### 1AC – Debris

#### Asteroid mining spikes the risk of satellite-dust collisions

Scoles 15 [(Sarah Scoles, freelance science writer, contributor at Wired and Popular Science, author of the books Making Contact and They Are Already Here) “Dust from asteroid mining spells danger for satellites,” New Scientist, May 27, 2015, <https://www.newscientist.com/article/mg22630235-100-dust-from-asteroid-mining-spells-danger-for-satellites/>] TDI

* Study this is citing – Javier Roa, Space Dynamic Group, Applied Physics Department, Technical University of Madrid. Casey J Handmer, Theoretical Astrophysics, California Institute of Technology. Both PhD Candidates. “Quantifying hazards: asteroid disruption in lunar distant retrograde orbits,” arXiv, Cornell University, May 14, 2015, <https://arxiv.org/pdf/1505.03800.pdf>

NASA chose the second option for its [Asteroid Redirect Mission](http://www.nasa.gov/content/what-is-nasa-s-asteroid-redirect-mission/), which aims to [pluck a boulder from an asteroid’s surface](https://www.newscientist.com/article/dn27243-rock-grab-from-asteroid-will-aid-human-mission-to-mars) and relocate it to a stable orbit around the moon. But an asteroid’s gravity is so weak that it’s not hard for surface particles to escape into space. Now a new model warns that debris shed by such transplanted rocks could intrude where many defence and communication satellites live – in geosynchronous orbit.

According to [Casey Handmer](http://www.caseyhandmer.com/) of the California Institute of Technology in Pasadena and Javier Roa of the Technical University of Madrid in Spain, 5 per cent of the escaped debris will end up in regions traversed by satellites. Over 10 years, it would cross geosynchronous orbit 63 times on average. A satellite in the wrong spot at the wrong time will suffer a damaging high-speed collision with that dust.

The study also looks at the “catastrophic disruption” of an asteroid 5 metres across or bigger. Its total break-up into a pile of rubble would increase the risk to satellites by more than 30 per cent ([arxiv.org/abs/1505.03800](http://arxiv.org/abs/1505.03800)).

#### Space dust wrecks satellites and debris exponentially spirals

Intagliata 17 [(Christopher Intagliata, MA Journalism from NYU, Editor for NPRs All Things Considered, Reporter/Host for Scientific American’s 60 Second Science) “The Sneaky Danger of Space Dust,” Scientific American, May 11, 2017, <https://www.scientificamerican.com/podcast/episode/the-sneaky-danger-of-space-dust/>] TDI

When tiny particles of space debris slam into satellites, the collision could cause the emission of hardware-frying radiation, Christopher Intagliata reports.

Aside from all the satellites, and the space station orbiting the Earth, there's a lot of trash circling the planet, too. Twenty-one thousand [baseball-sized chunks](https://www.scientificamerican.com/article/orbital-debris-space-fence/) of debris, [according to NASA](https://www.orbitaldebris.jsc.nasa.gov/faq.html). But that number's dwarfed by the number of small particles. There's hundreds of millions of those.

"And those smaller particles tend to be going fast. Think of picking up a grain of sand at the beach, and that would be on the large side. But they're going 60 kilometers per second."

Sigrid Close, an applied physicist and astronautical engineer at Stanford University. Close says that whereas mechanical damage—like punctures—is the worry with the bigger chunks, the dust-sized stuff might leave more insidious, invisible marks on satellites—by causing electrical damage.

"We also think this phenomenon can be attributed to some of the failures and anomalies we see on orbit, that right now are basically tagged as 'unknown cause.'"

Close and her colleague Alex Fletcher modeled this phenomenon mathematically, based on plasma physics behavior. And here's what they think happens. First, the dust slams into the spacecraft. Incredibly fast. It vaporizes and ionizes a bit of the ship—and itself. Which generates a cloud of ions and electrons, traveling at different speeds. And then: "It's like a spring action, the electrons are pulled back to the ions, ions are being pushed ahead a little bit. And then the electrons overshoot the ions, so they oscillate, and then they go back out again.”

That movement of electrons creates a pulse of electromagnetic radiation, which Close says could be the culprit for some of that electrical damage to satellites. The study is in the journal Physics of Plasmas. [Alex C. Fletcher and Sigrid Close, [Particle-in-cell simulations of an RF emission mechanism associated with hypervelocity impact plasmas](http://aip.scitation.org/doi/full/10.1063/1.4980833)]

**Collisions with nuclear powered spacecraft radiate the globe.**

Yuri **Zaitsev**, academic adviser with the Russian Academy of Engineering Sciences, **‘9**, “Russia to develop nuclear-powered spacecraft for Mars mission” http://en.rian.ru/analysis/20091111/156797969.html

Soviet and U.S. nuclear spacecraft programs were marred by a number of accidents.

In April 1964, a U.S. Navy Transit navigation satellite with a radio-isotopic generator onboard failed to reach orbit and disintegrated in the atmosphere, spewing out over 950 grams of plutonium-238. This was more than the total amount of plutonium released during all nuclear explosions by 1964.

In January 1978, Kosmos-954, a Soviet Radar Ocean Reconnaissance Satellite (RORSAT) with a nuclear reactor onboard reentered the atmosphere, after the satellite's reactor core failed to separate and boost it into a nuclear-safe orbit, and fell in Canada, contaminating 100,000 sq. km. of its territory.

In February 1983, the nuclear-powered Soviet satellite Kosmos-1402 went down in the South Atlantic.

The most serious threat involved Cassini-Huygens, a joint NASA/European Space Agency/Italian Space Agency robotic spacecraft mission currently studying the planet Saturn and its many natural satellites, that was launched on October 15, 1997 and which made a gravitational-assist flyby of the Earth on August 18, 1999.

The spacecraft, which had a nuclear reactor with 32.7 kg of plutonium-238, passed only 500 km above the Earth. Up to **five billion people could have got radiation poisoning had the spacecraft plunged into the atmosphere.**

On February 10, 2009, the Iridium-33 telecommunications satellite owned by U.S. company Iridium Satellite LLC and its defunct Russian equivalent, the Kosmos-2251 with a nuclear propulsion unit, collided over northern Siberia. This resulted in potentially hazardous space debris.

At present, **30 Russian** and **seven U.S. spacecraft** with nuclear systems onboard are orbiting the earth at 800-1,100-km altitudes, where **similar collisions can take place**. This makes up for about **40 "potential nuclear explosions**."

If any of these satellites hits a fragment of space junk, it will slow down and eventually **re-enter the atmosphere**, spewing radiation above the Earth and on its surface.

**That causes extinction.**

Karl **Grossman**, professor of journalism at the State University of New York/College of New York, **’96**, "Risking the World: Nuclear Proliferation in Space," Covert Action Quarterly, Summer 1996

To say nothing of the Earth and the life on it if something goes wrong. Plutonium has long been described by scientists as the **most toxic substance known**. It is "so toxic," says Dr. Helen Caldicott, founder of Physicians for Social Responsibility, "that less than one millionth of a gram is a carcinogenic dose. One pound, if uniformly distributed, could hypothetically induce **lung cancer in every person on Earth**." (3)

In addition to the specter of radioactivity spread by an accident on launch, another, potentially more lethal, scenario is causing concern. Because Cassini does not have the propulsion power to get directly from Earth to Saturn, NASA plans a "slingshot maneuver" in which the probe will circle Venus twice and hurtle back at Earth. It will then buzz the Earth in August 1999 at 42,300 miles per hour just 312 miles above the surface. After whipping around Earth and using its gravity, Cassini would then have the velocity, says NASA, to reach Saturn. But during that Earth fly-by, if Cassini comes in too close, it could burn up in the 75 mile-high atmosphere and disperse plutonium across the planet.

Dr. Michio Kaku, professor of nuclear physics at the City University of New York, explains the catastrophic consequence of such a fly-by accident:

"[If] there is a small misfire [of Cassini's] rocket system, it will mean that [it] will penetrate into the Earth's atmosphere and the sheer friction will begin to wipe out the heat shield and it will, like a meteor, **flame into the Earth's atmosphere** ... This thing, coming into the Earth's atmosphere will vaporize, release the payload and then particles of plutonium dioxide will begin to **rain down on populated areas**, if that is where the system is going to be hitting. [Pulverized plutonium dust] will rain down on people's hair, people's clothing, get into people's bodies. And because it is not water soluble, there is a very good chance that it could be inhaled and stay within the body causing cancer over a number of decades." (4)

Indeed, NASA says in its Final Environmental Impact Statement for the Cassini Mission, that if an "inadvertent reentry occurred" during the fly-by, approximately five billion of the seven to eight billion people on Earth, "could receive 99 percent or more of the radiation exposure." (5) As for the death toll, which NASA labels "health effects," the agency says that only 2,300 deaths "could occur over a 50-year period to this exposed population" and these "latent cancer fatalities" would likely be "statistically indistinguishable from normally occurring cancer fatalities among the world population." (6)

However, after reviewing the data in the NASA report, Dr. Ernest Sternglass, professor emeritus of radiological physics at the University of Pittsburgh School of Medicine, concluded that NASA "underestimate[s] the cancer alone by about 2,000 to 4,000 times. Which means that not counting all the other causes of death--infant mortality, heart disease, immune deficiency diseases and all that--we're talking in the order of ten to twenty million extra deaths." The actual death toll, then, the physicist warned, may be as high as 30 to 40 million people. (7)

**Space debris causes china war**

Micah **Zenko**, Whitehead Senior Fellow on the US and Americas Programme at Chatham House, 4-16-20**14**, "Dangerous Space Incidents," Council on Foreign Relations, https://www.cfr.org/report/dangerous-space-incidents?sp\_mid=45655631&sp\_rid=emFjay5iZWF1Y2hhbXBAZ21haWwuY29tS0

A January 2007 direct ascent ASAT test carried out by China against its defunct Fengyun-1C weather satellite instantly increased the amount of space debris in low earth orbit (LEO) by 40 percent. Debris is especially problematic in LEO, where half of the world's 1,100 active satellites operate. Space objects—even flecks of paint—travel as fast as eighteen thousand miles per hour and can cause catastrophic damage to manned and unmanned spacecraft—creating even more debris in the process. The U.S. National Research Council estimates that portions of LEO have reached a "tipping point," with hundreds of thousands of space debris larger than one centimeter stuck in orbit that will collide with other pieces of debris or spacecraft, thus creating exponentially more debris. Significant growth in the quantity or density of space debris could render certain high-demand portions of outer space **unnavigable and inutile**. Currently, there are no legal or internationally accepted means for removing existing debris.

China could also test co-orbital antisatellite systems in which an interceptor spacecraft destroys its target by exploding in close proximity, creating even more debris. For several years, Beijing has conducted a series of close proximity maneuvers with its satellites in LEO; the most recent occurred after a July 20, 2013, launch of three satellites on the same rocket, which have since conducted sudden maneuvers toward other Chinese satellites. Human or operating errors during these maneuvers could inadvertently result in a collision that produces harmful debris. While these maneuvers could eventually be used for civilian purposes, most U.S. officials believe these experiments are primarily intended to demonstrate latent ASAT capabilities.

An ASAT test that causes unintended damage to U.S. and ally satellites or an accident in space caused by debris could trigger a **major international crisis** between the United States and China. The risk is heightened by the fact that both countries have **no pre–space-launch notification arrangements**, similar to the U.S.-Russia agreement on notifications of intercontinental ballistic missile (ICBM) and submarine-launched ballistic missile (SLBM) launches. Management of such a crisis could also be hindered by a lack **of direct communication** between U.S. authorities and the PLA agency that oversees Chinese military space launches.

**China miscalc goes nuclear**

**Kulacki 16** — Gregory Kulacki, China Project Manager in the Global Security Program at the Union of Concerned Scientists, former Associate Professor of Government at Green Mountain College, former Director of External Studies at Pitzer College, former Director of Academic Programs in China for the Council on International Educational Exchange, holds a Ph.D. in Political Theory from the University of Maryland-College Park, holds graduate certificates in Chinese Economic History and International Politics at Fudan University (Shanghai), 2016 (“The Risk of Nuclear War with China: A Troubling Lack of Urgency,” Union of Concerned Scientists, May, Available Online at <http://www.ucsusa.org/sites/default/files/attach/2016/05/Nuclear-War-with-China.pdf>, Accessed 06-28-2016)

No Technical Exit

As long as both sides remain committed to pursuing technical solutions to their unique strategic problems, they are condemned to continue competing indefinitely. But stalemate is not a stable outcome; rather, it is **a perpetual high-wire act**. Twenty-four hours a day, 365 days a year, the governments of the United States and China are **a few poor decisions away** from starting a war that could **escalate rapidly and end in a nuclear exchange**.

Lack of mutual trust and a growing sense that their differences may be irreconcilable incline both governments to continue looking for military solutions—for new means of coercion that help them feel more secure. Establishing the trust needed to have confidence in diplomatic resolutions to the disagreements, animosities, and suspicions that have troubled leaders of the United States and the PRC for almost 70 years is extremely difficult when both governments take every new effort to up the technological ante as an act of bad faith.

The bilateral dialogues on strategic stability aim to manage the military competition, but they do not seek to end it. Although the two governments work very hard at avoiding conflict, they have yet to find a way out of what Graham Allison called their “Thucydides trap”—the risk of conflict between a rising power and an established power invested in the status quo (Allison 2015). Allison’s warning not to minimize the risks of war is sage advice, even if he does not say how the United States and China can escape the trap he describes. [end page 8]

PRC leaders believe it is possible to prosecute a major war **without risking** a U.S. nuclear attack. The leaders of the United States believe stopping the PRC from prosecuting such a war may depend, in certain contingencies, on a **credible threat** to use nuclear weapons—a threat U.S. leaders state they are prepared to execute. These **mismatched perceptions** increase both the **possibility of war** and the likelihood it will result in the use of **nuclear weapons**.

Well-informed U.S. officials tend to dismiss the possibility that the United States and the PRC could wander into a nuclear war. For example, Admiral Dennis Blair, a former Director of National Intelligence whose final military post was Commander in Chief of the U.S. Pacific Command, assured a large gathering of U.S. arms-control experts that “the chances of a nuclear exchange between the United States and China are somewhere between nil and zero.” J. Stapleton Roy, a former U.S. ambassador to the PRC, wholeheartedly agreed (Swaine, Blair, and Roy 2015). Similarly, PRC military strategists and arms control experts believe that the risk of nuclear war with the United States is not an urgent concern even if that risk may not be zero (Cunningham and Fravel 2015).

This lack of urgency is troubling. For example, the United States reportedly told the PRC it would risk military escalation to prevent or stop a proposed PRC island reclamation project in the Scarborough Shoal (Cooper and Douglas 2016). The PRC reportedly responded by committing to move ahead with the project later in 2016 (Chan 2016). This particular contest of wills is part of a steadily increasing number of unresolved diplomatic spats that have escalated to the level of overt military posturing reminiscent of U.S.-Soviet jousting during the Cold War.

The United States and the PRC are decades-old enemies, preparing for war and armed with nuclear weapons. Good faith efforts by the leaders of both nations have failed to stop accelerating preparations for war, including new investments in their nuclear forces. **Miscommunication**, **misunderstanding**, or **poor judgment** could spark a conflict that both governments may find difficult to stop.

War between the United States and the People’s Republic of China is not inevitable, but failing to acknowledge the risks is **certain to make it more likely**. Both governments should confront these risks with a greater sense of purpose. Only then will they devote the same measure of creativity, effort, and resources to **the diplomacy of reducing those risks** as they now spend preparing for war.

### 1AC – War

#### Private space mining is ramping up and causes global war -

#### 1] Asset protection – companies want security for investments

**Funnell 18** Antony Funnell [Antony Funnell is a Walkley Award-winning journalist and broadcaster. He is the presenter of the Future Tense series on ABC Radio National and is a former host of The Media Report], 8-1-2018, " War in space 'inevitable' because there's so much money to be made, expert warns," ABC Radio National, [https://www.abc.net.au/news/2018-08-24/conflict-in-space-is-inevitable-expert-warns/10146314 //](https://www.abc.net.au/news/2018-08-24/conflict-in-space-is-inevitable-expert-warns/10146314%20//) ash

A leading Australian space law expert has warned conflict over space assets is "inevitable", and more needs to be done now to avert the potential for hostility.

Professor Melissa de Zwart, the Dean of Law at the University of Adelaide, says growing commercial interest in the mining of precious minerals on asteroids and planets has heightened the danger.

"I think you have to be a realist about that," she said.

"Where you have resources, where you have competition for those resources, where you have investment of money in the extraction of those resources ... there will be an expectation of security around that investment."

While full-scale mining is yet to be tried, there is significant international interest.

Japanese aerospace agency Jaxa has already successfully landed a robotic craft on an asteroid and taken samples. It currently has another probe hovering over an asteroid named Ryugu.

Two American companies — Deep Space Industries and Planetary Resources — are thought to be the leaders in the field, but in May this year a UK firm called Asteroid Mining Corporation also entered the race.

"Those corporations will be looking to the nation-state to say, well, are you going to protect our investment in this business?" Professor de Zwart said.

A very crowded space

The US Government and American firms continue to play a dominant role in more traditional space technology development and deployment.

SpaceX, for example, is a major private supplier of rockets, while the US Air Force currently coordinates international satellite traffic, providing advanced warnings about potentially dangerous space debris.

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"Those corporations will be looking to the nation-state to say, well, are you going to protect our investment in this business?" Professor de Zwart said.

#### 2] Land grabs – armed satellites will compete over asteroids

**Skibba 18** Ramin Skibba [Current Assistant Project Scientist at UCSD studying the evolution of galaxy clustering. Ph.D. in Physics & Astronomy at the University of Pittsburgh], 5-2-2018, " Mining in Space Could Lead to Conflicts on Earth," Nautilus, <https://nautil.us/blog/-mining-in-space-could-lead-to-conflicts-on-earth> // ash

Space mining is no longer science fiction. By the 2020s, Planetary Resources and Deep Space Industries—for-profit space-mining companies cooperating with NASA—will be sending out swarms of tiny satellites to assess the composition of hurtling hunks of cosmic debris, identify the most lucrative ones, and harvest them. They’ve already developed prototype spacecraft to do the job. Some people—like Massachusetts Institute of Technology planetary scientist Sara Seager, former NASA deputy administrator Lori Garver, and science writer Phil Plait—argue that, to continue advancing as a space-faring species, we need to embrace this commercial space mining industry, and perhaps even facilitate it, too. But should we?

This question concerns me, as both an astrophysicist and a space enthusiast. Before becoming a science communicator, I worked for 15 years researching the evolution of galaxies, the properties of dark matter, and the expansion of the universe. From that perspective, the distance from us to the asteroid belt is actually rather small, so the question of whether to mine it, and in what way, hits close to home. The Space Act of 2015 authorizes the U.S. president “to facilitate the commercial exploration and utilization of space resources to meet national needs.” It’s an exciting prospect, to be sure, but also a troubling one.

For one thing, it appears to violate international law, according to Congressional testimony by Joanne Gabrynowicz, a space law expert at the University of Mississippi. Before NASA’s moon landing, the United States—along with other United Nations Security Council members and many other countries—signed the 1967 Outer Space Treaty. “Outer space, including the moon and other celestial bodies,” it states, “is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.” The 1979 Moon Agreement went further, declaring outer space to be the “common heritage of mankind” and explicitly forbidding any state or organization from annexing (non-Earth) natural resources in the solar system.

Major space-faring nations are not among the 16 countries party to the treaty, but they should arguably come to some equitable agreement, since international competition over natural resources in space may very well transform into conflict. Take platinum-group metals. Mining companies have found about 100,000 metric tons of the stuff in deposits worldwide, mostly in South Africa and Russia, amounting to $10 billion worth of production per year, according to the U.S. Geological Survey. These supplies should last several decades if demand for them doesn’t rise dramatically. (According to Bloomberg, supply for platinum-group metals is constrained while demand is increasing.)

Palladium, for example, valued for its conductive properties and chemical stability, is used in hundreds of millions of electronic devices sold annually for electrodes and connector platings, but it’s relatively scarce on Earth. A single giant, platinum-rich asteroid could contain as much platinum-group metals as all reserves on Earth, the Google-backed Planetary Resources claims. That’s a massive bounty. As Planetary Resources and other U.S. and foreign companies scramble for control over these valuable space minerals, competing “land grabs” by armed satellites may come next. Platinum-group metals in space may serve the same role as oil has on Earth, threatening to extend geopolitical struggles into astropolitical ones, something Trump is keen on preparing for. Yesterday he said he’s seriously weighing the idea of a “Space Force” military branch.

Moreover, the technology that might enable this free-for-all—versatile “nanosatellites,” no larger than a loaf of bread—is relatively inexpensive. While reporting for a story about these tiny satellites, also known as CubeSats, I came across some missions applicable to mining asteroids. In November, NASA will launch a satellite for a mission called Near-Earth Asteroid Scout, for example. It will deploy a solar sail, propel itself with sunlight, and journey to the asteroid belt, where it will scope out a particular asteroid and analyze its properties. NASA has also awarded grants to Planetary Resources to advance the designs of spectral imagers and propulsion systems for CubeSats, and other missions will develop the satellites’ abilities to communicate and network with each other. NASA also awarded Deep Space Industries contracts to assess commercial approaches for NASA’s asteroid goals, which may involve hosting DSI’s asteroid-prospecting equipment on its missions.

Like all forms of mining, it will be dangerous. If space-mining activities break up asteroids, the resulting debris could be hazardous for satellites, other spacecraft, and astronauts nearby. On the other hand, in a best-case scenario, space mining could be environmentally safe, capture only necessary minerals and water, and, in the more distant future even lead to the construction of a far-flung space station led by NASA and other space agencies, orbiting 200 million miles from Earth and serving as both a mining depot and a pit-stop for passing spacecraft.

But it’s not clear that a pact between the commercial space mining industry and NASA would align with the public’s interest. NASA’s increasing collaboration with space mining companies could distort and divert efforts previously focused on space exploration and basic research, and discourage public interest and engagement in astronomy.

For example, Seager advocated for space mining at a science writing conference I attended in 2015. She’s part of a motley group of advisors for Planetary Resources, including the movie director James Cameron, a lawyer for a prominent Washington D.C. firm, and Dante Lauretta, another astronomer whom I respect. Seager seems to believe that encouraging private space mining will lead to more investments and technological innovation that would enable more scientific research. In a 2012 interview with The Atlantic, for instance, she said, “The bottom line is that NASA is not working the best that it could for space science right now, and so in order for people like me to succeed with my own research goals, the commercial space industry needs to be able to succeed independently of government contracts.”

But if the U.S. and U.S.-based companies lay claim to the richest and most easily accessible prospecting sites, not allowing other companies and nations to share in the wealth, economic and political relations could be damaged. That’s why this seems to be a dangerous path for space explorers. Once you’re on board with the commercial space industry, then you as a researcher must accept, if not support, everything that comes with it. Seager and a few other researchers may be willing to take this risk, but what about the rest of the space science community? Moreover, to succeed, these businesses will seek profitable missions, while science, exploration, and discovery—goals that stimulate public interest—will inevitably have lower priority. (Other commercial spaceflight companies, like Elon Musk’s SpaceX, do generate public interest, but they’re not directly involved in mining asteroids.) NASA may have its shortcomings, but at least its missions and research goals answer to the public. It’s not exactly a welcome thought to imagine more and more of our presence and activity in space being ceded, with NASA’s help, to private industry.

#### 3] Conflicting legal interpretations spark international war

**Thompson 16** Clive Thompson [Clive Thompson (@pomeranian99) is a WIRED contributing editor and author of Coders: The Making of a New Tribe and the Remaking of the World], 01.14.2016, "The Minerals Found in Asteroids and Faraway Planets Could Be Worth Trillions. Who Gets to Mine Them?," Wired, <https://www.wired.com/2016/01/clive-thompson-11/> // ash

SPACE IS LOUSY with profits. Consider the asteroid Ryugu: It’s made of so many tons of nickel, iron, cobalt, and water, it’s worth an estimated $95 billion. Venture into deeper space and there’s even richer plunder---like Davida, an asteroid that the wanna-be space mining company Planetary Resources values at more than $100 trillion. That’s more than five times the GDP of the US.

These jaw-dropping payloads are why extraterrestrial mining is becoming an increasingly serious endeavor. Companies like Planetary Resources, backed by the likes of Googlers Larry Page and Eric Schmidt, are already launching satellites to scan for the most promising asteroids. Space experts say some firm could be ready to launch a mission within 10 years. But are they allowed to? Of course, anyone can reach an asteroid---NASA already has. But can you own one?

Let’s start with existing space law. The big one on the books is the 1967 Outer Space Treaty. Ratified by 103 countries, including the spacefaring ones, it prohibits anyone from “appropriating” territory in space. (There’s an even more restrictive 1979 Moon Treaty as well, but the spacegoing countries haven’t signed, so it’s probably less relevant.) The upshot, most space-law scholars agree, is that nobody can claim a celestial body for their own.

But what about just extracting resources and bringing them home? The issue hasn’t been litigated, but extraction is probably legally OK. Indeed, there’s precedent: The US brought 842 pounds of rocks back from the moon, and they’re designated as property of the US. No other country has disputed that ownership; in fact, the US and USSR traded moon rocks and regolith. “Russia has even sold some commercially,” says James Dunstan, a spacelaw expert with the Mobius Legal Group.

The big wrinkle may not be whether it’s legal to mine an asteroid but how to figure out who has permission and who owns what claims. The US has no agency or process to issue licenses for space mining. “The politics can’t be known, but there will be politics,” says Joanne Gabrynowicz, a spacelaw expert at the University of Mississippi. Licenses give clarity not only to would-be miners but also to investors and governments starting their own operations. “If you don’t have that license, the investors are taking a big chance,” she says.

The US is now drawing up a law. Problem is, it’s unilateral and incomplete. The Commercial Space Launch Competitiveness Act of 2015 says citizens can “possess, own, transport, use, and sell” an asteroid resource once they obtain it. But the bill doesn’t establish an agency or process for issuing licenses. Worse, it says your ownership claim begins as soon as you detect the existence of metals on an asteroid. You don’t even have to plant a flag. But what if China and Russia have different ideas—and different laws for their own citizens? Commercial activity in distant space could easily cause seething international strife here on our home planet.

#### Nuke war causes extinction – it won’t stay limited

Edwards 17 [(Paul N. Edwards, CISAC’s William J. Perry Fellow in International Security at Stanford’s Freeman Spogli Institute for International Studies. Being interviewed by EarthSky/card is only parts of the interview directly from Paul Edwards.) “How nuclear war would affect Earth’s climate,” EarthSky, September 8, 2017, earthsky.org/human-world/how-nuclear-war-would-affect-earths-climate] TDI

We are not talking enough about the climatic effects of nuclear war.

The “nuclear winter” theory of the mid-1980s played a significant role in the arms reductions of that period. But with the collapse of the Soviet Union and the reduction of U.S. and Russian nuclear arsenals, this aspect of nuclear war has faded from view. That’s not good. In the mid-2000s, climate scientists such as Alan Robock (Rutgers) took another look at nuclear winter theory. This time around, they used much-improved and much more detailed climate models than those available 20 years earlier. They also tested the potential effects of smaller nuclear exchanges.

The result: an exchange involving just 50 nuclear weapons — the kind of thing we might see in an India-Pakistan war, for example — could loft 5 billion kilograms of smoke, soot and dust high into the stratosphere. That’s enough to cool the entire planet by about 2 degrees Fahrenheit (1.25 degrees Celsius) — about where we were during the Little Ice Age of the 17th century. Growing seasons could be shortened enough to create really significant food shortages. So the climatic effects of even a relatively small nuclear war would be planet-wide.

What about a larger-scale conflict?

A U.S.-Russia war currently seems unlikely, but if it were to occur, hundreds or even thousands of nuclear weapons might be launched. The climatic consequences would be catastrophic: global average temperatures would drop as much as 12 degrees Fahrenheit (7 degrees Celsius) for up to several years — temperatures last seen during the great ice ages. Meanwhile, smoke and dust circulating in the stratosphere would darken the atmosphere enough to inhibit photosynthesis, causing disastrous crop failures, widespread famine and massive ecological disruption.

The effect would be similar to that of the giant meteor believed to be responsible for the extinction of the dinosaurs. This time, we would be the dinosaurs.

Many people are concerned about North Korea’s advancing missile capabilities. Is nuclear war likely in your opinion?

At this writing, I think we are closer to a nuclear war than we have been since the early 1960s. In the North Korea case, both Kim Jong-un and President Trump are bullies inclined to escalate confrontations. President Trump lacks impulse control, and there are precious few checks on his ability to initiate a nuclear strike. We have to hope that our generals, both inside and outside the White House, can rein him in.

North Korea would most certainly “lose” a nuclear war with the United States. But many millions would die, including hundreds of thousands of Americans currently living in South Korea and Japan (probable North Korean targets). Such vast damage would be wrought in Korea, Japan and Pacific island territories (such as Guam) that any “victory” wouldn’t deserve the name. Not only would that region be left with horrible suffering amongst the survivors; it would also immediately face famine and rampant disease. Radioactive fallout from such a war would spread around the world, including to the U.S.

It has been more than 70 years since the last time a nuclear bomb was used in warfare. What would be the effects on the environment and on human health today?

To my knowledge, most of the changes in nuclear weapons technology since the 1950s have focused on making them smaller and lighter, and making delivery systems more accurate, rather than on changing their effects on the environment or on human health. So-called “battlefield” weapons with lower explosive yields are part of some arsenals now — but it’s quite unlikely that any exchange between two nuclear powers would stay limited to these smaller, less destructive bombs.

### AC – Plan

#### Plan – states ought to ban the appropriation of outer space for mining activities by private entities.

#### Normal means is ratification of the Moon Treaty

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A third possible option is to get a larger global endorsement of the Moon Treaty, which highlights the common heritage of mankind. The Moon Treaty is important as it addresses a “loophole” of the OST “by banning any ownership of any extraterrestrial property by any organization or private person, unless that organization is international and governmental.”[[lxiv]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn64) But the fact that it has been endorsed only by a handful of countries makes it a “failure” from the international law perspective.[[lxv]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn65) Nevertheless, efforts must be made to strengthen the support base for the Moon Agreement given the potential pitfalls of resource extraction and space mining activities in outer space. Signatories to the Moon Treaty can take the lead within multilateral platforms such as the UN to debate the usefulness of the treaty in the changed context of technological advancements and new geopolitical dynamics, and potentially find compromises where there are disagreements.

### AC - Util

#### The standard is maximizing expected well-being.

#### 1] Phenomenal introspection --- it’s the most epistemically reliable --- historical moral disagreement over internal conceptions of morality such as questions of race, gender, class, religion, etc prove the fallibility of non-observational based ethics --- introspection means we value happiness because we can determine that we each value it --- just as I can observe a lemon’s yellowness, we can make those judgements about happiness.

#### 2] Actor specificity. Policymaking must be consequentialist since collective action results in conflicts that only util can resolve. Side constraints freeze state action since policy makers have to consider tradeoffs between multiple people. States lack intentionality since they're composed of multiple individuals—there is no act-omission distinction for them since they create permissions and prohibitions in terms of policies so authorizing action could never be considered an omission since the state assumes culpability in regulating the public domain.

3] Only consequentialism explains degrees of wrongness—if I break a promise to meet up for lunch, that is not as bad as breaking a promise to take a dying person to the hospital. Only the consequences of breaking the promise explain why the second one is much worse than the first. Intuitions outweigh—they’re the foundational basis for any argument and theories that contradict our intuitions are most likely false even if we can’t deductively determine why