes on line (currently planned for 2019) [4]. Commercial companies offering space surveillance services, such as LeoLabs, ExoAnalytics, Analytic Graphics Inc., Lockheed, and Boeing, might also add to the number of objects currently tracked. Space Policy Directive 3 (SPD-3) [13] specifically seeks to expand the use of commercial SSA services.

Existing operators can expect a sharp increase in the number of warnings and alerts they will receive because of the increase in the cataloged population. Almost all the increase will come from newly detected debris [5].

The pace of safety operations for each satellite on orbit will significantly change because of the increase in the catalog from the Space Fence. This effect is compounded because the NewSpace constellations described in Table 1 will drastically change the profile of satellites in LEO. The green bars in Fig. 1 represent the number of objects that will be added to the catalog (red or orange lines) from only the NewSpace large LEO constellations at their operational altitudes. This does not include the rocket stages that launch them, or satellites in the process of being phased into or removed from the operational orbits. Neighbors of one of these new constellations may face a radically different operations environment than their current practices were designed to address.

Satellites in these large LEO constellations typically have planned operational lifetimes of 5–10 years. Some companies have proposed to dispose of their satellites using low thrust electric propulsion systems, which would spiral satellites down over a period of months or years from operating altitudes as high as 1500 km through lower orbits where the Hubble Space Telescope, the International Space Station, and other critical LEO satellites operate [6]. Similar propulsive techniques would raise replacement satellites from lower launch injection orbits to higher operational orbits. These disposal and replenishment activities will add thousands of satellites each year transiting through lower altitudes and posing a risk to all resident satellites in those lower orbits. More importantly, failures will occur both among transiting satellites and operational constellations, potentially leaving hundreds more stranded along the transit path.

#### Public sector mining thumps

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

NASA Invests in Tech Concepts Aimed at Exploring Lunar Craters, Mining Asteroids

Robotically surveying lunar craters in record time and mining resources in space could help NASA establish a sustained human presence at the Moon – part of the agency’s broader [Moon to Mars exploration](https://www.nasa.gov/specials/moon2mars/) approach. Two mission concepts to explore these capabilities have been selected as the first-ever Phase III studies within the [NASA Innovative Advanced Concepts](https://www.nasa.gov/niac) (NIAC) program.

“We are pursuing new technologies across our development portfolio that could help make deep space exploration more Earth-independent by utilizing resources on the Moon and beyond,” said Jim Reuter, associate administrator of NASA’s Space Technology Mission Directorate. “These NIAC Phase III selections are a component of that forward-looking research and we hope new insights will help us achieve more firsts in space.”

The Phase III proposals outline an aerospace architecture, including a mission concept, that is innovative and could change what’s possible in space. Each selection will receive as much as $2 million. Over the course of two years, researchers will refine the concept design and explore aspects of implementing the new technology. The inaugural Phase III selections are:

Robotic Technologies Enabling the Exploration of Lunar Pits

William Whittaker, Carnegie Mellon University, Pittsburgh

This mission concept, called Skylight, proposes technologies to rapidly survey and model lunar craters. This mission would use high-resolution images to create 3D model of craters. The data would be used to determine whether a crater can be explored by human or robotic missions. The information could also be used to characterize ice on the Moon, a crucial capability for the sustained surface operations of NASA’s Artemis program. On Earth, the technology could be used to autonomously monitor mines and quarries.

[Mini Bee Prototype to Demonstrate the Apis Mission Architecture and Optical Mining Technology](https://www.nasa.gov/directorates/spacetech/niac/2019_Phase_I_Phase_II/Mini_Bee_Prototype)

Joel Sercel, TransAstra Corporation, Lake View Terrace, California

This flight demonstration mission concept proposes a method of asteroid resource harvesting called optical mining. Optical mining is an approach for excavating an asteroid and extracting water and other volatiles into an inflatable bag. Called Mini Bee, the mission concept aims to prove optical mining, in conjunction with other innovative spacecraft systems, can be used to obtain propellant in space. The proposed architecture includes resource prospecting, extraction and delivery.

### 1NC -- No ! -- Space War

#### No space escalation---empirics, de facto norms, and unpredictable consequences

Pavur 19 [James, DPhil Researcher Cybersecurity Centre for Doctoral Training Oxford University, Ivan Martinovic, Professor of Computer Science Department of Computer Science “The Cyber-ASAT: On the Impact of Cyber Weapons in Outer Space” https://ccdcoe.org/uploads/2019/06/Art\_12\_The-Cyber-ASAT.pdf]

3. STABILITY IN SPACE

Given the uncomfortable combination of high dependency and low survivability, one might expect to observe frequent attacks against critical military assets in orbit. However, despite decades of recurring prophesies of impending space war, no such conflict has broken out [14]–[18]. It is true that a handful of space security crises have occurred; most notably, the 2007 Chinese anti-satellite weapon (ASAT) test and the 2008 US ASAT demonstration in response [19]. Moreover, a recent Centre for Strategic and International Studies report suggests increasing interest in attacking US space assets, particularly among the Chinese, Russian, North Korean and Iranian militaries [20]. Overall, however, the space domain has remained puzzlingly peaceful. In this section, we outline three major contributors to this enduring stability: limited accessibility, attributable norms, and environmental interdependence.

A. Limited Accessibility

Space is difficult. Over 60 years have passed since the first Sputnik launch and only nine countries (ten including the EU) have orbital launch capabilities. Moreover, a launch programme alone does not guarantee the resources and precision required to operate a meaningful ASAT capability. Given this, one possible reason why space wars have not broken out is simply because only the US has ever had the ability to fight one [21, p. 402], [22, pp. 419–420].

Although launch technology may become cheaper and easier, it is unclear to what extent these advances will be distributed among presently non-spacefaring nations. Limited access to orbit necessarily reduces the scenarios which could plausibly escalate to ASAT usage. Only major conflicts between the handful of states with ‘space club’ membership could be considered possible flashpoints. Even then, the fragility of an attacker’s own space assets creates de-escalatory pressures due to the deterrent effect of retaliation. Since the earliest days of the space race, dominant powers have recognized this dynamic and demonstrated an inclination towards de-escalatory space strategies [23].

B. Attributable Norms

There also exists a long-standing normative framework favouring the peaceful use of space. The effectiveness of this regime, centred around the Outer Space Treaty (OST), is highly contentious and many have pointed out its serious legal and political shortcomings [24]–[26]. Nevertheless, this status quo framework has somehow supported over six decades of relative peace in orbit.

Over these six decades, norms have become deeply ingrained into the way states describe and perceive space weaponization. This de facto codification was dramatically demonstrated in 2005 when the US found itself on the short end of a 160-1 UN vote after opposing a non-binding resolution on space weaponization. Although states have occasionally pushed the boundaries of these norms, this has typically occurred through incremental legal re-interpretation rather than outright opposition [27]. Even the most notable incidents, such as the 2007-2008 US and Chinese ASAT demonstrations, were couched in rhetoric from both the norm violators and defenders, depicting space as a peaceful global commons [27, p. 56]. Altogether, this suggests that states perceive real costs to breaking this normative tradition and may even moderate their behaviours accordingly.

One further factor supporting this norms regime is the high degree of attributability surrounding ASAT weapons. For kinetic ASAT technology, plausible deniability and stealth are essentially impossible. The literally explosive act of launching a rocket cannot evade detection and, if used offensively, retaliation. This imposes high diplomatic costs on ASAT usage and testing, particularly during peacetime.

C. Environmental Interdependence

A third stabilizing force relates to the orbital debris consequences of ASATs. China’s 2007 ASAT demonstration was the largest debris-generating event in history, as the targeted satellite dissipated into thousands of dangerous debris particles [28, p. 4]. Since debris particles are indiscriminate and unpredictable, they often threaten the attacker’s own space assets [22, p. 420]. This is compounded by Kessler syndrome, a phenomenon whereby orbital debris ‘breeds’ as large pieces of debris collide and disintegrate. As space debris remains in orbit for hundreds of years, the cascade effect of an ASAT attack can constrain the attacker’s long-term use of space [29, pp. 295– 296]. Any state with kinetic ASAT capabilities will likely also operate satellites of its own, and they are necessarily exposed to this collateral damage threat. Space debris thus acts as a strong strategic deterrent to ASAT usage.

#### No escalation

Zarybnisky 18 [Dr. Eric J., MA in National Security Studies from the Naval War College, PhD in Operations Research from the MIT Sloan School of Management, Lt Col, USAF, “Celestial Deterrence: Deterring Aggression in the Global Commons of Space”, 3-28, https://apps.dtic.mil/dtic/tr/fulltext/u2/1062004.pdf]

PREVENTING AGGRESSION IN SPACE

While deterrence and the Cold War are strongly linked in the public’s mind through the nuclear standoff between the United States and the Soviet Union, the fundamentals of deterrence date back millennia and deterrence remains relevant. Thucydides alludes to the concept of deterrence in his telling of the Peloponnesian War when he describes rivals seeking advantages, such as recruiting allies, to dissuade an adversary from starting or expanding a conflict.6F6 Aggression in space was successfully avoided during the Cold War because both sides viewed an attack on military satellites as highly escalatory, and such an action would likely result in general nuclear war.7F7 In today’s more nuanced world, attacking satellites, including military satellites, does not necessarily result in nuclear war. For instance, foreign countries have used high-powered lasers against American intelligence-gathering satellites8F8 and the United States has been reluctant to respond, let alone retaliate with nuclear weapons. This shift in policy is a result of the broader use of gray zone operations, to which countries struggle to respond while limiting escalation. Beginning with the fundamentals of deterrence illuminates how it applies to prevention of aggression in space.

#### Multiple complex factors make space war escalation obsolete

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The assumption made is that space war will be successfully waged in both the heavens and on the Earth itself. This assumption, however, is grounded on several hypotheticals occurring. First, that total devastating strategic surprise can be achieved—the side attacked becomes so damaged and devastated that further resistance is impossible to sustain regardless of national will, since nuclear weapons overhang the entire enterprise. The analogy usually invoked for American audiences is a “Pearl Harbor” type attack. This scenario is premised on equivalent American incompetence and lack of readiness as exhibited in December 1941. One must note that Pearl Harbor ended as a strategic failure for Japan—it led to defeat because the attack mobilized U.S. power without hesitation, given the intense political divisions over whether to enter the worldwide conflicts already raging. The attack was a military failure because Navy carriers were not destroyed along with battleship row along with critical fuel facilities. Similar analogies invoke September 11, 2001 as the prototype for such attacks more recently, but the same caveats apply. Total surprise assumes that all relevant opponent systems and civilian assets are disabled and left vulnerable to follow on attacks. In fact, collapse of U.S. defenses leaves U.S. cities as hostages to the rulers of the heavens, or vice versa if the U.S. moves first. Space war is extremely destabilizing, as will be discussed, since survivability of one’s strategic assets becomes problematic.

Second, surprise requires that sufficient offensive space assets be placed in orbit without triggering a response by other states—the scale of such technology deployment is in itself possibly self-defeating given high costs and a likely lack of launch capacity. In addition, much launch capacity is now international rather than national, so maintaining secrecy becomes even more difficult. Space as an operational environment suffers from excessive transparency, meaning any launches can be monitored and tracked by others with strong evidence as to what is being deployed. One must remember that the original satellite launches in the 1950s were accurately tracked by a British grade-school class as a science project. In addition, at least since the early 1960s, remote sensing has increased exponentially the global capability to detect buildup of military assets of differing types, whether in space or on the ground. Commercial remote-sensing capabilities further enhance the capacity to detect militarily relevant actions. For example, commercial imagery is accessed by private parties to monitor the North Korean missile and nuclear weapons programs, in effect expanding the capacity of the world to look in on various states’ interior regions, scanning for relevant information, including weapons buildup and launch capabilities. Even construction of physical facilities for production of space assets or for other weaponry can be monitored, making surprise more difficult but not impossible, as demonstrated in earlier monitoring of North Korea and, in 1998, the nuclear tests by both Pakistan and India. That means if the ASAT weapons come from ground locations, there is a high probability that they can be detected but no guarantee exists that detection will in fact occur. The uncertainty will impact calculations of attack success.

Third, the most obvious initial attack of space-based assets will most likely come from cyber attacks, given that such actions do not necessarily require the scale of resources necessary for other modalities such as kinetic weapons, or even lasers or other energy-type weapons. One will have to position the weapons plus the infrastructure to permit rapid recycling of the weapons for the next attack. Firing off interceptors will likely be a one-off, meaning extremely precise targeting will be required if the attack is to be successful. Note that none of these systems require that individuals be placed in Earth orbit, despite the imagery describing such operations in fictional universes.

Deployment requires a large lift capacity for initial deployment plus replenishment of destroyed or inoperative space assets, since a space conflict assumes that assets will be lost either kinetically or be compromised by cyber or energy beams. In any case, the combatants must be able to recover their capabilities lost during the conflict; failure to do would mean defeat or at least stalemate, negating the reason for the attack. That raises a major question when one considers the problem or expectation that space war can be successfully conducted or defended. Operationally Responsive Space (ORS) remains a critical weak point for all potential space-war participants. Loss of space assets occurs routinely during operations, but actual combat losses can be exponential depending on the weaponry used, and replacing those losses becomes the race to the next level after the initial exchange or combat. Unfortunately, ORS remains a major weakness of the United States and likely other states; deploying replacement satellites remains a multiyear process, while launch capabilities are scheduled long in advance. The rise of multiple private launch competitors may partially alleviate some of the delay but that remains problematic given that the military payloads may be competing with commercial vendors also trying to replace losses. The tradeoff is that. in principle, private-launch vendors may be able to do so more cheaply, but their capacity may be saturated by demand from the civil and commercial sectors, leaving few “uncommitted” launch options for military purposes. Normally this is not an issue, but the available launch options may be third party rather than national-flag carriers, which raises severe security concerns.

Fourth, several other assumptions become essential to make the strategy work, including that such an attack does not render Earth orbit so debris-saturated that further military space operations become impossible to sustain. Also, damage to civilian space assets remains, such that their continuation is possible if undamaged replacements can be quickly reintroduced to restart economically critical operations. Globalization has been fostered through satellite technologies. Their disruption can be devastating for all parties, regardless of who is the winner or the loser. What may occur is the graveyard of the modern economic system. No potential space participants would be immune to the damage, regardless of whether or not they were participants in the actual conflict.