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#### I negate the resolution, Resolved: The appropriation of outer space by private entities is unjust.

### Contention 1 – Satellites

#### 1 – Current, privately owned satellites are key to agricultural success, addressing natural disasters, and reducing geopolitical tension

Dilanian 19 (Ken Dilanian and Kevin Monahan NBC, Tiny, privately owned satellites are changing how we view the Earth, 11/3/19, <https://www.nbcnews.com/news/world/tiny-privately-owned-satellites-are-changing-how-we-view-earth-n1042386>) AX

SAN FRANCISCO — In recent months, satellite photos have streamed into a former textile factory here revealing a build-up of potent Russian air defense systems in Ukraine, a serious new threat to NATO aircraft. This is not a secret CIA facility, and the images didn't come from a billion-dollar surveillance satellite. They were taken by private spacecraft — some the size of a loaf of bread — operated by Planet Labs, a Silicon Valley company that is leading a revolution in how humans glimpse Earth from space. A short stroll from the downtown San Francisco headquarters of Yelp and LinkedIn, Planet operates the largest and least expensive fleet of satellites in history — the first to take pictures of the entire landmass of the globe, once a day, and sell them to the public. The company is part of a fast-growing commercial satellite industry that is democratizing insights once available mainly to people with Top Secret government security clearances. In May, one of Planet's satellites captured a white plume of smoke from an illegal North Korean missile test, an image that rocketed through the next day's news cycle, undercutting President Donald Trump's insistence that the North Korean regime is negotiating with the U.S. in good faith. "I think it's so important that the pictures don't lie," said Will Marshall, one of Planet's co-founders and a former NASA spacecraft designer. "The picture is what it is. And sometimes that can be inconvenient. But it also will help us to transition away from this post-truth world, towards one more grounded in facts." The U.S. intelligence community is a Planet customer, but so are environmental groups, farmers, Wall Street traders and journalists. Planet's fleet of imaging satellites documents climate change, natural disasters, the growth of refugee camps and the number of cars in the parking lots of a national retail chain. When floods inundated Western Iowa in March, state officials didn't have a handle on the severity of the damage until they saw Planet's overhead imagery. They say the data helped them better coordinate the response. As last year's Camp fire raged across California, Planet's imagery helped officials decide where to send firefighting crews. "Earthquakes, fires, floods, typhoons, tsunamis… We can help, because we have an image the day before, an image afterwards, to help responders quickly get in there," Marshall said. The first spy satellites weighed nearly a ton and sent back pictures by dropping giant film canisters into passing airplanes. These days the most sophisticated government photo satellites can be the size of a school bus, and cost billions. Marshall and his partners built their first satellite in a garage, applying the principles of the smart phone, stuffing a sophisticated camera and telescope into a rectangular box that weighs as much as a bowling ball. Then they began blasting dozens of them into space at a time, piggybacking on commercial launches of larger satellites. Planet won't say how much each one costs to make, except that it's "orders of magnitude" cheaper than traditional satellites. Commercial imaging satellites are not new; Americans have been looking at pictures from space of their houses on Google maps for years. But those pictures tend to be several years old, because there are only so many commercial satellites and they can only cover so much ground. Planet has changed the game. The company's satellites are lined up in orbit like a Saturn ring, taking a photo of the same spot at the same time at least once every 24 hours. Never before have humans been able to document change on the planet's surface in quite this way. Marshall, who has given two Ted Talks on his technology, has a tag line for what he hopes this new imagery will mean for Earth: "You can't fix what you can't see." The company's fleet of 140 satellites beams back 1.2 million images a day. That is so much data that customers are turning to artificial intelligence to make sense of it. That technology is in its infancy, which means this could be the beginning of a new age of insights about the Earth. One day, there could be enough satellites in orbit to provide total persistent overhead coverage — an-on demand photo of any spot on the earth at any time, weather permitting. Other U.S. commercial satellite firms, including BlackSky and Maxar, operate more expensive satellites with better resolution than Planet's, but they don't have as many in orbit. Planet's small satellites stay in orbit only two or three years before burning up as they fall form the sky. So the company is constantly building more of them, with newer and better technology. "Last year we built roughly as many satellites as the whole world put together, outside of us, here in this little lab in San Francisco," Marshall said. The company, which has yet to go public, is now valued at $2 billion. As with any surveillance technology, the proliferation of commercial imagery can be put to ill use, by both governments and the private sector. The U.S. government limits the resolution of commercial satellite photos to ensure American spies still have the best pictures, and so the satellites cannot be used to snap close-ups of backyard sunbathers. But commercial satellites are not without privacy risks, and industry experts are only beginning to grapple with the implications. How long before a satellite photo of a straying spouse's car, parked where it should not be, is used in a divorce case? Robert Cardillo, who until last year led the U.S. spy agency that processes satellite imagery, says the leaders of his field are now grappling with the same sort of influx of new data as the National Security Agency did when human communication migrated to the internet. And he wants to avoid an Edward Snowden moment — revelations about surveillance that alarm the public. "We're awash in pixels," said Cardillo, the former director of the National Geospatial Intelligence Agency, or NGA, which has contracts with Planet and other private satellite companies. "Who controls the data? Where is it stored? How do you protect privacy? We have an opportunity to have this conversation now with the American people." Biking and walking to work in downtown San Francisco, Planet's hoodie-and-jeans-wearing employees argue that their products are not designed for spying. They named their small satellites "doves" for a reason, Marshall said — they believe they are a force for good. A New Zealand livestock company is using Planet's imagery to monitor the grass in its pastures and send the cattle to the areas where the grass is higher. Arizona State University, the Hawaii Institute of Marine Biology and the University of Queensland partnered with Planet to map the world's coral reefs. Humboldt County, California has used the pictures to dramatically improve its enforcement actions against illegal marijuana farmers. For Sarah Bidgood, who researches U.S.-Russia arms control issues at the James Martin Center for Nonproliferation Studies in Monterey, California, Planet's images have been invaluable, helping her track those new Russian weapons in Ukraine's Crimean peninsula, which Russia seized in 2014. It's better for everyone if private analysts can study the world's geopolitical hotspots, she said. "That's one of the things that Planet is doing that I think is so essential to the work of analysts like myself," Bidgood said. "It is placing information that gives us insights into granular changes on the ground into our hands. And that's what allows us to do good, nuanced analysis that can lead to good policy."

#### Without them, agriculture will be unable to meet the impending global food crisis.

Eos 20, https://www.precisionag.com/in-field-technologies/how-satellite-monitoring-can-make-farming-more-sustainable/

Modern agriculture has to balance between profitability and sustainability. Not to forget the coming global food crisis. According to the United Nations, the world population is expected to reach 9.8 billion people by 2050. The demand for crops will grow respectively. Can it be met unless farmers change their farming approaches today to preserve natural systems and resources? Hardly. Fertile lands aren’t inexhaustible. Statistics speak for itself: as the Environmental Defense Fund states, about 40% of the world’s land is used for food production. So, it is not about the area of the fields but about the way we treat them. Sustainable agriculture encourages us to think outside the box. Technologies are already offering powerful tools to help growers optimize farming. GPS-based ones are the most popular because they unlock numerous opportunities. Unfortunately, many of them, like analysis of vegetation indices, are still being missed out. Only 35%-40% of U.S. growers have implemented several technological tools on their farms, according to the precision ag platform EOS Crop Monitoring estimates. Leveling up to satellite monitoring, growers can take advantage of the rational distribution of nutrients depending on the cultivars and soil productivity. Using processed satellite imagery of their fields, growers can make data-driven decisions and thus cut down on expenses. Applying precisely the needed amount of fertilizers they avoid over-enrichment that causes soil degradation. Satellites to Take Care of Crops — and Nature Are satellite images worth their salt in ag? As the analysis by the World Business Council for Sustainable Development shows, consumers from different parts of the globe prioritize healthy and convenient food. And this is exactly what satellite imagery helps farmers provide as it helps to use chemicals rationally and sustainably. Implementing precision ag tools, growers can expect a boost of yield production. These technologies allow them to analyze the quality of applied interventions and define which of them work more efficiently. Rational use of water and fertilizers as well as timely reacting to problems also contributes to the health of the ecosystems. Growers opt to use this technology to enjoy operational and environmental benefits, such as: Making informed decisions about sowing on the areas vulnerable to yield losses and quickly reacting to emerging problems; Being aware of coming unfavorable weather conditions and timely reacting to the changes; Controlling crop rotation based on updating data on growing crops and yields; Evaluating and revealing the areas with considerable crop losses and potential crop gains; Practicing intercropping or multi-year crop rotation that allows farms to produce more yield and positively affect soil fertility; and Testing different cultivars as satellite imagery shows distinct variations in vegetation, allowing to choose the most productive variation. Resource Optimization “Sustainable” doesn’t necessarily mean “expensive”. Satellite monitoring is not merely an innovative but also cost-effective means of sustainable ag. According to the study published in Agronomy, “corn farm operating profit of precision agriculture adopters was 163 dollars per hectare higher than for non-adopters.” From an economic perspective, precision ag implementation enables growers to reduce large outlay. In fact, they can mitigate recurrent costs on vehicle maintenance used for transportation to different parts of arable land. On the environmental side of the issue, less vehicle use results in diminishing carbon dioxide emissions. Moreover, this technology is useful in budgeting. Having necessary data about field condition, growers can plan their expenditures more precisely. Saving on logistics and applying fertilizers with Variable Rate technology is already an important contribution to the health of the planet. Last but not least, crop monitoring carried out via satellites needs less human resources and is exceptionally efficient for tracking vast areas. Fewer field trips are needed, which means less gas is spent, fewer exhaust fumes will be in the air. On top of that, they take action after analyzing the obtained satellite images and can focus their potential on the solution of the existing issues. Satellite data also prevents growers from overlooking crucial points in certain zones. Precision Ag As a Cooperation Tool Precision ag also enhances the importance of networking for farmers. As Global Market Insights states, “the North America precision farming market is expected to hold a market share of over 32% by 2025 owing to mechanization and heavy dependence on technology for aiding agribusinesses.” As such, uniting into data-sharing communities, growers acquire numerous benefits from discovering new techniques to boosting income. Moreover, growers network effectively and conveniently when integrating precision ag technologies. Based on data retrieved from Meticulous Research, “the agriculture IoT market is expected to grow at a CAGR of 14.1% from 2019 to reach $34.9 billion by 2027.” Thereby, cooperation becomes even more significant than before, enabling farmers to communicate and stay tuned about up-to-date components, applications, and services. Farmers can discuss recent information and experience valuable for gaining profit and protecting nature or even monitor the fields together (for instance, with group accounts in EOS Crop Monitoring). Sharing analysis and prognosis with each other enables them to improve their operations and approaches as well as learn more about other practices. Eventually, the collaboration among data-driven farms emerges as an apparent step toward efficiency and sustainability. High yield production and conscious use of natural resources make satellite monitoring an easy choice for growers that want to care about the environment without financial losses.

### Contention 2 – Asteroid Mining

**The products of space mining and satellites produced by private entities can reduce harmful economic conditions on earth**

**Brodey ’21:** Thomas Brodey. “How Space Travel can reduce poverty”. Borgen Magazine. September 28th, 2021.

CHAPEL HILL, North Carolina — Amazon founder Jeff Bezos’ rocket launch opened a new chapter in space exploration. Space will no longer be the domain of just governments, as corporations increasingly take the lead in the research and funding of new programs. It is unclear, however, whether this new era of space exploration will benefit just wealthy businessmen like Bezos, or whether the many advantages of space travel will extend to the world as a whole, including those who suffer from poverty. The question is an important one because as counterintuitive as it may seem, investing in space travel actually offers a plethora of opportunities to reduce poverty here on earth. Satellites Satellites orbiting the earth can be a vital new weapon to fight poverty from space because these satellites can [closely examine](https://www.csmonitor.com/Business/new-economy/2016/0818/How-to-fight-global-poverty-from-space) physical living conditions around the world. Many impoverished countries lack the resources to conduct detailed surveys into the state of their people and the best ways to alleviate poverty. In Africa, for example, 14 countries have been unable to conduct any poverty surveys in the last decade. Thanks to new observation technology, satellites can offer an alternative, mapping out towns and villages while assessing economic conditions more cheaply and effectively than a government could. Once the world has more access to information about poverty, it can take steps to treat it. The uses of satellites to identify and fight poverty from space go still farther. India has used [its satellite program](https://www.economist.com/the-economist-explains/2013/11/04/how-can-poor-countries-afford-space-programmes) to better predict rainfall, storms and other weather phenomena. With its system of weather satellites, the Indian government can give farmers recommendations of what foods to plant, and when and where to plant them for optimum results. The many uses of satellites to reduce poverty might explain why a variety of poorer countries have launched their own space programs. Yet fighting poverty from space can even extend to the far reaches of the solar system. Many experts and economists expect that the moon and asteroids will become important sources of metals and other minerals within the next few decades. The moon in particular holds large reserves of [rare earth metals](https://www.popsci.com/elements-mine-on-the-moon/), essential for most electronics, including phones and computers. At the moment, virtually all of the world’s rare earth metals must be mined from a few very dangerous and inhumane work sites. In China, for example, the [toxic byproducts](https://www.theguardian.com/sustainable-business/rare-earth-mining-china-social-environmental-costs) of rare earth metal mining often leak into the water supply, killing livestock and plants, and driving locals away. Space travel provides an alternative to these sorts of exploitative and dangerous labor practices. Experts expect that space mining would cause [far less pollution](https://www.technologyreview.com/2018/10/19/139664/asteroid-mining-might-actually-be-better-for-the-environment/) and damage to the landscape than mining on earth. If we got our rare earth metals from space, the people who now work brutal and difficult mining jobs could instead find other professions, perhaps even working in the new space travel industry themselves. Meanwhile, increased supplies of rare earth metals would mean cheaper electronics, bringing connectivity and the information age to every corner of the world. Space travel offers an exciting chance for exploration and discovery, so it’s no wonder that the ultra-wealthy, such as Jeff Bezos and Elon Musk, are interested in going beyond the limits of the earth. Yet we must not forget the need for a globally conscious space exploration program. If we use space travel to reduce poverty on earth, all of humanity can partake in the wonders of space.

#### Asteroid mining solves environmental terrestrial mining impacts—particularly ocean acidification and global warming

Hlimi 14 (Tina Hlimi is a International Secretariat Member and Health & Hazards Coordinator for the Centre for International Sustainable Development Law (CISDL) in Montreal, Quebec, “THE NEXT FRONTIER: AN OVERVIEW OF THE LEGAL AND ENVIRONMENTAL IMPLICATIONS OF NEAR-EARTH ASTEROID MINING”, Annals of Air and Space Law Vol. 39, 2014, <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2546924)//NotJacob>

Near earth asteroids - NEA

In addition to demystifying the legal doctrine governing outer space natural resource appropriation it is also necessary to weigh the benefits and detriments of space-faring activities. Foremost, States around the world are developing at unprecedented rates and the human population is mounting in conjunction with demand for natural resources to sustain the current and newly established western standard of living. One of the fastest growing nations, China, is experiencing unhindered growth facilitated by fossil fuel use from coal and extensive mining. This has caused substantial water, soil and air degradation. In the face of these troubles, NEA mining could be the key to preserving the Earth's bounty and replenishing contaminated water supplies. The influx of natural resources could thwart the burning of dirty coal and fossil fuels, thereby mitigating the effects of climate change, such as, rising sea level, atmospheric pollution, melting of sea ice and rising temperatures. NEA harvesting could also protect the ocean and the fragile and largely unexplored deep seabeds 123 from oil and gas drilling. It could furthermore protect ecosystems from rare-earth mineral mining predominantly used to fuel the electronics sector. 124 NEA mining is especially pertinent as China restricted its global exports of rare-earth minerals in 2009, incongruously citing the need to protect the environment. Unfortunately, the supply cuts have forced dependent States like Japan, the United States and South Korea to heighten rare-Earth mineral exploration. This accordingly led to Japan's 2011 discovery of rare-earth minerals in the ocean-bed deposits of the Pacific Exclusive Economic Zone (PEEZ) thereby necessitating risky, deep-sea mining techniques, which may result in marine pollution if not carefully designed and developed. Other States, which have joined the environmentally destructive rare-earth mineral exploration movement include India, Canada, Tanzania, Australia, Brazil and Vietnam., There is accordingly much competition and exploration for rare-earth minerals which could result in significant exploitation of untouched areas like the PEEZ seabed and Mongolia.125 Other regions which may soon be targeted for mineral and hydrological resources include Antarctica and the Arctic. With the advent of technological advances, environmentally destructive practices such as refining may soon occur in outer space, sparing the Earth of pollution. 126 Accordingly, NEA mining is a viable technology for preserving the Earth's environment by curbing atmospheric and marine pollution, enhancing water supply and quality and mitigating the effects of climate change; all while allowing humankind to maintain and even improve their standard of living through increased technologies, consumption and population growth.