# Speech 1NC Strake Rd 4 vs Southlake 12-18 9AM

## 1

#### 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.

## 2

#### Interp – space mining isn’t appropriation – its not permanent and OST consensus.

Hofmann and Bergamasco 19 [Mahulena Hofmann (SES Chair in Space, SatCom and Media Law at the University of Luxembourg) and Federico Bergamasco (PhD Researcher in aviation, telecommunication and space law University of Luxembourg). “Space resources activities from the perspective of sustainability: legal aspects”. Global Sustainability. 9 December 2019. Accessed 12/18/21. <https://www.cambridge.org/core/services/aop-cambridge-core/content/view/DF153F4A77970AC9E12444EC2B001F8A/S2059479819000279a.pdf/div-class-title-space-resources-activities-from-the-perspective-of-sustainability-legal-aspects-div.pdf> //Xu]

However, the purpose of space mining activities is considered to be neither any ‘appropriation’ of parts of outer space nor of space resources in situ. Instead, the sole aim of any such activities is their extraction, use and commercialization, without any territorial demands or titles as to the celestial bodies (or parts thereof) concerned (Mizushima et al., 2017). The argument, which sees in the use or exploitation of a space mineral by one subject a limitation of the same right of another subject, is difficult to contest by other means than analogy with space exploration. As has been recognized by the drafters of the OST in its Articles IX and XII, a purely scientific project in one area of outer space could de facto prevent research at the same site by a subject from another State. To avoid such situations, the Treaty pre-envisages a system of international consultations aimed at avoiding any harmful interference with operations.

#### OST is the standard for space law.

Wikipedia No Date [Wikipedia. “Outer Space Treaty.” No Date. Accessed 12/18/21. <https://en.wikipedia.org/wiki/Outer_Space_Treaty> //Xu]

The Outer Space Treaty, formally the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, is a multilateral treaty that forms the basis of international space law. Negotiated and drafted under the auspices of the United Nations, it was opened for signature in the United States, the United Kingdom, and the Soviet Union on 27 January 1967, entering into force on 10 October 1967. As of February 2021, 111 countries are parties to the treaty—including all major spacefaring nations—and another 23 are signatories.[1][5][note 1]

#### Semantics o/w –

#### a] Precision – they can arbitrarily jettison words which decks ground and preparation because there is no stasis point

#### b] Jurisdiction – the judge doesn’t have the authority to vote aff if it wasn’t legitimate

#### Vote for predictable limits – their aff explodes the object of the resolution to include random space activities from tourism to research to satellite surveillance – that allows them to cherry-pick the best aff with no neg ground – also kills predictable advocacies which decks prepared engagement.

## 3

#### Interp: If the affirmative defends anything other than “The appropriation of outer space by private entities is unjust”, they must provide a counter solvency advocate.

#### Violation

#### Prefer

#### 1. Limits – there are infinite things you could which pushes you to uncontestable arguments. Even if your interp, the only way to verify if it’s fair is proof of counter-arguments.

#### 2. Shiftiness- CSA conceptualizes what their advocacy is and how it’s implemented. Ambiguous affs we don’t know about can’t delink if they delineate these things.

#### 3. Research – Forces the aff to go to the other side of the library and contest their own view points and encourages more in-depth answers since I can find responses.

#### Fairness – a) you conceded the judge will fairly evaluate your argument b) its constitutive to debate as competitive activity that requires objective evaluation

#### Education – a) it’s the only reason why schools fund debate b) it’s the only portable impact to debate

#### CI – a) brightlines are arbitrary and self-serving which doesn’t set good norms b) it collapses since weighing between brightlines rely on offense defense

#### DOD – a) it’s the only way to may up for time spent on theory b) it’s the only way to deter future abuse

#### No RVI’s- a) logic – you shouldn’t win for being fair b) clash – people go all in on theory which decks substance engagement c) chilling effect – people will be too scared to read theory because RVI’s encourage baiting theory

## 4

#### The role of the ballot is to *evaluate the desirability of resolutional action under the best normative framework*. Prefer: (a) AC / NC is structurally reciprocal since both sides have access to two routes to the ballot (b) it’s key to framework clash and phil ed is the only reason LD debate exists. c] reject new 1AR rob – 1] time skew 2] clash

#### Presumption and permissibility negates – a) more often false than true since I can prove something false in infinite ways b) real world policies require positive justification before being adopted – there’s alwahys an institutional DA to going through Congress c) resolved[[1]](#footnote-1) indicates “firmly determined” which means they proactively did something, to negate that means that they aren’t resolved

#### The litmus test for ethics is certainty and non-arbitrariness – blurry guidelines for ethics allows agents to inconsistently understand morality or arbitrarily opt out which renders ethics useless since it can’t serve as a guide to action.

#### Thus, ethics is transcendental, not empirical –

#### 1] Cartesian Skepticism – perceptions of the external world are fundamentally incoherent – the possibility of a dream world, simulation, or a hallucination makes empiricism unreliable.

#### 2] Causal Determinism – the physical world removes culpability from the agent – agential action occurs because of an antecedent NOT their will – only the transcendental world assumes an agent not subject to physical side constraints.

#### 3] Hume’s Guillotine – descriptive claims cannot prescribe action – “arsenic is poison” doesn’t mean “one ought not drink arsenic” because it doesn’t ought to be that way. Only the transcendental can form ought statements.

#### Thus, the standard is *consistency with the forms of objects* – the essence of the world that transcend space and time.

Wilber 19 [Jennifer Wilber (ESL instructor, substitute teacher, and freelance writer, B.A. in Creative Writing and English). “An Introduction to Plato’s Theory of Forms”. Owlcation. JUL 8, 2019. Accessed 12/21/20. [https://owlcation.com/humanities/An-Introduction-to-Platos-Theory-of-Forms //](https://owlcation.com/humanities/An-Introduction-to-Platos-Theory-of-Forms%20//) Xu]

The Platonic Forms, according to Plato, are just ideas of things that actually exist. They represent what each individual thing is supposed to be like in order for it to be that specific thing. For example, the Form of human shows qualities one must have in order to be human. It is a depiction of the idea of humanness. But no actual human is the perfect representation of the Form human. They are similar, but every human is different, and none are perfectly human. According to Plato, every object or quality in reality has a Form: dogs, cats, humans, oceans, tables, colors, beauty, love, and courage. Form answers the question "What is that?" Plato went a step further in asking “what is Form itself?” Plato assumed that an object was essentially or "really" a manifestation of the Form and that the phenomena were mere shadows that mimicked the Form. This means that objects in reality are momentary portrayals of the Form under varying circumstances. The “problem of universals,” or how can one Form in general be many things in particular, was solved by presuming that Form is a distinct singular thing that causes multiple representations of itself in particular objects. According to Plato’s Theory of Forms, matter is considered particular in itself. For Plato, Forms are more real than any objects that imitate them. Though the Forms are timeless and unchanging, physical manifestations of Forms are in a constant state of change. Where Forms are unqualified perfection, physical objects are qualified and conditioned. The Forms, according to Plato, are the essences of various objects. Forms are the qualities that an object must have to be considered that type of object. For example, there are countless chairs in the world but the Form of “chairness” is at the core of all chairs. Plato held that the world of Forms is transcendent to our own world, the world of substances, which is the essential basis of reality. Though no one has ever seen a perfect circle, nor a perfectly straight line, everyone knows what a circle and a straight line are. Plato uses this as evidence that his Forms are real. Perfect Examples of Forms Do Not Exist in Reality Forms are the purest representation of all things. Plato believed that true knowledge or intelligence is the ability to grasp the world of Forms with one's mind. It is difficult for many thinkers to understand the concept of perfect Forms. If there are no perfect examples, so how we can know what the Forms are, exactly? If there are no perfect humans, and we can't see the Form human, how do we know what the Form actually looks like? And if we don't know what it looks like, how do we know that no human is a perfect representation of that Form? Forms are aspatial (transcendent to space) and atemporal (transcendent to time). Forms do not exist within any time period, but rather provide the formal basis for time. Neither are they eternal in the sense of existing forever, nor mortal, existing for only a limited duration. Forms exists transcendent to time altogether, according to Plato’s Theory of Forms. Forms have no orientation in space, nor do they have a location. They are non-physical, but they are not in the mind. Forms are extra-mental ideas, meaning that they are real in the strictest sense of the word. Because the Forms exist independently of time and space, they can be said to exist only as ideas in people's minds. The Forms are objective "blueprints" for perfection. They are considered perfect themselves because they are unchanging. For example, if we have a square drawn on a blackboard, the square as it is drawn is not a perfect representation of a square. However, it is only the knowledge of the Form "square" that allows us to know the drawing on the chalkboard is meant to represent a square. The Form "square" is perfect and unchanging. The Form “square” is exactly the same no matter who thinks about it.

#### Prefer –

#### 1] Sequencing –

#### A] Understanding the form of objects is a prerequisite to the empirical

Cohen 15 [S. Marc Cohen- “Phaedo” <https://faculty.washington.edu/smcohen/320/phaedo.htm> Last updated 7/24/2015] UT AI

This is both an argument for the existence of Forms and an argument for our possession of a priori concepts. Plato bases the argument on the imperfection of sensible objects and our ability to make judgments about those sensible objects. (The Forms are supposed to be the perfect objects that the sensibles only imperfectly approximate). The argument as given at Phaedo 74-76 concerns the concept of equality, but it could equally well be given with respect to a number of different concepts (any concept that might have some claim to being an a priori concept). The argument tries to show that we cannot abstract the concept of equality from our sense-experience of objects that are equal. For

1. We never experience (in sense-perception) objects that are really, precisely, equal, and
2. We must already have the concept of equality in order to judge the things we encounter in sense-perception to be approximately, imperfectly, equal.

The argument can be schematized as follows:

1. We perceive sensible objects to be F.
2. But every sensible object is, at best, imperfectly F. That is, it is both F and not F (in some respect - shades of Heraclitus??). It falls short of being perfectly F.
3. We are aware of this imperfection in the objects of perception.
4. So we perceive objects to be imperfectly F.
5. To perceive something as imperfectly F, one must have in mind something that is perfectly F, something that the imperfectly F things fall short of. (E.g., we have an idea of equality that all sticks, stones, etc., only imperfectly exemplify.)
6. So we have in mind something that is perfectly F.
7. Thus, there is something that is perfectly F (e.g., Equality), that we have in mind in such cases.
8. Therefore, there is such a thing as the F itself (e.g., the Equal itself), and it is distinct from any sensible object.

#### B] Bindingness – even if exceptions exist to an ethic, it proves empirical inconsistencies exist that only the transcendental can universally apply and reasonably guide action.

#### 2] Performativity – a) all appeals to the good attempt to reference an ultimate form of the good and define it in the material world b) thoughts and ideas can only exist insofar as the theory of the form is true since it is what defines our ability to generate those thoughts in the first place.

#### 3] Ideal Theory Good – a] end point – we’d constantly be fixing injustices as a precondition to ethical action so we never get to the bottom of what is actually ethical b] relevance – every society has different injustices that occur – the resolution is a universal values statement which means you cannot universalize any theory under nonideal theory.

#### 4] Epistemic Confidence – a] modesty is arbitrary in calculating ethical value which can’t serve as a guide to action b] self-defeating – you wouldn’t take two different pills because a doctor recommended one and a stranger another.

#### I defend the squo and negate –

#### First, the rez is indexed to private entities – by[[2]](#footnote-2) identifies “identifying the agent performing an action” and is specific to appropriation through private entities.

#### Second, “A private entity relies on a small group of chosen investors in order to grow and fund their business. This could be employees, colleagues, friends, family, or even large institutional investors. Interested parties are able to support the private entity in order to help the company grow.”

That’s QT Company 20 [“What Are Private Entities?”. Quest Trust Company (custodian of self-directed IRAs located in Houston, Austin, and Dallas, Texas with clients Nationwide. Quest Trust Company, is the leading provider of self-directed retirement account administration services. Quest Trust Company has been in business since 2003 with over $2 Billion in assets under management. As a neutral party, Quest Trust Company does not offer any investments and therefore has no conflicts of interest with what our clients want to do with their IRAs). September 28, 2020. Accessed 12/17/21. <https://www.questtrustcompany.com/2020/09/28/what-are-private-entities/> //Xu]

#### Appropriation means “incorporation by joining or uniting” which is consistent with the form of private entities.

That’s Vocabulary.com [“appropriation”. Vocabulary.com. No Date. Accessed 12/17/21. <https://www.vocabulary.com/dictionary/appropriation> //Xu]

# AC

## Adv

#### Commercial mining solves extinction from scarcity, climate, terror, war, and disease.

Pelton 17—(Director Emeritus of the Space and Advanced Communications Research Institute at George Washington University, PHD in IR from Georgetown).. Pelton, Joseph N. 2017. The New Gold Rush: The Riches of Space Beckon! Springer. Accessed 8/30/19.

Are We Humans Doomed to Extinction? What will we do when Earth’s resources are used up by humanity? The world is now hugely over populated, with billions and billions crammed into our overcrowded cities. By 2050, we may be 9 billion strong, and by 2100 well over 11 billion people on Planet Earth. Some at the United Nations say we might even be an amazing 12 billion crawling around this small globe. And over 80 % of us will be living in congested cities. These cities will be ever more vulnerable to terrorist attack, natural disaster, and other plights that come with overcrowding and a dearth of jobs that will be fueled by rapid automation and the rise of artifi cial intelligence across the global economy. We are already rapidly running out of water and minerals. Climate change is threatening our very existence. Political leaders and even the Pope have cautioned us against inaction. Perhaps the naysayers are right. All humanity is at tremendous risk. Is there no hope for the future? This book is about hope. We think that there is literally heavenly hope for humanity. But we are not talking here about divine intervention. We are envisioning a new space economy that recognizes that there is more water in the skies that all our oceans. Th ere is a new wealth of natural resources and clean energy in the reaches of outer space—more than most of us could ever dream possible. There are those that say why waste money on outer space when we have severe problems here at home? Going into space is not a waste of money. It is our future. It is our hope for new jobs and resources. The great challenge of our times is to reverse public thinking to see space not as a resource drain but as the doorway to opportunity. The new space frontier can literally open up a “gold rush in the skies.” In brief, we think there is new hope for humanity. We see a new a pathway to the future via new ventures in space. For too long, space programs have been seen as a money pit. In the process, we have overlooked the great abundance available to us in the skies above. It is important to recognize there is already the beginning of a new gold rush in space—a pathway to astral abundance. “New Space” is a term increasingly used to describe radical new commercial space initiatives—many of which have come from Silicon Valley and often with backing from the group of entrepreneurs known popularly as the “space billionaires.” New space is revolutionizing the space industry with lower cost space transportation and space systems that represent significant cost savings and new technological breakthroughs. “New Commercial Space” and the “New Space Economy” represent more than a new way of looking at outer space. These new pathways to the stars could prove vital to human survival. If one does not believe in spending money to probe the mysteries of the universe then perhaps we can try what might be called “calibrated greed” on for size. One only needs to go to a cubesat workshop, or to Silicon Valley or one of many conferences like the “Disrupt Space” event in Bremen, Germany, held in April 2016 to recognize that entrepreneurial New Space initiatives are changing everything [ 1 ]. In fact, the very nature and dimensions of what outer space activities are today have changed forever. It is no longer your grandfather’s concept of outer space that was once dominated by the big national space agencies. The entrepreneurs are taking over. The hopeful statements in this book and the hard economic and technical data that backs them up are more than a minority opinion. It is a topic of growing interest at the World Economic Forum, where business and political heavyweights meet in Davos, Switzerland, to discuss how to stimulate new patterns of global economic growth. It is even the growing view of a group that call themselves “space ethicists.” Here is how Christopher J. Newman, at the University of Sunderland in the United Kingdom has put it: Space ethicists have offered the view that space exploration is not only desirable; it is a duty that we, as a species, must undertake in order to secure the survival of humanity over the longer term. Expanding both the resource base and, eventually, the habitats available for humanity means that any expenditure on space exploration, far from being viewed as frivolous, can legitimately be rationalized as an ethical investment choice. (Newman) On the other hand there are space ethicists and space exobiologists who argue that humans have created ecological ruin on the planet—and now space debris is starting to pollute space. Th ese countervailing thoughts by the “no growth” camp of space ethicists say we have no right to colonize other planets or to mine the Moon and asteroids—or at least no right to do so until we can prove we can sustain life here on Earth for the longer term. However, for most who are planning for the new space economy the opinion of space philosophers doesn’t really fl oat their boat. Legislators, bankers, and aspiring space entrepreneurs are far more interested in the views of the super-rich capitalists called the space billionaires. A number of these billionaires and space executives have already put some very serious money into enterprises intent on creating a new pathway to the stars. No less than five billionaires with established space ventures—Elon Musk, Paul Allen, Jeff Bezos, Sir Richard Branson, and Robert Bigelow—have invested millions if not billions of dollars into commercializing space. They are developing new technologies and establishing space enterprises that can bring the wealth of outer space down to Earth. This is not a pipe dream, but will increasingly be the economic reality of the 2020s. These wealthy space entrepreneurs see major new economic opportunities. To them space represents the last great frontier for enterprising pioneers. Th us they see an ever-expanding space frontier that offers opportunities in low-cost space transportation, satellite solar power satellites to produce clean energy 24h a day, space mining, space manufacturing and production, and eventually space habitats and colonies as a trajectory to a better human future. Some even more visionary thinkers envision the possibility of terraforming Mars, or creating new structures in space to protect our planet from cosmic hazards and even raising Earth’s orbit to escape the rising heat levels of the Sun in millennia to come. Some, of course, will say this is sci-fi hogwash. It can’t be done. We say that this is what people would have said in 1900 about airplanes, rocket ships, cell phones and nuclear devices. The skeptics laughed at Columbus and his plan to sail across the oceans to discover new worlds. When Thomas Jefferson bought the Louisiana Purchase from France or Seward bought Alaska, there were plenty of naysayers that said such investment in the unknown was an extravagant waste of money. A healthy skepticism is useful and can play a role in economic and business success. Before one dismisses the idea of an impending major new space economy and a new gold rush, it might useful to see what has already transpired in space development in just the past five decades. The world’s first geosynchronous communications satellite had a throughput capability of about 500 kb / s. In contrast, today’s state of the art Viasat 2 —a half century later— has an impressive throughput of some 140 Gb/s. Th is means that the relative throughput is nearly 300,000 greater, while its lifetime is some ten times longer (Figs. 1.1 and 1.2 ). Each new generation of communications satellite has had more power, better antenna systems, improved pointing and stabilization, and an extended lifetime. And the capabilities represented by remote sensing satellites , meteorological satellites , and navigation and timing satellites have also expanded their capabilities and performance in an impressive manner. When satellite applications first started, the market was measured in millions of dollars. Today commercial satellite services exceed a quarter of a billion dollars. Vital services such as the Internet, aircraft traffi c control and management, international banking, search and rescue and much, much more depend on application satellites. Th ose that would doubt the importance of satellites to the global economy might wish to view on You Tube the video “If Th ere Were a Day Without Satellites?” [ 2 ]. Let’s check in on what some of those very rich and smart guys think about the new space economy and its potential. (We are sorry to say that so far there are no female space billionaires, but surely this, too, will come someday soon.) Of course this twenty-fi rst century breakthrough that we call the New Space economy will not come just from new space commerce. It will also come from the amazing new technologies here on Earth. Vital new terrestrial technologies will accompany this cosmic journey into tomorrow. Information technology, robotics, artificial intelligence and commercial space travel systems have now set us on a course to allow us humans to harvest the amazing riches in the skies—new natural resources, new energy, and even totally new ways of looking at the purpose of human existence. If we pursue this course steadfastly, it can be the beginning of a New Space renaissance. But if we don’t seek to realize our ultimate destiny in space, Homo sapiens can end up in the dustbin of history—just like literally millions of already failed species. In each and every one of the five mass extinction events that have occurred over the last 1.5 billion years on Earth, some 50–80 % of all species have gone the way of the T. Rex, the woolly mammoth, and the Dodo bird along with extinct ferns, grasses and cacti. On the other hand, the best days of the human race could be just beginning. If we are smart about how we go about discovering and using these riches in the skies and applying the best of our new technologies, it could be the start of a new beginning for humanity. Konstantin Tsiokovsky, the Russian astronautics pioneer, who fi rst conceived of practical designs for spaceships, famously said: “A planet is the cradle of mankind, but one cannot live in a cradle forever.” Well before Tsiokovsky another genius, Leonardo da Vinci, said, quite poetically: “Once you have tasted flight, you will forever walk the earth with your eyes turned skyward, for there you have been, and there you will always long to return.” The founder of the X-Prize and of Planetary Resources, Inc., Dr. Peter Diamandis, has much more brashly said much the same thing in quite diff erent words when he said: “The meek shall inherit the Earth. The rest of us will go to Mars.” The New Space Billionaires Peter Diamandis is not alone in his thinking. From the list of “visionaries” quoted earlier, Elon Musk, the founder of SpaceX; Sir Richard Branson, the founder of Virgin Galactic; and Paul Allen, the co-founder of Microsoft and the man who financed SpaceShipOne, the world’s first successful spaceplane have all said the future will include a vibrant new space economy. Th ey, and others, have said that we can, we should and we soon shall go into space and realize the bounty that it can offer to us. Th e New Space enterprise is today indeed being led by those so-called space billionaires , who have an exciting vision of the future. They and others in the commercial space economy believe that the exploitation of outer space may open up a new golden age of astral abundance. They see outer space as a new frontier that can be a great source of new materials, energy and various forms of new wealth that might even save us from excesses of the past. Th is gold rush in the skies represents a new beginning. We are not talking about expensive new space ventures funded by NASA or other space agencies in Europe, Japan, China or India. No, these eff orts which we and others call New Space are today being forged by imaginative and resourceful commercial entrepreneurs. Th ese twenty-fi rst century visionaries have the fortitude and zeal to look to the abundance above. New breakthroughs in technology and New Space enterprises may be able to create an “astral life raft” for humanity. Just as Columbus and the Vikings had the imaginative drive that led them to discover the riches of a new world, we now have a cadre of space billionaires that are now leading us into this New Space era of tomorrow. These bold leaders, such as Paul Allen and Sir Richard Branson, plus other space entrepreneurs including Jeff Bezos of Amazon and Blue Origin, and Robert Bigelow, Chairman of Budget Suites and Bigelow Aerospace, not only dream of their future in the space industry but also have billions of dollars in assets. These are the bright stars of an entirely new industry that are leading us into the age of New Space commerce. These space billionaires, each in their own way, are proponents of a new age of astral abundance. Each of them is launching new commercial space industries. They are literally transforming our vision of tomorrow. These new types of entrepreneurial aerospace companies—the New Space enterprises—give new hope and new promise of transforming our world as we know it today. The New Space Frontier What happens in space in the next few decades, plus corresponding new information technologies and advanced robotics, will change our world forever. These changes will redefi ne wealth, change our views of work and employment and upend almost everything we think we know about economics, wealth, jobs, and politics. Th ese changes are about truly disruptive technologies of the most fundamental kinds. If you thought the Internet, smart phones, and spandex were disruptive technologies, just hang on. You have not seen anything yet. In short, if you want to understand a transition more fundamental than the changes brought to the twentieth century world by computers, communications and the Internet, then read this book. There are truly riches in the skies. Near-Earth asteroids largely composed of platinum and rare earth metals have an incredible value. Helium-3 isotopes accessible in outer space could provide clean and abundant energy. There is far more water in outer space than is in our oceans. In the pages that follow we will explain the potential for a cosmic shift in our global economy, our ecology, and our commercial and legal systems. These can take place by the end of this century. And if these changes do not take place we will be in trouble. Our conventional petro-chemical energy systems will fail us economically and eventually blanket us with a hydrocarbon haze of smog that will threaten our health and our very survival. Our rare precious metals that we need for modern electronic appliances will skyrocket in price, and the struggle between “haves” and “have nots” will grow increasingly ugly. A lack of affordable and readily available water, natural resources, food, health care and medical supplies, plus systematic threats to urban security and systemic warfare are the alternatives to astral abundance. The choices between astral abundance and a downward spiral in global standards of living are stark. Within the next few decades these problems will be increasingly real. By then the world may almost be begging for new, out of- the-box thinking. International peace and security will be an indispensable prerequisite for exploitation of astral abundance, as will good government for all. No one nation can be rich and secure when everyone else is poor and insecure. In short, global space security and strategic space defense, mediated by global space agreements, are part of this new pathway to the future.

#### Asteroid mining’s key to Space Colonization – anything else risks extinction from an existential crisis

Williams ’17 [Matt Williams, Writer for Universe Today. Citing A. J. Berliner, UC Berkeley; C. P. McKay. Space Sciences Division, NASA Ames Research Center; Valeriy Yakovlev, an astrophysicist and hydrogeologist from Laboratory of Water Quality in Kharkov, Ukraine. 3/10/17, “The future of space colonization – terraforming or space habitats?” [https://phys.org/news/2017-03-future-space-colonization-terraforming-habitats.html Accessed 1/2/20](https://phys.org/news/2017-03-future-space-colonization-terraforming-habitats.html%20Accessed%201/2/20) \*edited for gendered language]

In light of this, Yakolev presents what he considers to be the most likely prospects for humanity's exit to space between now and 2030. This will include the creation of the first space biospheres with artificial gravity, which will lead to key developments in terms of materials technology, life support-systems, and the robotic systems and infrastructure needed to install and service habitats in Low Earth Orbit (LEO). These habitats could be serviced thanks to the creation of robotic spacecraft that could harvest resources from nearby bodies – such as the Moon and Near-Earth Objects (NEOs). This concept would not only remove the need for planetary protections – i.e. worries about contaminating Mars' biosphere (assuming the presence of bacterial life), it would also allow human beings to become accustomed to space more gradually. As Yakovlev told Universe Today via email, the advantages to space habitats can be broken down into four points: "1. This is a universal way of mastering the infinite spaces of the Cosmos, both in the Solar System and outside it. We do not need surfaces for installing houses, but resources that robots will deliver from planets and satellites. 2. The possibility of creating a habitat as close as possible to the earth's cradle allows one to escape from the inevitable physical degradation under a different gravity. It is easier to create a protective magnetic field. "3. The transfer between worlds and sources of resources will not be a dangerous expedition, but a normal life. Is it good for sailors without their families? 4. The probability of death or degradation of [hu]mankind as a result of the global catastrophe is significantly reduced, as the colonization of the planets includes reconnaissance, delivery of goods, shuttle transport of people – and this is much longer than the construction of the biosphere in the Moon's orbit. Dr. Stephen William Hawking is right, a person does not have much time." And with space habitats in place, some very crucial research could begin, including medical and biologic research which would involve the first children born in space. It would also facilitate the development of reliable space shuttles and resource extraction technologies, which will come in handy for the settlement of other bodies – like the Moon, Mars, and even exoplanets. Ultimately, Yakolev thinks that space biospheres could also be accomplished within a reasonable timeframe – i.e. between 2030 and 2050 – which is simply not possible with terraforming. Citing the growing presence and power of the commercial space sector, Yakolev also believed a lot of the infrastructure that is necessary is already in place (or under development). "After we overcome the inertia of thinking +20 years, the experimental biosphere (like the settlement in Antarctica with watches), in 50 years the first generation of children born in the Cosmos will grow and the Earth will decrease, because it will enter the legends as a whole… As a result, terraforming will be canceled. And the subsequent conference will open the way for real exploration of the Cosmos. I'm proud to be on the same planet as Elon Reeve Musk. His missiles will be useful to lift designs for the first biosphere from the lunar factories. This is a close and direct way to conquer the Cosmos." With NASA scientists and entrepreneurs like Elon Musk and Bas Landorp looking to colonize Mars in the near future, and other commercial aerospace companies developing LEO, the size and shape of humanity's future in space is difficult to predict. Perhaps we will jointly decide on a path that takes us to the Moon, Mars, and beyond. Perhaps we will see our best efforts directed into near-Earth space. Or perhaps we will see ourselves going off in multiple directions at once. Whereas some groups will advocate creating space habitats in LEO (and later, elsewhere in the Solar System) that rely on artificial gravity and robotic spaceships mining asteroids for materials, others will focus on establishing outposts on planetary bodies, with the goal of turning them into "new Earths". Between them, we can expect that humans will begin developing a degree of "space expertise" in this century, which will certainly come in handy when we start pushing the boundaries of exploration and colonization even further.

#### That outweighs every impact

Bostrom ’03 [Nick Bostrom, 3. Professor, University of Oxford; Director, Future of Humanity Institute, University of Oxford; Director, Governance of AI program. Former lecturer at Yale. PhD, Philosophy, LSE; Studied Astrophysics & General Relativity (Dept. of Physics) and completed MSc-thesis in Computational neuroscience (Dept. of Math), King’s College, London; MA, Philosophy and Physics, University of Stockholm; BA, Philosophy, Mathematics, Mathematical Logic, Artificial Intelligence, University of Goteborg. “Astronomical Waste: The Opportunity Cost of Delayed Technological Development” <https://nickbostrom.com/astronomical/waste.html> Accessed 12/27/19]

ABSTRACT. With very advanced technology, a very large population of people living happy lives could be sustained in the accessible region of the universe. For every year that development of such technologies and colonization of the universe is delayed, there is therefore an opportunity cost: a potential good, lives worth living, is not being realized. Given some plausible assumptions, this cost is extremely large. However, the lesson for utilitarians is not that we ought to maximize the pace of technological development, but rather that we ought to maximize its safety, i.e. the probability that colonization will eventually occur. I. THE RATE OF LOSS OF POTENTIAL LIVES As I write these words, suns are illuminating and heating empty rooms, unused energy is being flushed down black holes, and our great common endowment of negentropy is being irreversibly degraded into entropy on a cosmic scale. These are resources that an advanced civilization could have used to create value-structures, such as sentient beings living worthwhile lives. The rate of this loss boggles the mind. One recent paper speculates, using loose theoretical considerations based on the rate of increase of entropy, that the loss of potential human lives in our own galactic supercluster is at least ~10^46 per century of delayed colonization.[1] This estimate assumes that all the lost entropy could have been used for productive purposes, although no currently known technological mechanisms are even remotely capable of doing that. Since the estimate is meant to be a lower bound, this radically unconservative assumption is undesirable. We can, however, get a lower bound more straightforwardly by simply counting the number or stars in our galactic supercluster and multiplying this number with the amount of computing power that the resources of each star could be used to generate using technologies for whose feasibility a strong case has already been made. We can then divide this total with the estimated amount of computing power needed to simulate one human life. As a rough approximation, let us say the Virgo Supercluster contains 10^13 stars. One estimate of the computing power extractable from a star and with an associated planet-sized computational structure, using advanced molecular nanotechnology[2], is 10^42 operations per second.[3] A typical estimate of the human brain’s processing power is roughly 10^17 operations per second or less.[4] Not much more seems to be needed to simulate the relevant parts of the environment in sufficient detail to enable the simulated minds to have experiences indistinguishable from typical current human experiences.[5] Given these estimates, it follows that the potential for approximately 10^38 human lives is lost every century that colonization of our local supercluster is delayed; or equivalently, about 10^29 potential human lives per second. While this estimate is conservative in that it assumes only computational mechanisms whose implementation has been at least outlined in the literature, it is useful to have an even more conservative estimate that does not assume a non-biological instantiation of the potential persons. Suppose that about 10^10 biological humans could be sustained around an average star. Then the Virgo Supercluster could contain 10^23 biological humans. This corresponds to a loss of potential equal to about 10^14 potential human lives per second of delayed colonization. What matters for present purposes is not the exact numbers but the fact that they are huge. Even with the most conservative estimate, assuming a biological implementation of all persons, the potential for one hundred trillion potential human beings is lost for every second of postponement of colonization of our supercluster.[6] II. THE OPPORTUNITY COST OF DELAYED COLONIZATION From a utilitarian perspective, this huge loss of potential human lives constitutes a correspondingly huge loss of potential value. I am assuming here that the human lives that could have been created would have been worthwhile ones. Since it is commonly supposed that even current human lives are typically worthwhile, this is a weak assumption. Any civilization advanced enough to colonize the local supercluster would likely also have the ability to establish at least the minimally favorable conditions required for future lives to be worth living. The effect on total value, then, seems greater for actions that accelerate technological development than for practically any other possible action. Advancing technology (or its enabling factors, such as economic productivity) even by such a tiny amount that it leads to colonization of the local supercluster just one second earlier than would otherwise have happened amounts to bringing about more than 10^29 human lives (or 10^14 human lives if we use the most conservative lower bound) that would not otherwise have existed. Few other philanthropic causes could hope to mach that level of utilitarian payoff. Utilitarians are not the only ones who should strongly oppose astronomical waste. There are many views about what has value that would concur with the assessment that the current rate of wastage constitutes an enormous loss of potential value. For example, we can take a thicker conception of human welfare than commonly supposed by utilitarians (whether of a hedonistic, experientialist, or desire-satisfactionist bent), such as a conception that locates value also in human flourishing, meaningful relationships, noble character, individual expression, aesthetic appreciation, and so forth. So long as the evaluation function is aggregative (does not count one person’s welfare for less just because there are many other persons in existence who also enjoy happy lives) and is not relativized to a particular point in time (no time-discounting), the conclusion will hold. These conditions can be relaxed further. Even if the welfare function is not perfectly aggregative (perhaps because one component of the good is diversity, the marginal rate of production of which might decline with increasing population size), it can still yield a similar bottom line provided only that at least some significant component of the good is sufficiently aggregative. Similarly, some degree of time-discounting future goods could be accommodated without changing the conclusion.[7]

### Adv 1

#### Alt causes to debris – small sats, meteoroids, EMPs.

Kelley, Electrical and Computer Engineering @ Cornell, et al. 12

[Michael C.; Stephanie Pancoast, Electrical and Computer Engineering @ Cornell; Sigrid Close, Aeronautics and Astronautics @ Stanford; Zhenzhen Wang, Physics and Astronomy @ UIowa: “Analysis of electromagnetic and electrostatic effects of particle impacts on spacecraft.” Elsevier Ltd. doi:10.1016/j.asr.2011.12.023]//AD

\*Hypervelocity means over 11km/s

Spacecraft are continually subject to impacts by meteoroids and space junk. The space shuttle and the International Space Station have been repeatedly hit and a space tether was severed by such an event. Such impacts can clearly have mechanical effects on spacecraft, but in recent years, evidence has arisen that electrical effects may be more important. Two types of effects are possible (Close et al., 2010). High-velocity impacts result in vaporization/ionization of the incoming particle and spacecraft material as well. This material is thought to be ejected as energetic ions that subsequently draw out electrons (Krueger, 1996; Ratcliff et al., 1997a,b). The result is that the vehicle potential initially drops sharply, rises again as the electron emission overcompensates positively, and then returns to its prior state by ambient plasma collection. These events may be intense enough to create an Electrostatic Discharge (ESD), which could damage spacecraft electronics. The expanding ions can separate from the electrons by a Debye length, after which an electric field builds up to draw out the electrons. The two plasma constituents then oscillate about each other at the plasma frequency while, at the same time, the plasma expands at the ambipolar diffusion rate. This continues until electron ion collisions are sufficient to slow the expansion process to the collisional diffusion rate. As the expansion proceeds, the plasma frequency decreases, as does the frequency of the radiation generated. This electrostatic oscillation will act as an antenna and radiate electromagnetic waves, which propagate in and around the spacecraft in a phenomenon we call an Electromagnetic Pulse (EMP). In this paper, we compare the theory proposed by Close et al. (2010) with observations of particle impacts on the Cassini spacecraft, which was instrumented with ESD and EMP detectors as well as dust/ice detectors. 0273-1177/$36.00 2011 COSPAR. Published by Elsevier Ltd. All rights reserved. doi:10.1016/j.asr.2011.12.023 ⇑ Corresponding author. Tel.: +1 607 255 7425; fax: +1 607 255 6236. E-mail addresses: mck13@cornell.edu (M.C. Kelley), pancoast@ stanford.edu (S. Pancoast), sigridc@stanford.edu (S. Close), zhenzhen-wang @uiowa.edu (Z. Wang). 1 Now at Stanford University. www.elsevier.com/locate/asr Available online at www.sciencedirect.com Advances in Space Research 49 (2012) 1029–1033 1.1. Review and analysis of ESD and EMP observations on Cassini The Radio and Plasma Wave Science (RPWS) instrumentation on Cassini detected a high rate of impact by dusty ice particles when it penetrated the rings of Saturn (Wang et al., 2006) and the Jupiter flyby (Meyer-Vernet et al., 2009). The instrument detected pulse-like potential changes between a short monopole antenna and spacecraft ground. The ground potential pulse had the waveform, V ðtÞ ¼ 0:4 1 et=s Q C ; ð1Þ where s = 40 ms, Q is the maximum charge on the spacecraft, and C is its capacitance (Wang et al., 2006). The factor 0.4 is due to a capacity divider at the amplified input. The Fourier Transform of the associated waveform is a two-component power law spectral response: f 2 at low frequencies (less that 4 kHz) and f 4 at high frequencies (4– 100 kHz). This is shown here in Fig. 1. Superposed on this power law behavior was a 10 db increase in power between 40 and 80 kHz. Fig. 3 of Wang et al. (2006) shows the wavelength of a double probe detection during impact events. The initial polarity can be of either sign. This rules out vehicle potential changes since the sign of the common mode voltage would always have the same polarity. We thus conclude that the signal is due to impact on one of the probes by ejected plasma. Depending on the proximity of one or the other probes to the impact, the sign will change. Unfortunately, since we do not know where the impact occurred, we cannot interpret whether ions or electrons were ejected first. Using Eq. (1) and a capacitance of 200 pF, the charge emissions were estimated to be 10 pC. Following work by Krueger (1996) for 15 km/s impacts of a dielectric on a metal, Wang et al. (2006) determined an rms ice particle size of 77 pg and an rms diameter of 5.2 lm for these dusty ice particles. Dividing the emitted charge by the charge on an electron, 10 pC corresponds to 5 107 ions released initially, which is followed by an equal number of ions. The expansion of the ions will occur for about one Debye length before the electrons are attracted by the ambipolar electric field. Thus, the number density at that time can be found from, n ¼ 3N=4pðkDÞ 3 ð2Þ and kD ¼ ðV eÞth=xp; ð3Þ where kD is the Debye length, xp is the plasma frequency, N is the total number of electrons emitted and (Ve)th is the electron thermal speed we take to be 106 m/s. For a fixed Te, Eq. (2) depends only on n and we can solve for t to find n = 2.25 1018 m3 . The initial plasma frequency is thus 10 GHz. Initially, until about 10 collision times, the expansion will continue at the ambipolar rate, which is thought to be about 104 m/s. We believe that the excess power in the spectrum between 40–80 kHz is oscillation of the ions and electrons at the plasma frequency, which decreases in time as the plasma expands. Only a narrow window of the plasma frequency oscillations spectrum is available due to the power spectral density in the FFT of the pulse and the upper limit of the instrument frequency response. Sixty kiloHertz will be attained after about 1 ls at the ambipolar expansion rate. The spectrum in Fig. 1 is intriguing but is a composite and cannot be used to explore the time dependence of the electromagnetic response to an impact. However, another set of impact events were recorded on Cassini (Meyer-Vernet et al., 2009) that were due to nanometer-size dust particles being accelerated by the solar wind to 450 km/s. In this case, we have the full waveform to work with, up to 110 kHz. We have analyzed the broadband data from the dipole antenna on Cassini during such events. Because of the high common-mode rejection ratio for the system, the initial pulse caused by the vehicle potential change is greatly suppressed but the EMP is well documented. Fig. 2 shows the waveform (top panel) for one of the impacts along with a Fourier analysis (central panel) and a wavelet analysis (lower panel). At the left-hand side of the top panel, the suppressed ESD pulse is seen as a 25 lv pulse, followed by a series of oscillations that decreases with time from about 80 kHz to less than 20 kHz during 180 ms. Fourier analysis is not well suited for analyzing such a time series, but the middle panel does show the FFT of various segments of the interval. The wavelet analysis is much more revealing. The initial pulse is characterized by intense wavelets over the entire 32 frequency bins as befits a sharp change in the signal. This is followed by wavelet intensities that occur first at the highest frequency and then progress to the lower frequencies over time. For reference, the unity scale wavelet has a characteristic time of 0.67 ms. Fig. 1. Composite spectrum from many impacts. [After Wang et al. (2006). Reproduced with permission of Elsevier.] 1030 M.C. Kelley et al. / Advances in Space Research 49 (2012) 1029–1033 0 0.0225 0.045 0.0675 0.09 0.1125 0.135 0.1575 0.18 −1.5 −1 −0.5 0 0.5 1 x 10−5 Time (ms) E (V/m) 0 20 40 60 80 100 120 0 0.2 0.4 0.6 0.8 1 x 10−5 FFT (V2/m2Hz) Freq (kHz) Time (ms) scales a 0.0225 0.045 0.0675 0.09 0.1125 0.135 0.1575 0.18 1 7 13 19 25 31 Fig. 2. Waveform, Fourier analysis, and wavelet analysis for the impact of nanometer-size particles at solar wind velocity on Cassini. A symlet order-2 wavelet was used. The scale a = 1 corresponds to the frequency >148 kHz and scale = 32 corresponds to 4.7 kHz. 100 101 102 103 10−7 10−6 10−5 Freq (kHz) FFT (V2/m2Hz) FFT of signal Fitted curve 0 20 40 60 80 100 120 0 1 2 3 4 x 10−6 Freq (kHz) FFT (V2/m2Hz) 0 20 40 60 80 100 120 0 0.5 1 1.5 2 x 10−6 Freq (kHz) FFT (V2/m2Hz) Slope = −3.4569 Fig. 3. Three spectral presentations. The top panel is a log–log plot of the first third of the data set. The middle panel covers the whole period in a loglinear format. The lower panel does not include the pulse. M.C. Kelley et al. / Advances in Space Research 49 (2012) 1029–1033 1031 In Fig. 3 we replot the various spectra using log–log and log-linear axes. The top panel is for the first third of the period, which includes the pulse. We see an f 2 power law followed by an f 4 power law, as is also found in Fig. 1. The middle panel is the FFT of the whole interval, whereas the lower panel begins at 10 ms and does not include the pulse. Evidence for high-frequency oscillations is seen when the pulse is absent or when the frequency is high enough for the power to exceed that of the pulse spectrum. In Fig. 4 we present three more examples of waveforms and wavelet analysis for dust impacts. In each case, the pulse and oscillations are seen. To study this quantitatively, we follow Meyer-Vernet et al. (2009) and Close et al. (2010) for nanoparticles at these high velocities. The former authors calculate that the charge release was 5 1013 C. Dividing by the charge on an electron yields 3 106 particles. Note that the plasma expands for 0.225 ms before we first can measure the plasma frequency since, before this, the vehicle potential change dominates the signal. Ratcliff et al. (1997a,b) predict an expansion velocity of 10 km/s, which yields a diameter of 2.25 m at that time and a plasma density of 84,000 m3 for a sphere and twice that for a half sphere. The plasma frequency at that time is thus 2600–3600 Hz, in reasonable agreement with the data. Since the volume increases as t 3 , the plasma frequency at 10 times the delay should be 260–360 Hz, which is also in good agreement with the data. 2. Scaling to other impacts Close et al. (2010) and Stewart and Valiant (2006) studied the impact effects over a wide range of metallic (meteoroid) impact particles. To scale this to earth-orbiting satellites impacted by meteors, we need to increase the differential velocity to as high as 45 km/s, which increases the Q release to 1000 C/g (Lee et al., 2012). Since the vehicle potential changes scales with this differential Q, we find that it rises from the 20 mV measured on Cassini to 500 V (for metallic impactors of the same size as those in the Cassini case). The released charge scales linearly with mass and as V3.8 (Lee et al., 2012), so very large potentials are possible. There is thus a definite possibility that an Electrostatic Discharge (ESD) is possible for impacts on the spacecraft ground plane. Note that the Cassini impacts are thought to have been on the large conducting high-gain antenna. Hoerz et al. (1975) and Stewart and Valiant (2006) developed a crater impact theory and compared it favorably with data for Martian craters. If we extrapolate these data to the rms particle size detected on Cassini, a diameter 0 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.1 −1 0 1 x 10−5 Time (ms) E (V/m) Time (ms) scales a 1 7 13 19 25 31 0 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.1 −10 −5 0 5 x 10−5 E (V/m) Time (ms) Time (ms) scales a 1 7 13 19 25 31 0 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.1 −2.5 −2 −1.5 x 10−5 Time (ms) E (V/m) Time (ms) scales a 1 7 13 19 25 31 Fig. 4. Three more examples of waveforms and wavelet analysis for dust impacts. The scales are identical to those in Fig. 2. 1032 M.C. Kelley et al. / Advances in Space Research 49 (2012) 1029–1033 of 5.2 lm, the ejected volume is 108 m3 , corresponding to a linear dimension of 0.22 cm. For impact of aluminum on aluminum, this corresponds to 6.3 1020 atoms. For an impact of ice on aluminum, we lower this by a factor of 10. Finally, since the impact velocity on Mars is about 1.7 times higher than ice on Cassini and the particle release varies as the velocity to the fourth power, we lower this by another factor of 30–2.1 1019. Dividing by the initial volume found above yields a neutral number density of 3 1022 m3 . The number density of plasma particles was found above to be n = 2.25 1018. The low ratio of charged particles to neutral atoms available strongly suggests that most of the charge is tied up on dust particles. Murr and Rivas (1994) studied the recoagulation of atoms from ablating meteors. They found that for meteors larger than 10 g, recoagulation proceeds exponentially. Of course, the number density of the tail for such a large meteoroid would be much smaller than an impact event of the same size, so recoagulation is very fast. We turn now to the case of 6 nm particles traveling at solar wind speeds (450 km/s). The comparison with Martian craters does not work as well for such small particles and we work the problem backwards. At .27 ms, the expanding sphere is 2.7 m in diameter and the oscillation frequency is 5 kHz. This corresponds to a plasma density of 3.1 105 m3 and a total number of ejected ions of 2.4 107 . A 6 nm particle would make a crater about 10 times its diameter at 40 km/s. For a hemisphere, the volume would be 4.3 1022 m3 . The volume scales as V2 so, at 400 km/s, it would be 4.3 1020 m3 . Aluminum would hold 5 104 particles. Since the incoming particle is the same size, this estimate yields 4 106 particles, a factor only five times lower than the data suggest. The vehicle potential is not likely to be affected by these particles We have compared observations of high-velocity impacts on the Cassini spacecraft with the theory of Close et al. (2010). We find excellent agreement with both the vehicle potential changes and the plasma oscillations for large, low-velocity particle impacts and for small, hypervelocity particles. When applied to particle impacts on earth-orbiting satellites, our first conclusion is that very high vehicle potential changes are possible for hyper-velocity metallic impacts on spacecraft ground, which could lead to ESD failures. We also find that an Electromagnetic Pulse will be generated and radiated by such impacts.

**No impact to debris---the risk to spacecraft is miniscule compared to normal mission hazards**

Lawrence M. **Wein 9**, Professor & Senior Fellow at Stanford’s Center for International Security and Cooperation, “Space debris: Assessing risk and responsibility,” *Advances in Space Research*, Volume 43, 2009, pp. 1372-1390

[Translated scientific notation to % probability in brackets]

More importantly, while our numerical results mimic earlier results (Liou and Johnson, 2005; Walker and Martin, 2004) that stressed the importance of postmission deorbiting, we do not necessarily agree with the claim that the only way to prevent future problems is to remove existing large intacts from space (Liou and Johnson, 2006, 2008). The divergence between our views and those in Liou and Johnson (2006, 2008) is perhaps due to the different performance metrics used. The root causes for alarm in Liou and Johnson (2006, 2008) appear to be the growth rate of fragments and the small increase in the rate of catastrophic collisions over the next 200 years (Liou and Johnson, 2008, Fig. 2). However, the great majority of catastrophic collisions in the SOI do not involve operational spacecraft, and are hazardous only in the sense that the fragments generated from such a collision could subsequently damage or destroy operational spacecraft. Therefore, we introduced the notion of the lifetime risk of an operational spacecraft as the primary performance metric. Our model predicts that the lifetime risk is <5x10^-4 [less than .0005%] over the next two centuries, and always stays <10^-3 [less than .001%] than if there is very high (>98%) spacecraft deorbiting compliance. These risks appear to be low relative to the immense cost and considerable technological uncertainty involved in removing large objects from space, are dwarfed by the ~20% historical mission-impacting (but not necessarily mission-ending) failure rate of spacecraft (Frost and Sullivan, 2004), and could be overestimated if improved traffic management techniques lower future collision risks (Johnson, 2004). Hence, the need to bring large objects down from space does not appear to be as clear cut as suggested in Liou and Johnson (2006, 2008). Nonetheless, our model does not incorporate the possibility of intentional catastrophic collisions (ASAT tests, space wars) that could conceivably occur in the future. In addition, Fig. 5 considers only catastrophic collisions, whereas noncatastrophic intact-fragment collisions could easily disable an operational spacecraft. If the operational lifetime risk is modified to include noncatastrophic collisions with fragments >= 10cm, then the sustainable risk rises by ~50%: it increases from 2.19x10^-2 [.0219%] to 3.09x10^-2 in the base case, and increases from 4.91x10^-4 [.000491%] to 7.94x10^-4 in the full compliance case. Moreover, if fragments >= 1 cm (rather than >= 10 cm) are harmful to spacecraft (Johnson, 2004), then we (as well as other researchers) could be underestimating the risk.

#### No risk of space war – its unintended consequences deters aggressors

Handberg 18 - chair of the Political Science Department at University of Central Florida – specializes in space policy, defense policy, the U.S. Supreme Court and judicial politics (Roger Handberg; “Defense & Security Analysis”; “War and rumours of war, do improvements in space technologies bring space conflict closer?”; Routledge: Taylor and Francis Group; pg. 4; Accessed 7/3/18)

The reasons why the space sanctuary approach survived intellectual and political attack is the reality that the result would be a graveyard in terms of sustaining any viable operational presence in low Earth orbit and likely out to the orbital arc. Attacking satellites initially involved nuclear warheads, which could be as devastating to the attacker as to the target. EMP effects from nuclear blasts, even if mitigated for national security space assets, meant that civilian electronic systems in the affected areas are likely to be junk. That effectively defeats the justification for the defensive use of ASAT weapons. The idea being that you defeat the enemy and take possession of the resulting open area, either in space, or on the ground. Alternatively, you reject the use of nuclear weapons because of the after-effects of EMP and radiation depending on the circumstances. Instead, you employ kinetic hit-to-kill (HTK) weapons. The debris fields produced can be extraordinarily large and persistent. The Chinese 2007 ASAT test destroying their aging weather satellite produced one of the largest debris fields ever observed.11 This problem draws much attention, but few remedies exist except establishing international standards calling for de-orbiting satellites if possible, or at the geosynchronous orbit (35,790 km), lifting up out of the orbit into a higher storage orbit. Attacks on orbiting satellites produces much space debris, which only slowly re-enters the atmosphere to burn up on re-entry. For example, Vanguard 1 launched in March 1958 remains in space until the twenty-second century.12 Even more detrimental to any idea of space conflict with its debris issues was the question that became a bigger problem going forward. Whenever a satellite prematurely went out of service, for whatever reason, satellite replacement took time, sometimes multiple years. Replacement was not a particular problem initially when space applications were in their infancy. Terrestrial systems still existed, but as space applications are more integrated into routine military operations; especially when deployed globally, earlier systems either disappear, or are downgraded in importance.

### Adv 2

#### Squo barriers prevent utilization of metals in Africa which proves mining space rocks wont make a difference – Memorial reads blue

1AC Oni 19 [(David, a space industry and technology analyst at Space in Africa. He’s a graduate of Mining Engineering from the Federal University of Technology Akure.) “The Effect of Asteroid Mining on Mining Activities in Africa,” Africa News, 9/24/19, <https://africanews.space/the-effect-of-asteroid-mining-on-mining-activities-in-africa/>] recut srey

At the moment, Asteroid mining poses no threat to terrestrial mining; however, this will not hold for long. The space industry is progressing at such a rapid pace, and the prospects are unequivocally mouth-watering. The big question is, will asteroid mining lure away investors in Africa? The planetary resources company estimates that a single 30-m asteroid may contain 30 billion dollars in platinum alone and a 500m rock could contain half the entire world resources of PGM. Considering the abundance of minerals in asteroids, once asteroid mining materialises, it will severely affect the precious metals market, usurp the prices of rare earth minerals, and a whole lot more because minerals that are usually somewhat scarce on earth will be easily accessible on asteroids. While foreign investors run the majority of the large-scale mining activities in the region, reports say that many African countries are dangerously dependent on mining activities. For some African countries, despite massive mineral wealth, their mining sectors are underdeveloped, and this is as a result of much focus on oil resources and a couple of other challenges. The million-dollar question is, what will become of the mining activities in Africa?

#### No great power war over Africa---deterrence solves, and resource interests don’t cause escalation

Lloyd Thrall 15, Associate at the RAND corporation, M.A. in international studies and diplomacy, SOAS, University of London, PhD student in War Studies at King’s College London, "China’s Expanding African Relations Implications for U.S. National Security," 2015, http://www.rand.org/content/dam/rand/pubs/research\_reports/RR900/RR905/RAND\_RR905.pdf

There is little credible potential for a Sino-American conflict over resources in Africa. Contrary to popular and perennial assumptions about resource wars, industry and energy analysis sources project adequate supply of conventional hydrocarbons beyond 2035.6 Given reservoir depletion curves, any tightening of supply would be gradual. The adequacy of supply is further augmented when tertiary production and unconventional sources are considered (such as shale and tar sands). U.S. strength in unconventional sources, and potential energy independence, further reduces the likelihood of a conflict. Even in a future with vastly inflated hydrocarbon prices, these costs pale in comparison to those associated with a Sino-American war, the economic costs of which likely fall more heavily on China than the United States.7 Global hydrocarbon resources are distributed via a fungible global market, with many stakeholders and moderate diversity of supply. This enables importing states to buy a predictable supply of hydrocarbons at reasonable and competing prices over long contracts. African sources do not constitute a majority of this supply chain, and supposed victory in a theoretical great-power resource war would not guarantee security of resource supply. In sum, the potential for either China or the United States to be willing to enter war with a nuclear adversary over African oil, let alone other, less valuable resources, is extraordinarily small.8

1. https://www.google.com/search?q=resolved+definition&rlz=1C1CHBF\_enUS877US877&oq=resolved+definition&aqs=chrome..69i57.2078j0j7&sourceid=chrome&ie=UTF-8 [↑](#footnote-ref-1)
2. <https://www.google.com/search?q=by+definition&rlz=1C1CHBF_enUS877US877&oq=by+definition&aqs=chrome.0.69i59.1737j0j7&sourceid=chrome&ie=UTF-8> //Xu [↑](#footnote-ref-2)