# 21 Blake R5 AC

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

#### I Value Morality

#### Pleasure and pain are the starting point for moral reasoning—they’re our most baseline desires and the only things that explain the intrinsic value of objects or actions

**Moen 16**, Ole Martin (PhD, Research Fellow in Philosophy at University of Oslo). "An Argument for Hedonism." Journal of Value Inquiry 50.2 (2016): 267. SM

Let us start by observing, empirically, that **a widely shared judgment about intrinsic value** and disvalue **is that pleasure is intrinsically valuable and pain is intrinsically disvaluable**. On virtually any proposed list of intrinsic values and disvalues (we will look at some of them below), pleasure is included among the intrinsic values and pain among the intrinsic disvalues. This inclusion makes intuitive sense, moreover, for **there is something undeniably good about** the way **pleasure** feels and something undeniably bad about the way pain feels, and neither the goodness of pleasure nor the badness of pain seems to be exhausted by the further effects that these experiences might have. “Pleasure” and “pain” are here understood inclusively, as encompassing anything hedonically positive and anything hedonically negative. 2 The special value statuses of pleasure and pain are manifested in how we treat these experiences in our everyday reasoning about values. If you tell me that you are heading for the convenience store, **I might ask: “What for**?” This is a reasonable question, for when you go to the convenience store you usually do so, not merely for the sake of going to the convenience store, but for the sake of achieving something further that you deem to be valuable. You might answer, for example: “To buy soda.” This answer makes sense, for soda is a nice thing and you can get it at the convenience store. I might further inquire, however: “What is buying the soda good for?” This further question can also be a reasonable one, for it need not be obvious why you want the soda. You might answer: “Well, I want it for the pleasure of drinking it.” If I then proceed by asking “But what is the pleasure of drinking the soda good for?” the discussion is likely to reach an awkward end. **The reason is that** the **pleasure is not good for anything further**; it is simply that for which going to the convenience store and buying the soda is good. 3 As Aristotle observes: “**We never ask** [a man] **what** his **end is in being pleased, because we assume** that **pleasure is** choice **worthy in itself**.”4 Presumably, a similar story can be told in the case of pains, for if someone says “This is painful!” we never respond by asking: “And why is that a problem?” We take for granted that **if something is painful, we have a sufficient explanation of why it is bad**. If we are onto something in our everyday reasoning about values, it seems that **pleasure** and pain are both places where we **reach the end of the line in matters of value**. Although pleasure and pain thus seem to be good candidates **for intrinsic value** and disvalue

#### Thus the Standard is Maximizing Expected Well-Being

#### Util is the only theory relevant to morality because consequences are the only form of value we can experience.

**Harris 10** [Sam Harris CEO of Project reason “The Moral Landscape: How Science Can Determine Human Values” 2010]

Here is my (consequentialist) starting point: all questions of value (right and wrong, good and evil, etc.) depend upon the possibility of experiencing such value. Without potential consequences at the level of experience—happiness, suffering, joy, despair, etc.—all talk of value is empty. Therefore, to say that an act is morally necessary, or evil, or blameless, is to make (tacit) claims about its consequences in the lives of conscious creatures (whether actual or potential). I am unaware of any interesting exception to this rule. Needless to say, [For example,] if one is worried about pleasing God or His angels, this assumes that such invisible entities are conscious (in some sense) and cognizant of human behavior. It also generally assumes [and] that it is possible to suffer their [his] wrath or enjoy their approval, either in this world or the world to come. Even within religion, therefore, consequences and conscious states remain the foundation of all values.

**Moral uncertainty means preventing extinction should be our highest priority.  
Bostrom 12** [Nick Bostrom. Faculty of Philosophy & Oxford Martin School University of Oxford. “Existential Risk Prevention as Global Priority.” Global Policy (2012)]  
These reflections on **moral uncertainty suggest** an alternative, complementary way of looking at existential risk; they also suggest a new way of thinking about the ideal of sustainability. Let me elaborate.¶ **Our present understanding of axiology might** well **be confused. We may not** nowknow — at least not in concrete detail — what outcomes would count as a big win for humanity; we might not even yet **be able to imagine the best ends** of our journey. **If we are** indeedprofoundly **uncertain** about our ultimate aims,then we should recognize that **there is a great** option **value in preserving** — and ideally improving — **our ability to recognize value and** to **steer the future accordingly. Ensuring** that **there will be a future** version of **humanity** with great powers and a propensity to use them wisely **is** plausibly **the best way** available to us **to increase the probability that the future will contain** a lot of **value.** To do this, we must prevent any existential catastrophe.

## Contention 1 – Space Debris

#### Low earth orbit is currently congested with space debris. It is currently at it’s brink and will constitute a huge threat if things get worse. David 21’

(Leonard David, April 14, 2021, “Space Junk Removal is Not Going Smoothly”, https://www.scientificamerican.com/article/space-junk-removal-is-not-going-smoothly/)

A Space Age “tragedy of the commons” is unfolding right under our nose—or, really, right over our head—and no consensus yet exists on how to stop it. For more than a half-century, humans have been hurling objects into low-Earth orbit in ever growing numbers. And with few meaningful limitations on further launches into that increasingly congested realm, the prevailing attitude has been persistently permissive: in orbit, it seems, there is always room for one more. After so many decades of the buildup of high-speed clutter in the form of spent rocket stages, stray bolts and paint chips, solid-rocket-motor slag, dead or dying satellites and the scattered fragments from antisatellite tests—all of which could individually damage or destroy other assets—low-Earth orbit is finally on the verge of becoming too crowded for comfort. And the problem is now poised to get much worse because of the rise of satellite “mega constellations” requiring thousands of spacecraft, such as SpaceX’s Starlink, a broadband Internet network. Starlink is but one of many similar projects: Another mega constellation from a company called OneWeb is already being deployed. And Amazon’s Project Kuiper is seeking to create a mega constellation of up to 3,200 satellites in the near future. As the congestion has grown, so too have close calls between orbiting assets. The International Space Station, for instance, regularly tweaks its orbit to avoid potentially hazardous debris. Worse yet, there has been an uptick in the threat of full-on collisions that generate menacing refuse that exacerbates the already bad situation. Consider the February 2009 run-in between a dead Russian Cosmos satellite and a commercial Iridium spacecraft, which produced an enormous amount of debris. ADVERTISEMENT Finding ways to remove at least some of all that space junk should be a top global priority, says Donald Kessler, a retired NASA senior scientist for orbital debris research. In the late 1970s he foretold the possibility of a scenario that has been dubbed the Kessler syndrome: as the density of space rubbish increases, a cascading, self-sustaining runaway cycle of debris-generating collisions can arise that might ultimately make low-Earth orbit too hazardous to support most space activities. “There is now agreement within the community that the debris environment has reached a ‘tipping point’ where debris would continue to increase even if all launches were stopped,” Kessler says. “It takes an Iridium-Cosmos-type collision to get everyone’s attention. That’s what it boils down to.... And we’re overdue for something like that to happen.

#### Current solutions fail to solve – laser blasts, solar sails, ELSA-d, and so on. The only solution is to stay out of space. David 21’

(Leonard David, April 14, 2021, “Space Junk Removal is Not Going Smoothly”, https://www.scientificamerican.com/article/space-junk-removal-is-not-going-smoothly/)

Kessler’s nightmare scenario has yielded no shortage of possible debris-flushing fixes: nets, laser blasts, harpoons, giant foam balls, puffs of air, tethers and solar sails—as well as garbage-gathering robotic arms and tentacles—have all been proposed as solutions for taking out our orbital trash. A new entrant in grappling with this worrisome state of affairs is the just launched End-of-Life Services by Astroscale Demonstration (ELSA-d) mission. ELSA-d is a two-satellite mission developed by Astroscale, a Japan-based satellite services company: it consists of a “servicer” satellite designed to safely remove debris from orbit and a “client” one that doubles as an object of interest. The project aims to showcase a magnetic system that can capture stable and even tumbling objects, whether for disposal or servicing in orbit. Following a multiphase test agenda, the servicer and client will then deorbit together, disintegrating during their fiery plunge into Earth’s atmosphere. ADVERTISEMENT ELSA-d is now circling in Earth orbit. The mission was lofted on March 22 via a Russian Soyuz rocket that tossed scads of other hitchhiking satellites into space. Following the liftoff, Astroscale’s founder and CEO Nobu Okada said [ELSA-d will prove out debris-removal capabilities](https://astroscale.com/astroscale-celebrates-successful-launch-of-elsa-d/) and “propel regulatory developments and advance the business case for end-of-life and active debris removal services.” The launch is a step toward realizing “safe and sustainable development of space for the benefit of future generations,” he said. Although ELSA-d and other technology demonstrations of its ilk are unquestionably positive developments for clearing orbital debris, they should not be mistaken for cure-alls. Despite their modest successes, such missions are falling short of addressing the dynamic dilemma at hand, and the **proliferation of space junk continues essentially unabated.** “From my perspective, **the best solution to dealing with space debris is not to generate it in the first place**,” says T. S. Kelso, a scientist at CelesTrak, an analytic group that keeps an eye on Earth-orbiting objects. “Like any environmental issue, it is easier and far less expensive to prevent pollution than to clean it up later. Stop leaving things in orbit after they have completed their mission.”

#### Private company clean ups fail – multiple warrants prove; Overcrowding will become a problem long before debris removal can take on a significant scale, hi costs, and contestation over who will pay. Daily brief 18’

(Daily Brief, 10/1/2018, “Space Debris threatens global economy and security”, https://dailybrief.oxan.com/Analysis/DB238840/Space-debris-threatens-global-economy-and-security)

Actively removing debris from orbit presents enormous technical challenges, but various techniques are proposed or under development. Magnets, nets or harpoons could be used to capture debris. Last month the United Kingdom's RemoveDebris research satellite successfully used a net to capture a satellite for the first time. It will test a harpoon next year, and also a sail that could be used to pull debris into the atmosphere by increasing atmospheric drag. Plasma beams could be used to deflect debris into the atmosphere. Japanese and Australian researchers last month reported testing this successfully in a lab. Lasers could be used to heat part of an object so that its orbit is altered by the force from the material being burned off. Chinese researchers published a numerical simulation demonstrating this possibility earlier this year. However, on current trends, **overcrowding will likely become a serious problem long before active debris removal is possible on any significant scale**. Even when it is, the costs of the clean-up will be high and who should pay for it will be fiercely contested.

## Contention 2 – Private companies uniquely increase space debris, pushing it past the brink

#### Three reasons:

#### One of the biggest concerns of private property rights in space is pollution. Cherian and Abraham 07 (Jijo George Cherian and Job Abraham are is a Final Year Students of law, B.A.LLB (Hons) degree program, at the National University of Advanced Legal Studies in Kochi, India, 2007, “Concept of Private Property in Space – An Analysis,” The Journal of International Commerical Law and Technology)

One of the primary concerns is the degradation of celestial bodies in exercise of property rights granted to persons. The International community fears whether degradation of celestial bodies would have a negative impact on the environment of the Earth. Man seems to have an inherent trait to alter the ecology of his habitat sometimes knowingly, sometimes unknowingly. Space is one of the very few realms that mankind has not been able to effectively pollute, but even that challenge is being overcome. The issue of space debris is one of such concern. Even in the absence of private players, space debris is now assuming alarming proportions, especially since mankind’s contribution to the increase in space debris is substantial. In the event that there exists a possibility that, the climate of earth maybe negatively affected, a thorough study must be undertaken to swot up the possible repercussions of such degradation. And if property rights are indeed deemed to be fit to be incorporated into space law**, the issue of pollution of space environment will need to be addressed** on “war footing”. Another classical example is the offer of the company TransOrbital. It is a private company that, through its “TrailBlazer lunar orbiter,” is offering the “first delivery service to the moon”. TransOrbital claims it is “the only private company to be authorized by the [U.S.] State Department and [the National Oceanic and Atmospheric Administration] for commercial flights to the Moon”. The company's delivery system will take capsules that contain items of the customer's choice, including business cards, jewellery, art, and cremated remains, to the Moon. While, it maybe argued that such action is detrimental to the ecology of the moon, it cannot be said to be the first of its kind. Although the various Space treaties explicitly prohibit the conducting of nuclear tests in space, space tourism will cause its fair share of problems including despoilment of the moon surface

#### Private companies are given the unique permission to launch as many space object as they want without check back – they exponentially increase debris. Haskins 18’

(Caroline Haskins, May, 08,2018, The Future, “Private Space Companies no longer have to follow the law”, https://theoutline.com/post/4469/outer-space-treaty-commerce-free-enterprise-bill-spacex-blue-origin-boeing-lockheed-martin)

**It just got a whole lot easier for private companies to launch satellites, rovers, and spacecrafts, and pursue future industries like asteroid mining**. The catch? The U.S. is completely ignoring what’s outlined in a 51-year-old treaty designed to keep space peaceful and war-free.The [Space Commerce Free Enterprise Bill](https://www.govtrack.us/congress/bills/115/hr2809/text), which [passed the House of Representatives yesterday](https://www.jdsupra.com/legalnews/house-passes-space-commerce-free-91943/), works off the [Outer Space Treaty](https://theoutline.com/post/3739/mars-colony-settlement-spacex-elon-musk-trump?zd=1&zi=ld4wx6g3), which the United States and dozens of other countries signed in 1967 and serves as a basic framework for keeping space safe and accessible for every country. Countries can’t own property on behalf of their own nation, and they’re liable for any private activity from their country. But the U.S.’s new bill won’t apply every part of the Outer Space Treaty to **private companies**. In other words, the U.S. doesn’t believe that it’s liable for activities of private space companies like SpaceX or Blue Origin.The bill also bundles almost all space mission approvals under one roof, the Office of Space Commerce, to try and **encourage as many companies as possible to launch objects into space**. The office would be in charge of everything from a theoretical asteroid mining industry to private space stations, which have been proposed as tourist attractions by companies like [Blue Origin](http://www.businessinsider.com/jeff-bezos-blue-origin-rocket-space-most-important-work-im-doing-2018-4).

#### Private entities don’t need coordination with one another. With no governing body to coordinate between private entities activities into space, there isn’t a way to track their space activity and hazardous debris they produce. This is a unique issue with private entities.

## Contention 3: Devasting Impacts

### Subpoint A: Satellite Damage

#### Space Debris poses a huge danger to Landsat Satellites – just in 2017 there were 300,000 close calls, even debris a little bigger than a paint fleck can cause significant damage. EROS 20’

(Earth Resources Observation and Science Center, January 8, 2020, “Space debris remains ongoing concern landsat and other satellites”, https://www.usgs.gov/news/space-debris-remains-ongoing-concern-landsat-other-satellites)

There is no question but that they pose concerns for Landsat satellites, said Doug Daniels, Principal Systems Engineer with The Aerospace Corporation at the Earth Resources Observation and Science (EROS) Center. “Absolutely, space debris is something that the Landsat flight operations teams and the mission managers worry about on a daily basis,” Daniels said. “Avoiding any type of collision with orbiting spacecraft or a piece of space debris ... everything the team does is paramount to ensuring that doesn’t happen.” In 2017, the U.S. government reported that it logged 308,984 close calls with space junk and issued 655 "emergency-reportable" alerts to satellite operators. The U.S. Department of Defense uses what it calls the Space Surveillance Network to detect, track, and catalogue the many human-made items swirling around the planet using a global network of telescopes. The clutter in low Earth orbit—described as the space up to 1,250 miles from the planet’s surface—has grown rapidly in the last 15 years: On Jan. 11, 2007, the Chinese government destroyed an aged Fengyun-1C weather satellite in a missile test, creating an estimated 2,500 pieces of new debris; On Feb. 10, 2009, a defunct 1,900-pound Russian Cosmos satellite and a 1,200-pound Iridium Communications Inc. satellite collided at 22,300 mph some 490 miles above Siberia, creating even more debris; Potential threats continue to exist with other orbiting, decommissioned satellites. Many of these will slowly decay in orbit for 100-plus years before burning into the atmosphere. Today, more than 23,000 known man-made fragments larger than about four inches—a little wider than two golf balls across—zip around our planet. Those are just the pieces large enough to track. An estimated 500,000 pieces between 0.4 inches and 4 inches across are also littering space. For a satellite to be hit by debris and survive, it would likely have to something as small as a paint fleck, Daniels said. “Any time that you have a satellite that is hit by space debris, it’s bad,” he said. “The outcome is never going to be positive. It really doesn’t take that much.” While monitoring tools can assess the orbital debris environment and give Landsat operators a week or more to avoid potential collisions, there are other times when they only have a few hours to react, Daniels said. In either case, the well-being of Landsat isn’t left to the Hollywood image of a flight operator nervously commanding the satellite with a joystick 400-plus miles below.

#### The first impact is food uncertainty. Satellites are crucial to crop monitoring and gives agricultural sectors key information about where and when to plant crop. This information is uniquely key during climate change. Haynes et al 2021’

(Keelin Haynes, Mary Mitkish, Chris Justice, September 23, 2021, “Landsat 9 to futher nasa’s food security missions”, https://earthobservatory.nasa.gov/blogs/fromthefield/2021/09/23/landsat-9-to-further-nasas-food-security-missions/)

“Landsat 9 provides a critical extension of the Landsat data record for monitoring our food supplies and helping to inform and address crucial decisions in how we manage, grow and adapt our food production sustainably under a warming climate, with an increasing population and growing demand for food.” The next generation of Earth observation satellites is scheduled to launch in just a few short days. The [ninth sensor in the NASA/USGS Landsat program](https://landsat.gsfc.nasa.gov/landsat-9/landsat-9-overview) will continue the mission’s critical work in monitoring how the surface of the Earth has changed in the near-50 years since the first Landsat satellite was launched. Landsat has enabled a number of applications in diverse fields including forest management, fire, and climate. The system has also found extensive use in monitoring global agriculture and food security applications. Landsat [revolutionized](https://www.sciencedirect.com/science/article/pii/S0034425719300719) what it means to monitor agriculture, analyze crop conditions and estimate crop yields. Provided by advancements in satellite imagery and technology, the ability to remotely monitor crops over large areas and in difficult to access places on a regular basis has lowered on-the-ground labor requirements while simultaneously increasing the amount of analysis that can be performed. Advancements in spatial and temporal resolution, or how “zoomed in” and frequently the imagery is obtained, combined with new computing capabilities have created a variety of novel applications that have completely shifted what is possible in terms of agricultural monitoring and research.

#### Inefficient farming within the context of climate change leads to massive food shortages – we must preserve satellites for efficient farming. Alexander 17’

(Peter Alexander, et al, May 2017, “Losses, inefficiencies and waste in the global food system”, https://www.sciencedirect.com/science/article/pii/S0308521X16302384)

The global food system is subject to the conflicting pressures of delivering the food demanded by an expanding and increasingly affluent population, while helping to achieve environmental sustainability ([Godfray et al., 2010](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0135), [Tilman and Clark, 2014](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0395)). Along with rising population, higher consumption rates for commodities such as meat and milk, due to rising incomes ([Kearney, 2010](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0210), [Keyzer et al., 2005](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0215), [Tilman et al., 2011](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0400)), and increasing non-food demands for agricultural commodities, principally for [bioenergy](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/bioenergy) ([Müller et al., 2008](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0270)), all increase the pressures on agriculture. This situation is further complicated by climate impacts, leading to changes in [land suitability](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/land-suitability) and crop and animal yields ([Müller and Robertson, 2014](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0265), [Nelson et al., 2014](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0280)). Meeting food demands either by expanding agricultural areas, causing land use change, or the intensification of production (i.e. seeking higher yields through the use of greater inputs, such as fertilisers, pesticides or water, or changes in management practices) have the potential to cause environmental harm, including [greenhouse gas](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/greenhouse-gases) emissions (GHGs), deteriorating soil quality, use of scarce water and biodiversity loss ([Cassman, 1999](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0050), [Johnson et al., 2014](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0205), [Smith et al., 2013](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0370)). These impacts need to be reduced, particularly GHGs (currently 30% of all anthropogenic emissions ([Le Quéré et al., 2015](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0240))) if international climate change targets are to be met ([Benton and Bajželj, 2016](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0030)). **Achieving greater food security in a sustainable manner requires improved food system efficiency.** Production practices and consumer preferences, including diet and waste rates, influence the efficiency of the food system in producing agricultural biomass and its use in meeting human nutritional requirements ([Smil, 2004](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0350)). Approaches to achieving this objective have considered changes to agricultural production systems ([Garnett et al., 2013](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0130), [Smith, 2008](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0360), [Tilman et al., 2011](https://www.sciencedirect.com/science/article/pii/S0308521X16302384#bb0400)), the role of diet and the potential for demand side measures ([Bajželj et al., 2014](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0025), [Lamb et al., 2016](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0230), [Smil, 2013](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0355), [Stehfest et al., 2009](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0380)), and the reduction of food waste ([Gustavsson et al., 2011](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0145), [Hall et al., 2009](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0150), [Smith, 2013](https://www.sciencedirect.com/science/article/pii/S0308521X16302384" \l "bb0365)).

### Subpoint b: Kessler Effect and entrapment

#### Collisions of space debris cause fragmentation, producing an uncontrollable cascade of growing debris – this creates a dangerous barrier around earth’s low orbit.

**Liou and Johnson ‘8** [J.-C. Liou- ESCG/ERC,, Nicholas L. Johnson - Orbital Debris Program Office, NASA Johnson Space Center. “Instability of the present LEO satellite populations” Advances in Space Research 41 (2008) 1046–1053]

Since the launch of Sputnik 1, space activities have cre- ated an orbital debris environment that poses increasing impact risks to existing space systems, including human space flight and robotic missions. Although the Space Shuttle and International Space Station normally operate in the relatively pristine regime between 200 and 400 km above the Earth, their large cross-sectional areas yield col- lision rates comparable to their smaller robotic cousins in the more densely populated, higher altitude regions. Three accidental collisions between cataloged satellites during the period from late 1991 to early 2005 have already been doc- umented (Anon, 2005), although fortunately none resulted in the creation of large, trackable debris clouds. Currently, more than 9000 Earth orbiting man-made objects, with a combined mass exceeding 5 million kilograms, are tracked by the US Space Surveillance Network (SSN) and main- tained in the US satellite catalog (Anon, 2006). As the satellite population in the low Earth orbit (LEO, 200–2000 km altitude) region increases, the probabilities of mutual collisions among orbiting objects also increase. High collision activities may produce more fragments than those removed by drag in some altitude regimes. **This off- balance may lead to a collision cascade such that collision fragments induce more collisions in the environment** (Kess- ler and Cour-Palais, 1978; Eichler and Rex, 1990). The con- cept of ‘‘critical density’’ was pioneered by Kessler (1991) to characterize this uncontrollable population growth. Additional studies, based on analytical, semi-analytical, and numerical approaches, were carried out by various groups to analyze this phenomenon (Su, 1993; Rossi et al., 1994; Anselmo et al., 1997; Kessler, 2000; Kessler and Anz-Meador, 2001; Krisko et al., 2001a). These studies adopted different model assumptions, initial conditions and future launch rates. Some of them even included different postmission disposal measures in the simulations. They all came to a similar conclusion that, indeed, the LEO deb- ris populations at some altitudes would be unstable. Colli- sions would take over as the dominant debris generation mechanism, and the debris generated would feed back to the environment and induce more collisions.

#### The impact is making earth’s low orbital impossible to travel through. Welsh 12’

(Jennifer Welsh, Oct 4, 2012, “Space Debris Could Trap Us on Earth”, https://www.businessinsider.com/space-debris-could-trap-us-on-earth-2012-10)

We think of space as a big empty expanse, but closer to Earth, the space just beyond the outer reaches of our atmosphere are teeming with satellites and broken bits of space debris. Based on an idea called the Kessler syndrome, these defunct satellites and space debris could potentially cut us off from accessing space, since even the tiniest piece of debris could take out a rocket, space shuttle or space station. These tiny pieces of debris are created when two larger satellites collide. There are probably tens of millions of pieces of space debris. [The Guardian explains](http://www.guardian.co.uk/science/across-the-universe/2012/oct/04/astronomy-space): Back then, [NASA](https://www.businessinsider.com/blackboard/nasa) employee Donald Kessler, together with colleague Burton Cour-Palais, proposed that as the number of satellites rose, so would the risk of accidental collisions. The resulting debris would take out further satellites, sparking a chain reaction that would swiftly encircle the planet with a vast cloud of debris. Orbits would then become unusable because anything placed up there would be sandblasted into smithereens, exacerbating the problem. **Eventually our** [**access to space would be lost**](https://www.newscientist.com/article/mg20727772.300-space-junk-hunting-zombies-in-outer-space.html?full=true)