I negate resolved: The Appropriation of outer space by private entities is unjust

My value is Justice as stated by the resolution

As stated by Cornell 20,

https://www.law.cornell.edu/wex/justice

[Justice is] The ethical, philosophical **idea that people are to be treated impartially, fairly, properly, and reasonably by the law and by arbiters of the law,** that laws are to ensure that no harm befalls another, **and that, where harm is alleged, both the accuser and the accused receive a morally right consequence merited by their actions**

My value Criterion is Saving Lives

1. Lives are the basis for human values

Weiwei, Ai, January **2019**, https://www.theguardian.com/commentisfree/2019/jan/01/human-dignity-danger-ai-weiwei

[Lives are]If we truly believe in values that we can all identify with and aspire to – **a recognition of truth, an understanding of science, an appreciation of the self, a respect for life and** a faith in society – then we need to eliminate obstacles to understanding, uphold the fundamental definition of humanity, affirm **the shared value of human lives** and other lives, and acknowledge the symbiotic interdependency of human beings and the environment. A belief in ourselves and a belief in others, a trust in humanitarianism's power to do good, and **an earnest recognition of the value of life – these form the foundation for all human values and all human efforts.**

2. Extinction outweighs everything- having human life is a prerequisite to achieving any other framework. Without humans existing, nothing can be accomplished or furthered.

Contention 1: Planetary Defense

Asteroids, big and small, present a major risk that private companies solve

Don A. **Nelson**, Retired NASA Mission Planner, January 1, **2020**.

https://aerospaceamerica.aiaa.org/departments/more-than-government-work/ //SJ.

To date, **approximately 20,000 near-Earth asteroids have been discovered,** of which **800** have been **classified by NASA as possible impact risks**, because they are **greater than 500 feet** (152 meters) in **size** and their orbits bring them within 4.7 million miles (7.6 million kilometers) of Earth's orbit. The trouble is, **size alone doesn't determine** destructive **power.** The density and the angle of entry into the atmosphere determine how much kinetic energy is generated. It is these **small asteroids** that **are** the **most concerning.** They **impact Earth at a greater frequency and** far too **often are not discovered until a few days before their impact.**

The small undetected asteroid that broke up over Chelyabinsk, Russia, on Feb. 15, 2013, created a shock wave that shattered glass and injured about 1,200 people. It would have been far worse if it had been an iron core asteroid with a high entry angle into the atmosphere. Or consider **Asteroid 2008TC3, estimated to be 4 meters and discovered the day before it broke up on Oct. 7, 2008, and scattered at least 600 extremely hot fragments** over the Nubian Desert. Had this occurred over a dry forest region, the outcome would have been far different.Or last March, BBC News reported that a **"space rock" exploded in the atmosphere** the previous December but that the event went largely unnoticed because the explosion was over the Bering Sea. Last **July, our planet reportedly had a near miss with a city-killer asteroid.**

And yet, on its Planetary Defense webpage, NASA says, "No known asteroid poses a significant risk of impact with Earth over the next 100 years." The statement is true, but the key word is "known." Surprises from smaller asteroids happen fairly regularly.

Consider these questions: Is there a credible asteroid threat that requires the immediate development of a planetary defense system? Can the requirements for the system be defined? Can this system be built and operated without significant government funding? This old retired NASA engineer believes the answer to each of these questions is yes.

The three requirements for the defense system are: rapid deployment, reliability and affordability. Such an asteroid defense system must be able to detect the threat, provide rapid access to inspect the object and categorize the degree of danger and the ability to neutralize it.

It would be cost prohibitive for the U.S. and partner governments to develop stand-alone launch vehicles and deflection devices for this purpose. Rather, the need for planetary defense must be a participating part of the developing 21st-century commercial space transportation system programs. For cost-effective and reliable commercial space operations, the private-sector transportation system must include reusable launchers and space tugs based in orbit. These vehicles will for that reason meet the defense system requirements for rapid launch and access to the threat. **Future civil, military and commercial satellites in addition to their primary function could be equipped with sensors to identify asteroid threats.** Since there are no new technology requirements demanded of the vehicles for planetary defense, they can be developed by the private sector with minimum or no government funding.vRapid deployment can be achieved only with reusable launch vehicles. There may not be an inventory of expendable launchers available when an asteroid threat is discovered. Also, expendable launchers cannot achieve the required reliability because of undetected manufacturing errors on vehicles whose first flight is the only flight. Reusable launchers and space-based vehicles have the potential to achieve a failure rate equivalent to commercial aircraft.

Private Companies are solving the requirements for a defense system

Tom **Agan**. Harvard Business Review writer. . What SpaceX Can Teach Us About Cost Innovation. 4-25-**2013**
https://hbr.org/2013/04/what-spacex-can-teach-us-about

Earlier this week, the space-transport start-up **SpaceX had its most successful launch** test yet with Grasshopper, **the first fully and rapidly reusable rocket.** This is **the latest step** in the company's journey **to dramatically reduce the cost of space travel**, and follows the first private resupply of the International Space Station with the launch of their Falcon 9 rocket and Dragon spacecraft last fall. Initially when the start-up's founder, serial entrepreneur Elon Musk, looked at the space industry, he faced a quandary about where to innovate, given the restrictions and mandatory performance criteria for space travel. **Musk quickly zeroed in on the one area ripe for innovation: cost reduction.** He gathered a team with a wide cross-section of expertise and put them to work at trimming the fat. **NASA has tried for decades to provide low-cost space flight — that was the failed promise of the Space Shuttle** — a reusable spacecraft to avoid the expensive building of a new craft for each mission. The complexity of the Shuttle and its reliance on 1970's technology drove costs up. Contractors paid based on their costs, with little incentive to save, increased them even more. Working against NASA as well was a heritage of exploration: unique space missions that pushed technologies and space travel to the edge. It was fundamentally different from the mindset of low-cost frequent and standardized transport that SpaceX embraces today. **Heise, 18** -- Managing Notes Editor, Michigan Journal of International Law
[Jack, "Space, the Final Frontier of Enterprise: Incentivizing Asteroid Mining Under a Revised International Framework, 40 Mich. J. Int'l L. 189, 2018, https://repository.law.umich.edu/mjil/vol40/iss1/5, accessed 6-24-21]

Commercial Space Mining also aids in planetary defense

Heise, 18 -- Managing Notes Editor, Michigan Journal of International Law
[Jack, "Space, the Final Frontier of Enterprise: Incentivizing Asteroid Mining Under a Revised International Framework, 40 Mich. J. Int'l L. 189, 2018, https://repository.law.umich.edu/mjil/vol40/iss1/5
A casual Internet search for asteroid mining is likely to turn up **sky-high dollar value estimates of asteroids**. From Neil deGrasse Tyson saying that asteroid mining will make the first trillionaire,12 to a Goldman Sachs note stating that a single asteroid could contain **$25–$50 billion** worth of platinum relative to a $2.6 billion cost of an asteroid-grabbing spacecraft,13 to reports that NASA is sending a probe to an asteroid worth **$10,000 quadrillion**, the profit element of this enterprise is not lost on observers.14 However, these estimates depend on the extraction of metals like platinum, their return to Earth, and sale at the current market price, which, as the aforementioned Goldman Sachs note concedes, would "crater the global price of platinum . . . ."15

Instead of attempting to mine metals, the initial step in asteroid mining proposed by Planetary Resources, the most prominent asteroid mining company in existence today, is to **mine asteroids for water**.16 By making propellant available in space, asteroid mining "increases the payload capacity of rockets, enables the creation of a space highway with fuel depots located at various points of need throughout the Solar System, and allows spacecraft to **travel much farther**."17 In other words, the business of asteroid mining, at least in its infancy, is not about harvesting valuable metals and returning them to Earth,18 but rather about **providing raw materials** to enable the **growth of the space economy**.

The impetus to provide in-space materials to the space economy is a matter of physics. Launching an object into space is expensive: SpaceX's Falcon 9—with the capacity to carry just over 50,000 pounds of payload into low Earth orbit19—costs an estimated $36.7 million to launch and uses between $200,000 and $300,000 in fuel each trip.20 If asteroid mining companies were able to provide some of the **propellant in space**, that would **not only reduce fuel costs**, but would **reduce the overall launch weight**, **freeing up more space for payload**.21

In sum, should asteroid mining companies be able to provide fuel in space, it could **dramatically reduce the costs** of transporting rockets and cargo into space—both into **low Earth orbit** and to **more distant targets**, like Mars. Having this infrastructure in place could also **reduce the long-term costs** of the asteroid mining business itself, given that the business model involves launching objects into space. While a 2012 study estimated the total cost of an asteroid retrieval mission at $2.6 billion,22 a substantial reduction in launch costs would result in meaningful savings.23 This model of asteroid mining as a provider of in-space resources, then, can facilitate the growth of the space economy: future forays into space would have their costs greatly reduced by a "space highway with fuel depots."24

B. Public and Private Actors in the Asteroid Mining Space

Both private companies and the space agencies of sovereign governments bear mentioning in a full discussion of asteroid mining. The role of the private sector in space has expanded substantially in the past decade, leading some commentators to suggest that the private sector has eclipsed the public sector in this arena.25 The asteroid mining industry, as detailed above, both depends upon and tends to facilitate this development. Sovereign space agencies, by contrast, conduct a waning share of activity in space and increasingly operate by way of public-private partnerships as an investor in the space economy.26 This marks an important shift from the factual backdrop of the original OST in that private, independent companies are increasingly taking the wheel.

As explored above, the asteroid mining business facilitates the **growth of the space economy** by reducing launch costs. However, the future of asteroid mining as a **lucrative industry** also depends upon the existence and growth of a **robust space economy**. The **symbiotic relationships** that could develop between private companies deserves emphasis. The viability of asteroid mining depends on a space economy to which asteroid mining companies can **sell fuel and metals**: the lack of a current market in asteroid resources should **resolve itself** "when the space population hits critical mass, demanding infrastructure."27 For spaceflight companies,28 a crucial component to reduce costs is access to propellant in space.29

Sovereign governments continue to play a significant, albeit declining, role in the space economy. NASA's share of the national budget decreased from 4.4% in 1966 to 0.5% in 2014.30 Its current strategy centers on partnership with the private space economy: "NASA helps mitigate financial risk, while the private sector conducts research and innovation more efficiently than NASA can . . . ."31 Similarly Luxembourg, which lacks its own space agency,32 opened a 200 million Euro fund in 2016 to bring asteroid mining companies to the country.33 Planetary Resources has availed itself of opportunities offered by both NASA and Luxembourg, performing contract work with the former and securing funding from the latter.34

While sovereign governments do hold some of the purse strings relevant to asteroid mining companies and the space economy as a whole, private companies are **increasingly displacing national space agencies**.35 A private space economy that is **increasingly independent from sovereign governments** tends to undermine the factual framework upon which the original OST relied.36 Specifically, Article VI assigns responsibility for nongovernmental entities to national governments, the implicit assumption likely being that private entities would be acting at the behest of a sovereign.37 This concern is increasingly unsubstantiated in an environment in which private, independent companies are ascendant.38

C. Global Benefits of Asteroid Mining

Asteroid mining has the potential to **facilitate space travel**, an outcome the OST holds to be in the interest of **humanity as a whole**.39 The potential of asteroid mining to **reduce the cost of spaceflight**, moreover, could **facilitate the growth of the space economy**. Asteroid mining thus aligns with another stated purposes of the OST in the sense that an expanded space economy could provide **substantial benefits to all mankind**.40 **First**, in seeking to face the challenges posed by space travel, the public sector space race gave rise to **numerous technological innovations**, ranging from LEDs to emergency blankets to memory foam.41 It seems likely that the private space race would result in a **similar degree of innovation**, the products of which could **benefit people across the globe**.

Second, a successful mission to Mars could provide benefits beyond a mere sense of interplanetary accomplishment. NASA suggests that, given the parallels between the formation and evolution of Mars and Earth, a voyage there could help "us learn more about our own planet's history and future."42 The scientific advancements from such a mission cannot currently be anticipated and are **difficult to predict**, but "expand[ing] the frontiers of knowledge" in this manner could well bring **benefits to all mankind**.43

Third, the development of asteroid mining technology could also help **advance asteroid diversion tactics**. The **development of the technology** required to conduct successful asteroid mining operations could "help us to divert any incoming asteroids."44 This is of **great importance** since NASA recently eliminated its Asteroid Redirect Mission due to funding cuts;45 NASA's project was hailed by some scientists as a "critical step in demonstrating we can protect our planet from a future asteroid impact . . . ."46 Asteroid mining could step in and **fill an important void**.

While the probability of an Armageddon-causing impact is low, the effects of an **impact** would be **extremely severe**.47 Even **some mitigation** of this risk as a byproduct of asteroid mining would be a **benefit to humanity as a whole**.

Finally, reduced launch costs could facilitate measures to **combat global climate change**. One proposed solution for canceling out predicted increases in average worldwide temperature is to "prevent[] . . . about **1%** of incoming solar radiation—insolation—from reaching the Earth. This could be done by **scattering into space** from the vicinity of Earth an appropriately small fraction of total insolation."48 Asteroid mining could facilitate such measures in that "[t]echnologies that could **greatly decrease the cost of space-launch** could make a telling difference in the practicality of all types of **spacedeployed scattering systems of scales** appropriate to insolation modulation."49 There are certainly intermediate measures to combat climate change that ought to be taken first, but asteroid mining would **facilitate this expedited solution**. While some of the benefits of asteroid mining would doubtless accrue primarily to those nations with asteroid mining companies within their borders, the benefits noted in this section—space exploration as a **general proposition**, **technological and scientific development**, improvement of **asteroid diversion technology**, and facilitated means of **swiftly countering climate change**—would **inure substantially to the benefit of all mankind**.

Asteroids cause extinction
Higgins, 18 -- correspondent at Vox
[Abigail, covers international development, global health, poverty, and gender. Before Vox she was a foreign correspondent and researcher in East Africa writing for The Washington Post, The Guardian, and Foreign Policy, among others, "10 ways the world is most likely to end, explained by scientists", 10-18-18, Vox, https://www.vox.com/future-perfect/2018/10/18/17957162/nuclear-war-asteroid-volcano-science-climate-change, accessed 12-4-19]

Asteroids are rocks that revolve around the sun and that occasionally collide with the Earth. An asteroid large enough to **cause a global catastrophe** hits Earth **every 120,000 years**, scientists estimate. It's likely what **killed the dinosaurs**, and if an asteroid even **one-tenth the size** of the one that **caused their extinction** hit Earth today, the results would be **devastating**. Scientists estimate it could **release enough particles** to **block the sun for months** and cause a **famine killing hundreds of millions**.
NASA announced in 2011 that it had mapped more than 90 percent of objects in space larger than 1 kilometer in diameter, and that none of them are likely to hit Earth. But there's **still a lot we don't know** about smaller objects that, while unlikely to cause a global catastrophe, could have a **big enough local impact** to **disrupt social and economic systems**.

Contention 2: Space Tech

Subpoint A: Solar Panels

Asteroid Mining creates solar panels in space
Chris **Taylor**. . How asteroid mining will save the Earth — and mint trillionaires. May 2, **2019**
https://mashable.com/feature/asteroid-mining-space-economy
Secondly, there's the climate change fix. Suarez sees **asteroid mining** as **the only way we're going to build solar power satellites.** Which, as you probably know, is **a form of uninterrupted solar power collection that is theoretically more effective**, inch for inch, than any solar panels on Earth at high noon, but **operating 24/7.** (In space, basically, it's always double high noon). The power collected is beamed back to large receptors on Earth with large, low-power microwaves, which researchers think will be harmless enough to let

humans and animals pass through the beam. A space solar power array like the one China is said to be working on could reliably supply 2,000 gigawatts — or over 1,000 times more power than the largest solar farm currently in existence. "We're looking at **a 20-year window to completely replace human civilization's power infrastructure,"** Suarez told me, citing the report of the Intergovernmental Panel on Climate Change on the coming catastrophe. Solar satellite technology "has existed since the 1970s. What we were missing is millions of tons of construction materials in orbit. **Asteroid mining can place it there."** The Earth-centric early 21st century can't really wrap its brain around this, but the idea is not to bring all that building material and precious metals down into our gravity well. Far better to create a whole new commodities exchange in space. **You mine the useful stuff of asteroids both near to Earth and far**, thousands of them taking less energy to reach than the moon. That's something else we're still grasping, how relatively easy it is **to ship stuff in zero-G environments.** For those who worry about asteroids that could wipe out civilization — though luckily, this isn't likely to happen any time soon — here is a way for humanity to get proficient in moving them out of the way, fast. Indeed, **the National Space Society has offered a proposal to capture the asteroid Aphosis** (which is set to miss Earth in the year 2029, but not by a very comfortable margin)**, keep it in orbit, and turn it into 150 small solar-power satellites, as a proof of concept.**

Renewable energy reduces carbon emission

Union of Concerned Scientists.org 17 Union of Concerned Scientists, Dec 20, 2017, "Benefits of Renewable Energy Use," https://www.ucsusa.org/resources/benefits-renewable-energy-use

Human activity is overloading our atmosphere with carbon dioxide and other global warming emissions..These gases act like a blanket, trapping heat. The result is a web of significant and harmful impacts, from stronger, more frequent storms, to drought, sea level rise, and extinction.In the United States, about 29 percent of global warming emissions come from our electricity sector. Most of those emissions come from fossil fuels like coal and natural gas In contrast, renewable energy sources produce little to no global warming emissions. Even when including "life cycle" emissions of clean energy (ie, the emissions from each stage of a technology's life—manufacturing, installation, operation, decommissioning), the global warming emissions associated with renewable energy are minimal [3].
Increasing the supply of renewable energy would allow us to replace carbon-intensive energy sources and significantly reduce US global warming emissions. For example, a 2009 UCS analysis found that a 25 percent by 2025 national renewable electricity standard would lower power plant CO2 emissions 277 million metric tons annually by 2025—the equivalent of the annual output from 70 typical (600 MW) new coal plants [4]. In addition, a ground-breaking study by the US Department of Energy's National Renewable Energy Laboratory (NREL) explored the feasibility of generating 80 percent of the country's electricity from renewable sources by 2050. They found that **renewable energy could help reduce the electricity sector's emissions by approximately *81 percent*** [5].

Subpoint B: Space Mining

Space Mining reduces carbon emissions

Emerging Technology from the arXivarchive, **MIT Technology Review,** Asteroid Mining Might Actually be better for the environment, October 19, **2019**
https://www.technologyreview.com/2018/10/19/139664/asteroid-mining-might-actually-be-better-for-the-environment/
Reentries are just as damaging. That's because a significant mass of a re-entering vehicle ablates in the upper atmosphere, producing NOx such as nitrous oxide (N2O), a greenhouse gas that is about 300 times more potent than CO2. By one estimate, the space shuttle released about 20% of its mass in the form of N2O every time it returned to Earth. **Hein and co** use these numbers to **calculate that a kilogram of platinum mined from an asteroid would release some 150 kilograms of CO2 into Earth's atmosphere. However, economies** of scale from large asteroid-mining operations **could lower this to about 60 kilograms of CO2 per kilogram of platinum.** That needs to be **compared** with the emission from Earth-based mining. Here, platinum mining generates significant greenhouse gases, mostly from the energy it takes to remove this stuff from the ground.Indeed, the numbers are huge. The mining industry estimates that **producing one kilogram of platinum on Earth releases around 40,000 kilograms of carbon dioxide. "The global warming effect of Earth-based mining is several orders of magnitude larger," say Hein and co.**

European Space Agency Helium 3 mining on the lunar surface
https://www.esa.int/Enabling_Support/Preparing_for_the_Future/Space_for_Earth/Energy/Helium-3_mining_on_the_lunar_surface
The idea of harvesting a clean and efficient form of energy from the Moon has stimulated science fiction and fact in recent decades. Unlike Earth, which is protected by its magnetic field, **the Moon has been bombarded with** large **quantities of Helium-3 by the solar wind. It is thought that this isotope could provide safer nuclear energy in a fusion reactor, since it is not radioactive and would not produce dangerous waste products.**

The Apollo programme's own geologist, Harrison Schmidt, has repeatedly made the argument for Helium-3 mining, whilst Gerald Kulcinski at the University of Wisconsin-Madison is another leading proponent. He has created a small reactor at the Fusion Technology Institute, but so far it has not been possible to create the helium fusion reaction with a net power output.
This has not stopped the search for Helium-3 from being a motivating factor in space exploration, however. Apart from the traditional space-faring nations, the India has previously indicated its interest in mining the lunar surface. The use of Moon resources was also part of Newt Gingrich's unsuccessful candidacy for the Republican party's nomination for the US presidency in 2012.
Private enterprise is also interested in using fuel from the Moon – although possibly by extracting water rather than Helium-3. The Shackleton Energy company envisages providing propellant for missions throughout the Solar System using lunar water. **Some teams vying for the Google Lunar X-Prize also see mining as an ultimate goal of their landers. ESA has** also **considered using the Moon to help missions farther into the Solar System.**
Arguments have also been made for mining Helium-3 from Jupiter, where it is much more abundant – it would need to be given the distances involved. Extracting the molecule from Jupiter would also be a less power-hungry process.
Not everyone is in agreement that Helium 3 will produce a safe fusion solution. In an article entitled "Fears over Factoids" in 2007, the theoretical physicist Frank Close famously described the concept as "moonshine". Either way, it seems we will have to be patient to find out the answers.

Effects of climate change **Science Daily 18**

ScienceDaily, 11-29-2018, "Climate change risks 'extinction domino effect': Loss of animal or plant species to climate change causes global 'extinction domino effect'," https://www.sciencedaily.com/releases/2018/11/181129122506.htm
New research reveals the extinction of plant or animal species from extreme environmental change increases the risk of an 'extinction domino effect' that could annihilate all life on Earth. This would be the worst-case scenario of what scientists call 'co-extinctions', where an organism dies out because it depends on another doomed species**,** with the findings published today in the journal *Scientific Reports*. Think of a plant's flower pollinated by only one species of bee -- if the bee becomes extinct, so too will the plant eventually.
"But because all species are connected in the web of life, our paper demonstrates that even the most tolerant species ultimately succumb to extinction when the less-tolerant species on which they depend disappear." "Failing to take into account these co-extinctions therefore underestimates the rate and magnitude of the loss of entire species from events like climate change by up to 10 times," says co-author Professor Bradshaw of Flinders University in South Australia Professor Bradshaw and Dr Strona say that their virtual scenarios warn humanity not to underestimate the impact of co-extinctions.
Another really important discovery was that **in the case of global warming** in particular, **the combination of intolerance to heat combined with co-extinctions mean that 5-6 degrees of average warming globally is enough to wipe out most life on the planet,"** says Dr Strona. Professor Bradshaw further warns that their work shows how climate warming creates extinction cascades in the worst possible way, when compared to random extinctions or even from the stresses arising from nuclear winter.