## 1AC

### Util (Longer/Circuit Version)

**My value is morality because the use of the word ought the resolution implies moral obligation**

#### Governments and agents can only evaluate generalities

**Goodin 90.** Robert Goodin 90, [professor of philosophy at the Australian National University college of arts and social sciences], “The Utilitarian Response,” pgs 141-142 //RS

My larger argument turns on the proposition that there is something special about the situation of public officials that makes utilitarianism more probable for them than private individuals. Before proceeding with the large argument, I must therefore say what it is that makes it so special about public officials and their situations that make it both more necessary and more desirable for them to adopt a more credible form of utilitarianism. Consider, first, the argument from necessity. Public officials are obliged to make their choices under uncertainty, and uncertainty of a very special sort at that. All choices – public and private alike – are made under some degree of uncertainty, of course. But in the nature of things, private individuals will usually have more complete information on the peculiarities of their own circumstances and on the ramifications that alternative possible choices might have for them. Public officials, in contrast, are relatively poorly informed as to the effects that their choices will have on individuals, one by one. What they typically do know are generalities: averages and aggregates. They know what will happen most often to most people as a result of their various possible choices, but that is all. That is enough to allow public policy-makers to use the utilitarian calculus – assuming they want to use it at all – to choose general rules or conduct.

#### Any plausible moral theory must prioritize extinction

**Pummer 15** [Theron, Junior Research Fellow in Philosophy at St. Anne's College, University of Oxford. “Moral Agreement on Saving the World” Practical Ethics, University of Oxford. May 18, 2015]

**There appears to be lot of disagreement in moral philosophy. Whether these many apparent disagreements are deep and irresolvable, I believe there is at least one thing it is reasonable to agree on right now**, whatever general moral view we adopt**: that it is very important to reduce the risk that all intelligent beings on this planet is eliminated by an enormous catastrophe, such as a nuclear war.** How we might in fact try to reduce such existential risks is discussed elsewhere. My claim here is only that **we – whether we’re consequentialists, deontologists, or virtue ethicists – should all agree that we should try to save the world.** According to consequentialism, we should maximize the good, where this is taken to be the goodness, from an impartial perspective, of outcomes. **Clearly one thing that makes an outcome good is that the people in it are doing well. There is little disagreement here.** If the happiness or well-being of possible future people is just as important as that of people who already exist, and if they would have good lives, it is not hard to see how reducing existential risk is easily the most important thing in the whole world. This is for the familiar reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. There are so many possible future people that reducing existential risk is arguably the most important thing in the worl**d, even if the well-being of these possible people were given only 0.001% as much weight as that of existing people.** Even on a wholly person-affecting view – according to which there’s nothing (apart from effects on existing people) to be said in favor of creating happy people – the case for reducing existential risk is very strong. As noted in this seminal paper, **this case is strengthened by the fact that there’s a good chance that many existing people will, with the aid of life-extension technology, live very long and very high quality lives. You might think what I have just argued applies to consequentialists only. There is a tendency to assume that, if an argument appeals to consequentialist considerations (the goodness of outcomes), it is irrelevant to non-consequentialists. But that is a huge mistake.** **Non-consequentialism is the view that there’s more that determines rightness than the goodness of consequences or outcomes; it is not the view that the latter don’t matter.** Even John Rawls wrote, “**All ethical doctrines worth our attention take consequences into account in judging rightness. One which did not would simply be irrational, crazy.**” **Minimally plausible versions of deontology and virtue ethics must be concerned in part with promoting the good, from an impartial point of view.** **They’d thus imply very strong reasons to reduce existential risk**, at least when this doesn’t significantly involve doing harm to others or damaging one’s character. What’s even more surprising, perhaps, is that even if our own good (or that of those near and dear to us) has much greater weight than goodness from the impartial “point of view of the universe,” indeed even if the latter is entirely morally irrelevant, we may nonetheless have very strong reasons to reduce existential risk. **Even egoism, the view that each agent should maximize her own good, might imply strong reasons to reduce existential risk.** It will depend, among other things, on what one’s own good consists in. If well-being consisted in pleasure only, it is somewhat harder to argue that egoism would imply strong reasons to reduce existential risk – perhaps we could argue that one would maximize her expected hedonic well-being by funding life extension technology or by having herself cryogenically frozen at the time of her bodily death as well as giving money to reduce existential risk (so that there is a world for her to live in!). I am not sure, however, how strong the reasons to do this would be. But views which imply that, if I don’t care about other people, I have no or very little reason to help them are not even minimally plausible views (in addition to hedonistic egoism, I here have in mind views that imply that one has no reason to perform an act unless one actually desires to do that act). **To be minimally plausible, egoism will need to be paired with a more sophisticated account of well-being.** To see this, it is enough to consider, as Plato did, the possibility of a ring of invisibility – **suppose that, while wearing it, Ayn could derive some pleasure by helping the poor, but instead could derive just a bit more by severely harming them. Hedonistic egoism would absurdly imply she should do the latter. To avoid this implication, egoists would need to build something like the meaningfulness of a life into well-being**, in some robust way, where this would to a significant extent be a function of other-regarding concerns (see chapter 12 of this classic intro to ethics). But **once these elements are included, we can (roughly, as above) argue that this sort of egoism will imply strong reasons to reduce existential risk.** Add to all of this Samuel Scheffler’s recent intriguing arguments (quick podcast version available here) that most of what makes our lives go well would be undermined if there were no future generations of intelligent persons. On his view, my life would contain vastly less well-being if (say) a year after my death the world came to an end. So obviously if Scheffler were right I’d have very strong reason to reduce existential risk. **We should also take into account moral uncertainty.** **What is it reasonable for one to do, when one is uncertain not (only) about the empirical facts, but also about the moral facts?** I’ve just argued that **there’s agreement among minimally plausible ethical views that we have strong reason to reduce existential risk – not only consequentialists, but also deontologists, virtue ethicists, and sophisticated egoists should agree.** But **even those (hedonistic egoists) who disagree should have a significant level of confidence that they are mistaken, and that one of the above views is correct. Even if they were 90% sure that their view is the correct one** (and 10% sure that one of these other ones is correct), **they would have pretty strong reason, from the standpoint of moral uncertainty, to reduce existential risk.** Perhaps most disturbingly still, **even if we are only 1% sure that the well-being of possible future people matters, it is at least arguable that, from the standpoint of moral uncertainty, reducing existential risk is the most important thing in the world.** Again, this is largely for the reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. (For more on this and other related issues, see this excellent dissertation). Of course, it is uncertain whether these untold trillions would, in general, have good lives. It’s possible they’ll be miserable. **It is enough for my claim that there is moral agreement in the relevant sense if**, at least given certain empirical claims about what future lives would most likely be like, **all minimally plausible moral views would converge on this conclusion that we should try to save the world.** While there are some non-crazy **views that place significantly greater moral weight on avoiding suffering than on promoting happiness**, for reasons others have offered (and for independent reasons I won’t get into here unless requested to), they nonetheless **seem to be fairly implausible views.** And **even if things did not go well for our ancestors, I am optimistic that they will overall go fantastically well for our descendants, if we allow them to. I suspect that most of us alive today – at least those of us not suffering from extreme illness or poverty – have lives that are well worth living and that things will continue to improve.** Derek Parfit, whose work has emphasized future generations as well as agreement in ethics, described our situation clearly and accurately: “We live during the hinge of history. **Given the scientific and technological discoveries of the last two centuries, the world has never changed as fast.** We shall soon have even greater powers to transform, not only our surroundings, but ourselves and our successors. **If we act wisely in the next few centuries, humanity will survive its most dangerous and decisive period.** Our descendants could, if necessary, go elsewhere, spreading through this galaxy…. **Our descendants might, I believe, make the further future very good. But that good future may also depend in part on us. If our selfish recklessness ends human history, we would be acting very wrongly.**”(From chapter 36 of On What Matters)

#### Thus, the standard is maximizing expected well being.

### C1

#### China is rapidly increasing space involvement.

**Campbell**, C. (20**19**, July 17). *From Satellites to the Moon and Mars, China Is Quickly Becoming a* *Space Superpower*. Time. Retrieved December 14, 2021, from <https://time.com/5623537/china-space/> Graduate, Glasgow University. Following a move to Asia, initially worked as a travel writer based in Thailand before joining exiled Burmese media organization The Irrawaddy. 2013, joined TIME as Reporter and later as Associate Editor, Hong Kong office. Helped helm Hong Kong's overnight breaking news coverage on Time.com while still reporting on South-East Asia, including turbulent elections in Cambodia, the disappearance of Malaysia Airlines Flight 370, and Thailand's military coup. Interviewed four current Asian world leaders. Currently, TIME Correspondent, Beijing. // ech

It was perhaps only a matter of time before the Celestial Empire reached for the stars. **China’s government has made conquering space a key strategic priority, with the nation’s reported $8 billion space budget second only to the U.S., according to the Space Foundation, an American non-profit**. Chinese scientists were early pioneers of rudimentary rockets back in the year 900, though only launched its first Long March rocket in 1970 on the back of Soviet technology, sending a human into space in 2003. **Now, it’s making fast progress**. **In January**, **China broke new ground by landing its Chang’e 4 lunar lander on the far side of the moon**, which, due to the moon’s synchronous, tidally locked rotation, remains constantly hidden from Earth. There, China’s Jade Rabbit 2 rover was able to transmit data back to Earth via a satellite previously deployed around the moon to establish a radio link. **In another first, a cotton seed was germinated onboard the Chang’e 4**, which is named after China’s mythical moon goddess. After the mission, Chinese President Xi Jinping praised the “outstanding feats” that had “set a model for the whole [Chinese Communist] Party, the whole armed forces and people of all ethnic groups in China.” Such backing from the top underscores the scale of China’s ambitions. **China already has the largest filled-aperture radio telescope in the world, which measures just over 1,640 feet across. Other than visiting Mars, China plans to send probes to asteroids, Jupiter and even Uranus. It also aims to build a scientific research station in the moon’s southern polar region, as well as establish its own sophisticated large-scale space station within 10 years. “They have a strategic, long-term set of goals and work deliberately and systematically to achieve those goals,”** says Kathy Laurini, who served as NASA’s senior advisor for Exploration and Space Operations, among other roles, during 36 years with the American space agency. **Satellite launches are a priority, too**. **China had 38 launches last year, more than any other country, as it attempts to catch up with the West’s satellite infrastructure.** And **last month, China launched a rocket from a mobile platform in the Yellow Sea for the first time, sending five commercial satellites and two others containing experimental technology into orbit. The feat meant China is only the third country after the U.S. and Russia to master sea launches. The speed at which China is surpassing each technological hurdle spotlights how the Beijing government views space as vital for boosting the economy and promoting high-end industry and spill-off technologies. “They see space as a very important driver for growth and competitiveness going forward,”** says Andrew Jones, a journalist specializing in China’s space program.

#### Chinese private companies increasingly work towards joint goals with the government, showing China’s ability to circumvent norms by use of private entities.

**Olson**, S. (20**20**, September 30). Are Private Chinese Companies Really Private? The Diplomat. Retrieved December 8, 2021, from https://thediplomat.com/2020/09/are-private-chinese-companies-really-private/ Mr. Olson began his career in Washington DC as an international trade negotiator and served on the US negotiating team for the NAFTA negotiations. //ear

**China has often been criticized for a lack of transparency, especially with regard to its economic** and trade **policies**. While in many cases these criticisms are valid, it belies the fact that in other instances, China is remarkably open and transparent about its intentions and ambitions. Such is the case with China’s “Opinion on Strengthening the United Front Work of the Private Economy in the New Era,” recently released by the Central Committee of the Chinese Communist Party (and further elaborated on by President Xi Jinping himself). **This document tells us in no uncertain terms that Chinese private companies will be increasingly called upon to conduct their operations in tight coordination with governmental policy objectives and ideologies.** The rest of the world should take note. A Different Vision of “Private” Business The 5,000 word “opinion” aims to ratchet-up the role and influence of the CCP within the private sector in order “to better focus the wisdom and strength of the private businesspeople on the goal and mission to realize the great rejuvenation of the Chinese nation.” The objective is to establish a “united front” between business and government and facilitate the “enhancement of the party’s leadership over the private economy.” According to the plan, “**private economic figures are to be more closely united around the party,” thereby achieving “a high degree of consistency with the Party Central Committee on** political stand, political direction, **political principles**, and political roads.” **All of this stands in stark contrast to long-accepted concepts of how private companies function in a free market**. The overriding purpose of business, according to these traditional precepts, is to earn profits through the provision of value-added products and services, in response to marketplace signals and under the constraint of basic economic realities. Government ideology plays no role in that equation. Enjoying this article? Click here to subscribe for full access. Just $5 a month. But China has a very different vision. **Government officials and government ideologies are directly infused into business operations. Private sector employees are “educated” on government policies and ideologies, with the expectation that this “enlightenment” will help inform their business decisions**. **This government-business symbiosis is further cemented by the provision of massive government subsidies** (estimated to be about 3 percent of China’s GDP) to Chinese companies. To be clear, China – like any other sovereign nation – is entirely free to define the nature of the relationship between the Chinese state and the Chinese private sector, and craft its own economic development philosophies. So there can be no complaint with China for exercising its sovereignty.

#### Two Scenario’s for China Rise:

#### Scenario 1: Military Developments

#### From the US government itself – China in space is a substantial military threat.

**Office of the Director of National Intelligence**. (20**21**, April 9). *Annual Threat Assessment*. United States Unclassified Reports. Retrieved December 14, 2021, from [https://www.dni.gov/files/ODNI/documents/assessments/ATA-2021-Unclassified-Report.pdf //](https://www.dni.gov/files/ODNI/documents/assessments/ATA-2021-Unclassified-Report.pdf%20//) ech

**Space Beijing is working to match or exceed US capabilities in space to gain the military, economic, and prestige benefits that Washington has accrued from space leadership**. We expect a Chinese space station in low Earth orbit (LEO) to be operational between 2022 and 2024. China also has conducted and plans to conduct additional lunar exploration missions, and it intends to establish a robotic research station on the Moon and later an intermittently crewed lunar base. [ 8 ] The PLA will continue to integrate space services—such as satellite reconnaissance and positioning, navigation, and timing (PNT)—and satellite communications into its weapons and command-and-control systems to erode the US military’s information advantage. Counterspace operations will be integral to potential military campaigns by the PLA, and **China has counterspace weapons capabilities intended to target US and allied satellites. Beijing continues to train its military space elements and field new destructive and nondestructive ground- and space-based antisatellite (ASAT) weapons.** China has already fielded ground-based ASAT missiles intended to destroy satellites in LEO and ground-based ASAT lasers probably intended to blind or damage sensitive space-based optical sensors on LEO satellites.

#### China is working to weaponize space and is a direct threat to US power.

**Gould**, J. (20**21**, April 14). *China aims to weaponize space, says intel community report*. Defense News. Retrieved December 14, 2021, from <https://www.defensenews.com/congress/2021/04/14/china-aims-to-weaponize-space-says-intel-community-report/> Joe Gould is the Congress and industry reporter at Defense News, covering defense budget and policy matters on Capitol Hill as well as industry news. //ech

**China is working to weaponize space with an array of capabilities intended to target U.S. and allied satellites as part of its ambitious plans to displace the U.S. in space, the U.S. intelligence community warned in its new Global Risk Assessment report**. The Office of the Director of National Intelligence’s report says that China’s military, the People’s Liberation Army, plans to “match or exceed U.S. capabilities in space to gain the military, economic, and prestige benefits that Washington has accrued from space leadership.” Those counter-space operations will be “integral to potential military campaigns by the PLA.” **The broad-based report also highlights Russia’s space capabilities and overall calls China “the top threat” to U.S. technological competitiveness.** Asked about **China’s nascent constellation** of 138 commercial Earth observation satellites at a Senate Intelligence Committee hearing Wednesday, ODNI Director Avril Haines affirmed they were **part of China’s challenge to American dominance.** She declined to publicly discuss U.S. capabilities. “I think **there’s just no question, as a general matter, that China is focused on achieving leadership in space, in fact, as compared to the United States and has been working hard on a variety of different efforts in this area to try to contest what has been presumed our leadership**,” Haines said. Haines told lawmakers the administration is working to help the policy community understand it supports the new Space Force’s work to maintain American leadership in space and space’s benefits economically, in communications, intelligence and national security.

#### Scenario 2: Economic Advantage

#### China presence in Space brings them major economic benefits and advantages in different markets.

**Pollpeter**, K. (**n.d.).** *China Dream, Space Dream* (E. Anderson, J. Wilson, & F. Yang, Ed.). IGCC. Retrieved December 14, 2021, from <https://www.uscc.gov/sites/default/files/Research/China%20Dream%20Space%20Dream_Report.pdf> Kevin Pollpeter is a research scientist in the CNA China Studies Division. He is an internationally recognized expert on China's space program and is widely published on Chinese national security issues, focusing on Chinese military modernization, China's defense industry, and Chinese views on information warfare. He holds an M.A. in international policy studies from the Monterey Institute of International Studies and is currently enrolled in a Ph.D. program at King's College London. //ech

**In addition to military utility, China has also embraced its space program as a driver of economic and technological advancement.** China’s 2006 space white paper states: “Since the space industry is an important part of the national overall development strategy, China will maintain long term, steady development in this field.” 91 **China sees much potential in developing the space market**. Revenue from the global space industry increased 7 percent to $304.31 billion in 2012. This is a 63 percent increase from $186.64 billion in 2005. Of this amount, 26 percent, or $78.44 billion, is made up of government space budgets, which increased just 1 percent in 2012. The largest portion of the space economy is commercial satellite services, which accounts for 38 percent of global space activity or $115.97 billion. This includes telecommunications, earth observation, and positioning services.92 **China has identified four areas in which its space program brings economic benefits: 1) Creating a market for high technology; 2) The development of “spin-off” civilian technologies; 3) The use of satellite application technologies; and 4) The export of satellites and commercial launch services.** According to Chinese analysts, space has its most profound effect on high technology development, with investments in space technologies said to yield $10 in gross domestic product growth for every dollar spent. 93 Space programs can be large endeavors requiring the participation of numerous government and commercial entities and involving many different technologies, including propulsion, electronics, computers, guidance, power supply, and materials.94 The demand created by space projects can spur advancement in computers, microelectronics, precision manufacturing, automatic control, new energy, and new materials. **Chinese analysts point to the U.S. Apollo program as the best example of this, which is said to have led to advances in radar, radio-guidance, synthetic materials, computers, and biological engineering and laid a solid foundation for U.S. high-technology development and technology-based military innovation.** 95 **Chinese analysts point to a similar effect in their country.** China’s first computer was used to develop space technology.96 Of the 1,000 new materials developed in China, 80 percent are said to have resulted from research in space technology; and more than 2,000 space technology achievements have been reported in various sectors of the national economy and nearly 1,000 products developed by the space industry have been converted for civilian use. Finally, the work of the more than 3,000 enterprises involved in China’s human spaceflight program is said to have contributed to technological progress in electronics, new materials, and automatic control.97 The creation of markets for high technology products is also intended to support the development of China’s other strategic emerging industries through the introduction of spin off technologies―technologies originally developed for the space industry that have found a civilian application. This effort is conducted through eight industrial parks called “aerospace bases” formed through partnerships between the space industry and the governments of Beijing, Shanghai, Xi’an, Chengdu, Tianjin, Inner Mongolia, Shenzhen, and Hainan. **These bases are not only designed to manufacture space products, but also to leverage the industry’s capabilities in space technologies to build civilian products. In doing so, the space industry focuses on technologies and products in areas identified as strategic emerging industries by the central government.** **These include high-end manufacturing, alternative energy, new materials, alternative energy automobiles, and new generation information technologies.**98

#### China rise is bad---undermines US heg, stopping military development and superiority is key

**Maher 16** - Research Fellow in the Europe in the World program at the Robert Schuman Centre for Advanced Studies, European University Institute, San Domenico di Fiesole (FI), Italy.

Richard Maher, 5-30-2016, "The Rise of China and the Future of the Atlantic Alliance," http://www.sciencedirect.com/science/article/pii/S0030438716300102, Date Accessed: 6-22-2016 //NM recut by HA

**China's dramatic rise has been arguably the most important geopolitical development**of the past two decades.4 **China has already become the world's second largest economy and second biggest military spender, and is the only country that could one day challenge the United States’ status as the world's sole superpower**. Barring catastrophic internal convulsions in China, world politics thus seems headed toward a return to a kind of bipolarity, with the United States and China the two dominant powers in the international system. While a U.S.-China bipolar system would differ in many important respects from the bipolar system that existed during the Cold War, a return to a two-superpower world would affect international politics in profound ways, especially in alliance dynamics.5 As several analysts have pointed out,**China likely will emerge as a much more formidable adversary for the United States than was the Soviet Union. China's gross domestic product (GDP) is expected to surpass that of the United States within the next decade.** China is already the world's biggest exporter, the world's second biggest creditor (after Japan), and will soon become the world's largest importer. **China has embarked on a military modernization program that will make it a potent military competitor to the United States**, particularly in the coastal waters of the western Pacific. China—unlike the Soviet Union, which had a world-class military establishment but a dysfunctional economy—will thus become both an economic and a military superpower. And with its growing wealth and power, China will demand enhanced status and recognition.6 Geopolitical tensions between the United States and China are rising.7 As its power continues to grow, **China will be more likely to challenge directly U.S. military supremacy** in East Asia and the western Pacific.8 As a result, security issues increasingly dominate the U.S.-China agenda. As Aaron Friedberg has written, “The United States and the People's Republic of China are today locked in a quiet but increasingly tense struggle for power and influence, not only in Asia but around the world.”9**China increasingly shows signs of being a revisionist power, seeking changes in the regional and international systems that reflect its growing wealth and influence**. Chinese President Xi Jinping has called for a “new type of great-power relationship” with the United States, for example, in which Washington acknowledges China's arrival as a great power and its sovereignty claims to contested islands in the East and South China Seas.10 Institutions like the China-led Asian Infrastructure Investment Bank (AIIB) and the New Development Bank (NDB) are designed to compete directly with U.S.-led institutions such as the World Bank and, with Japan, the Asian Development Bank (ADB).**Tensions between China and several of its neighbors are also rising,** many of which—including Japan, the Philippines, and Vietnam—are U.S. allies. In territorial and maritime disputes in the East and South China Seas, China has tried to intimidate its neighbors and force resolutions that would ensure its control of these contested areas. China and Japan nearly came to blows in 2012 over the Diaoyu/Senkaku Islands, for example, which are administered by Japan but also claimed by China.11 China has started to build military airfields on disputed reefs in the South China Sea and, in November 2013, announced an exclusive “air defense identification zone” over contested islands in the East China Sea. Both measures have been viewed by regional powers and the United States as a signal of a more assertive Chinese foreign policy, and have raised uncertainty, elevated hostilities, fuelled resentments, and made Chinese intentions in the region increasingly hard to understand.12 China is upgrading its nuclear arsenal, and determined to introduce multiple warheads on its most powerful long-range ballistic missile, the DF-5, which is capable of reaching the United States.13 For decades, China opted to maintain a minimal nuclear deterrent against potential aggression. This commitment is now questioned by the United States and other powers, and China's decision to make its most advanced nuclear weapons more lethal raises the fear of a potential nuclear arms race that was a core feature of the Cold War.14 China has made major investments in cyber technology and has created a powerful arsenal of cyber weapons.15 Cyberattacks against U.S. government and corporate sites that emanate from China are a central and increasingly divisive issue between the two governments. The United States accuses China of being engaged in widespread and systematic hacking, which has led to the theft of billions of dollars’ worth of intellectual property. U.S. officials believe that the purpose of Chinese “probes and attacks” on American computer networks is “both to steal intellectual property and prepare for future conflict.”16 China is expanding and modernizing its submarine force and building a second aircraft carrier, which will extend its power projection capabilities as far as the Indian Ocean and Persian Gulf.17 In late 2014, China sent submarines through the Persian Gulf for the first time, waters traditionally dominated by the U.S. Navy. Rather than trying to match America's global reach, however,**China's military modernization program has focused on weapons systems designed to blunt U.S. technological superiority in the event of military conflict, such as developing a means to disrupt American surveillance and communications satellites and expanding the accuracy and range of its tactical and ballistic missile systems.18 Several points of tension, thus, exist between China and the United States, and many analysts fear that forces are bringing the two countries into overt and sustained strategic competition**. Even though European countries have an important stake in maintaining stability in the Asia-Pacific, it is unlikely that they will be able or willing to contribute much to a future U.S.-led balancing coalition again China. There are three main reasons why an EU contribution would be unlikely: divergent threat perceptions, limited strategic capabilities, and lower dependence on the United States today for their security. The remainder of this article will examine these factors in turn.

#### Impact: China rise leads to extinction

**US Unipolarity is sustainable and creates a structural disincentive for great power war and escalation — independently causes cascading prolif and extinction**

**Brands 15** (Hal Brands. **,** History PhD Yale PhD. he’s on the faculty at the Sanford School of Public Policy at Duke University, The Elliott School of International Affairs, The Washington Quarterly, Summer 2015 38:2 pp. 7–28)

The fundamental reason is that **both U.S. influence and international stability are thoroughly interwoven** with a robust U.S. forward presence. Regarding influence, the protection that Washington has afforded its allies has equally afforded the United States great sway over those allies’ policies.43 During the Cold War and after, for instance, **the United States has used the influence provided by its security posture to veto allies’ pursuit of nuclear weapons, to obtain more advantageous terms in financial and trade agreements,** and even to affect the composition of allied nations’ governments.44 More broadly, it has used its alliances as vehicles for shaping political, security, and economic agendas in key regions and bilateral relationships, thus giving the United States an outsized voice on a range of important issues. To be clear, this influence has never been as pervasive as U.S. officials might like, or as some observers might imagine. But by any reasonable standard of comparison, it has nonetheless been remarkable. One can tell a similar story about the relative stability of the post-war order. As even some leading offshore balancers have acknowledged, **the lack of conflict in regions like Europe in recent decades is not something that has occurred naturally. It has occurred because the “American pacifier” has suppressed precisely the dynamics that previously fostered geopolitical turmoil.** That pacifier has limited arms races and security competitions by providing the protection that allows other countries to under-build their militaries. **It has soothed historical rivalries** by affording a climate of security in which powerful countries like Germany and Japan could be revived economically and reintegrated into thriving and fairly cooperative regional orders. It has induced caution in the behavior of allies and adversaries alike, deterring aggression and dissuading other destabilizing behavior. As John Mearsheimer has noted, the United States “effectively acts as a night watchman,” lending order to an otherwise disorderly and anarchical environment.45 **What would happen if Washington backed away from this role? The most logical answer is that both U.S. influence and global stability would suffer. With respect to influence, the United States would effectively be surrendering the most powerful bargaining chip it has traditionally wielded in dealing with friends and allies, and jeopardizing the position of leadership it has** used to shape bilateral and regional agendas for decades. The consequences would seem no less damaging where stability is concerned. As offshore balancers have argued, it may be that U.S. retrenchment would force local powers to spend more on defense, while perhaps assuaging certain points of friction with countries that feel threatened or encircled by U.S. presence. But it equally stands to reason that **removing the American pacifier would liberate the more destabilizing influences that U.S. policy had previously stifled. Long-dormant security competitions might reawaken as countries armed themselves more vigorously; historical antagonisms between old rivals might reemerge** in the absence of a robust U.S. presence and the reassurance it provides. Moreover, **countries that seek to revise existing regional orders in their favor [.]—think Russia in Europe, or China in Asia—might indeed applaud U.S. retrenchment, but they might just as plausibly feel empowered to more assertively press their interests**. If the United States has been a kind of Leviathan in key regions, Mearsheimer acknowledges, then “take away that Leviathan and there is likely to be big trouble.”46 Scanning the global horizon today, one can easily see where such trouble might arise. In Europe, a revisionist Russia is already destabilizing its neighbors and contesting the post-Cold War settlement in the region. In the Gulf and broader Middle East, the threat of Iranian ascendancy has stoked region-wide tensions manifesting in proxy wars and hints of an incipient arms race, even as that region also contends with a severe threat to its stability in the form of the Islamic State. In East Asia, a rising China is challenging the regional status quo in numerous ways, sounding alarms among its neighbors—many of whom also have historical grievances against each other. In these circumstances, removing the American pacifier would likely yield not low-cost stability, but increased conflict and upheaval. That conflict and upheaval, in turn, would be quite damaging to U.S. interests even if it did not result in the nightmare scenario of a hostile power dominating a key region. It is hard to imagine, for instance, that increased instability and acrimony would produce the robust multilateral cooperation necessary to deal with transnational threats from pandemics to piracy. More problematic still might be the economic consequences. As scholars like Michael Mandelbaum have argued, the enormous progress toward global prosperity and integration that has occurred since World War II (and now the Cold War) has come in the climate of relative stability and security provided largely by the United States.47 One simply cannot confidently predict that this progress would endure amid escalating geopolitical competition in regions of enormous importance to the world economy. Perhaps the greatest risk that a strategy of offshore balancing would run, of course, is that a key region might not be able to maintain its own balance following U.S. retrenchment. That prospect might have seemed far-fetched in the early post-Cold War era, and it remains unlikely in the immediate future. But in East Asia particularly, the rise and growing assertiveness of China has highlighted the medium- to long-term danger that a hostile power could in fact gain regional primacy. If China’s economy continues to grow rapidly, and if Beijing continues to increase military spending by 10 percent or more each year, then its neighbors will ultimately face grave challenges in containing Chinese power even if they join forces in that endeavor. This possibility, ironically, is one to which leading advocates of retrenchment have been attuned. “The United States will have to play a key role in countering China,” Mearshimer writes, “because its Asian neighbors are not strong enough to do it by themselves.”48 If this is true, however, then offshore balancing becomes a dangerous and potentially self-defeating strategy. As mentioned above, it could lead countries like Japan and South Korea to seek nuclear weapons, thereby stoking arms races and elevating regional tensions. Alternatively, and perhaps more worryingly, it might encourage the scenario that offshore balancers seek to avoid, by easing China’s ascent to regional hegemony. As Robert Gilpin has written, “Retrenchment by its very nature is an indication of relative weakness and declining power, and thus retrenchment can have a deteriorating effect on relations with allies and rivals.”49 In East Asia today, U.S. allies rely on U.S. reassurance to navigate increasingly fraught relationships with a more assertive China precisely because they understand that they will have great trouble balancing Beijing on their own. A significant U.S. retrenchment might therefore tempt these countries to acquiesce to, or bandwagon with, a rising China if they felt that prospects for successful resistance were diminishing as the United States retreated.50 In the same vein, retrenchment would compromise alliance relationships, basing agreements, and other assets that might help Washington check Chinese power in the first place—and that would allow the United States to surge additional forces into theater in a crisis. In sum, if one expects that Asian countries will be unable to counter China themselves, then reducing U.S. influence and leverage in the region is a curious policy. Offshore balancing might promise to preserve a stable and advantageous environment while reducing U.S. burdens. But upon closer analysis, the probable outcomes of the strategy seem more perilous and destabilizing than its proponents acknowledge.

### Contention 2: Space Debris

#### Rocket Launches, Satellites and Human Activity all inevitably create space debris

**Polyakov**, M. (20**21**, **May 5**). Where does space junk come from – and how do we clean it up? World Economic Forum. Retrieved December 6, 2021, from <https://www.weforum.org/agenda/2021/05/why-we-need-to-clean-up-space-junk-debris-low-earth-orbit-pollution-satellite-rocket-noosphere-firefly/> //ear Dr. Max Polyakov is the Founder of Noosphere Ventures, Firefly Aerospace, and EOS Data Analytics

**As long as humans launch objects into orbit, space debris is inevitable**. **Rocket launches leave boosters, fairings, interstages, and other debris in LEO.** **So do rocket explosions, which currently account for seven of the top 10 debris-creating events. Human presence also creates orbital flotsam** – such as cameras, pliers, an astronaut’s glove, a wrench, a spatula, even a tool bag lost during space walks. **Some debris is created naturally from the impacts of micrometeoroids** – dust-sized fragments of asteroids and comets. **With limited lifetimes, operational satellites can become space debris. Satellites run out of maneuvering fuel, batteries wear out, solar panels degrade – causing an orbital debris feedback loop, in which the problem is exacerbated when solar panels are sandblasted by micrometeoroids and tiny debris**. **As with rocket debris, spent satellites eventually re-enter Earth’s atmosphere and burn up, but the process can take years** – **and the higher they orbit above Earth, the longer those orbits take to decay**.

#### Already, expansion of private entities in space creates more space debris with no legal consequences.

**McMillan**, A. (20**21**, July 14). *The final frontier - 21st century space race*. International Bar Association. Retrieved December 14, 2021, from <https://www.ibanet.org/the-final-frontier>. Anne McMillan is a legally trained journalist and a fan of law, language, swimming and chai. //ech

Another UN body, the International Telecommunication Union, manages space telecommunications, assigning satellite ‘slots’ and coordinating shared global use of the radio spectrum. Its dispute settlement mechanism is optional and, in reality, not used, with negotiated solutions between States being the norm. Nacimiento highlights the inadequacy of the current legal regime. ‘**There are no binding international rules governing space traffic management to avoid [crashes] and, if [they] happen, to regulate responsibilities and liabilities.** So this is an area where **international rules are needed in order to avoid conflicts between states using satellites for civilian and military purposes**.’ **The numbers of satellites being launched, or planned to be launched, is exploding** with the development of new and cheaper technology, and so more legal disputes are likely. And yet again private companies are at the centre of this expansion. Smaller satellites in low Earth orbit, running internet services or engaged in Earth observation, are predicted to balloon in numbers in the coming years. Compared to the approximately 3,500 active satellites currently orbiting the Earth, we can expect 40-50,000 after a decade. **With such expansion comes an increased risk of collisions which create more space debris, thus heightening the risk to rockets, manned vehicles, space stations and other space traffic.** A tiny speck of unidentified paint, or space debris, travels at such a high velocity in space that it could disable a spacecraft. The inadequacy of both hard and soft law in this area brings with it not just the possible loss of services, equipment and human life, but also **the risk of conflict. ‘We have seen a crash in 2009 between a US communications satellite and a Russian intelligence satellite in space**,’ says Nacimiento. ‘In 2019 a Starlink satellite forced a satellite operated by the European Space Agency into an evasive maneuver to avoid a crash. **Such incidents could easily provoke conflicts between states, in particular when satellites for intelligence or military uses are concerned**.’ Claims under the 1972 Space Liability Convention’s fault-based liability system have proved impractical, **as there are very few legally binding duties in outer space to establish fault against**. As such, the Convention has never been tested in court. And the risk escalates if not all incidents are accidental. China, India, Russia and the US have all demonstrated their anti-satellite capability by deploying anti-satellite weapons (ASATs) in space. In 2019 India created a massive cloud of space debris by using an ASAT to destroy one of its own satellites, yet faced no legal consequences. The OST provisions on the military use of space are limited in scope, precluding only the placing in space of certain types of weapons (such as nuclear weapons or other weapons of mass destruction). The use of civilian satellites for military purposes easily evades the treaty. The OST also allows the deployment of military personnel in space for scientific or ‘other peaceful purposes’.

#### Privatization of space leads to unchecked debris.

Muelhaupt et al. 19 – Theodore, Marlon Sorge, Jamie Morin, and Robert Wilson, 6/18/19, Center for Orbital and Reentry Debris Studies, Center for Space Policy and Strategy, The Aerospace Corporation, 30 year Space Systems Analyst and Operator, [“Space traffic management in the new space era,” Journal of Space Safety Engineering, <https://www.sciencedirect.com/science/article/pii/S246889671930045X?via%3Dihub>] justin recut by ha

The last decade has seen rapid growth and change in the space industry, and an explosion of commercial and private activity. Terms like NewSpace or democratized space are often used to describe this global trend to develop faster and cheaper access to space, distinct from more traditional government-driven activities focused on security, political, or scientific activities. The easier access to space has opened participation to many more participants than was historically possible. This new activity could profoundly worsen the space debris environment, particularly in low Earth orbit (LEO), but there are also signs of progress and the outlook is encouraging. Many NewSpace operators are actively working to mitigate their impact. Nevertheless, NewSpace represents a significant break with past experience and business as usual will not work in this changed environment. New standards, space policy, and licensing approaches are powerful levers that can shape the future of operations and the debris environment. 2. Characterizing NewSpace: a step change in the space environment In just the last few years, commercial companies have proposed, funded, and in a few cases begun deployment of very large constellations of small to medium-sized satellites. These constellations will add much more complexity to space operations. Table 1 shows some of the constellations that have been announced for launch in the next decade. Two dozen companies, when taken together, have proposed placing well over 20,000 satellites in orbit in the next 10 years. For perspective, fewer than 8100 payloads have been placed in Earth orbit in the entire history of the space age, only 4800 [1] remain in orbit and approximately 1950 [2] of those are still active. And it isn't simply numbers – the mass in orbit will increase substantially, and long-term debris generation is strongly correlated with mass. Table 1. Some announced NewSpace constellations. Operator Number of satellites Altitude (km) Country SpaceX V-band 7518 335–345 US Capella 48 350–650 US Planet Swift 6 350–650 US Black Sky 60 450 US Satellogic NuSat 300 500 Argentina Kepler 140 550 US SpaceX Starlink 1584 550 US Skybox 30 576 US Fleet 100 580 Australia Amazon Kuiper 3236 590–630 US Commsat 800 600 China Kineis 20 600 France Yalini 135 600 Canada Spire 100 651 US Planet Doves 150 675 US Orbcomm 31 750 US Iridium 72 780 US Theia 112 800 US Lucky Star 156 1000 China Telesat LEO 72 1000 Canada Hongyan 300 1100 China Xinwei 32 1100 China SpaceX Starlink 2825 1110–1325 US OneWeb 720 1200 ESA Telesat LEO 45 1248 Canada Astrome Tech 600 1400 India LeoSat 108 1400 US Globalstar 40 1412 US This table is in constant flux. It is based largely on U.S. filings with the Federal Communications Commission (FCC) and various press releases, but many of the companies here have already altered or abandoned their original plans, and new systems are no doubt in work. Although many of these large constellations may never be launched as listed, the traffic created if just half are successful would be more than double the number of payloads launched in the last 60 years and more than 6 times the number of currently active satellites. Current space safety, space surveillance, collision avoidance (COLA) and debris mitigation processes have been designed for and have evolved with the current population profile, launch rates and density of LEO space. By almost any metric used to measure activity in space, whether it is payloads in orbit, the size of constellations, the rate of launches, the economic stakes, the potential for debris creation, the number of conjunctions, NewSpace represents a fundamental change. 3. Compounding effects of better SSA, more satellites, and new operational concepts The changes in the space environment can be seen on this figurative map of low Earth orbit. Fig. 1 shows the LEO environment as a function of altitude. The number of objects found in each 10 km “bin” is plotted on the horizontal axis, while the altitude is plotted vertically. Objects in elliptical orbits are distributed between bins as partial objects proportional to the time spent in each bin. Some notable resident systems are indicated in blue text on the right to provide an altitude reference. The (dotted) red line shows the number of objects in the current catalog tracked by the U.S. Space Surveillance Network (SSN). All the COLA alerts and actions that must be taken by the residents are due to their neighbors in the nearby bins, so the currently visible risk is proportional to the red line.



Fig. 1. Objects in LEO orbit by altitude per 10 km altitude bin. Elliptical orbit objects distributed by portion spent in each bin. Some notable existing resident systems are listed on the right. New residents, including some replacement systems, are on the left. (For interpretation of the references to color in this figure, the reader is referred to the web version of this article.) The red line of the current catalog does not represent the complete risk; it indicates the risk we can track and perhaps avoid. A rule of thumb is that the current SSN LEO catalog contains objects about 10 cm or larger. It is generally accepted that an impact in LEO with an object 1 cm or larger will cause damage likely to be fatal to a satellite's mission. Therefore, there is a large latent risk from unobserved debris. While we cannot currently track and catalog much smaller than 10 cm, experiments have been performed to detect and sample much smaller objects and statistically model the population at this size [3]. The (solid) blue line represents the model of the 1 cm and larger debris that is likely mission-ending, usually called lethal but not trackable. If LEO operators avoid collisions with all the objects in the red line, they are nonetheless inherently accepting the risk from the blue line. This risk is already present. The (dashed) orange line is an estimate of the population at 5 cm and larger and is thus an estimate of what the catalog might conservatively be a few years after the Space Fence, a new radar system being built by the Air Force, comes on line (currently planned for 2019) [4]. Commercial companies offering space surveillance services, such as LeoLabs, ExoAnalytics, Analytic Graphics Inc., Lockheed, and Boeing, might also add to the number of objects currently tracked. Space Policy Directive 3 (SPD-3) [13] specifically seeks to expand the use of commercial SSA services. Existing operators can expect a sharp increase in the number of warnings and alerts they will receive because of the increase in the cataloged population. Almost all the increase will come from newly detected debris [5]. The pace of safety operations for each satellite on orbit will significantly change because of the increase in the catalog from the Space Fence. This effect is compounded because the NewSpace constellations described in Table 1 will drastically change the profile of satellites in LEO. The green bars in Fig. 1 represent the number of objects that will be added to the catalog (red or orange lines) from only the NewSpace large LEO constellations at their operational altitudes. This does not include the rocket stages that launch them, or satellites in the process of being phased into or removed from the operational orbits. Neighbors of one of these new constellations may face a radically different operations environment than their current practices were designed to address. Satellites in these large LEO constellations typically have planned operational lifetimes of 5–10 years. Some companies have proposed to dispose of their satellites using low thrust electric propulsion systems, which would spiral satellites down over a period of months or years from operating altitudes as high as 1500 km through lower orbits where the Hubble Space Telescope, the International Space Station, and other critical LEO satellites operate [6]. Similar propulsive techniques would raise replacement satellites from lower launch injection orbits to higher operational orbits. These disposal and replenishment activities will add thousands of satellites each year transiting through lower altitudes and posing a risk to all resident satellites in those lower orbits. More importantly, failures will occur both among transiting satellites and operational constellations, potentially leaving hundreds more stranded along the transit path. Aerospace studies [7–9] have shown that failed satellites, whether they fail during operations or fail during disposal, can pose as great or even greater risk than the many thousands of operational satellites (Fig. 2). Given the rapid flux in the proposed large LEO constellations (LLC), we created a Future Constellations Model (FCM) with elements that represented the characteristics of the different systems being proposed. In our models, almost all the collisions and the resulting debris from those collisions occur because of failed systems. Most large constellation operators intend to perform active collision avoidance for active systems, whether operational or in some stage of check-out or disposal, but failed satellites are assumed to be incapable of maneuver. Fig. 2 also shows that satellites in the disposal phase can contribute to collisions similarly to satellites in the operational phase. Fig 2 Download : Download full-size image Fig. 2. Collisions during operations and disposal over 10 years for various NewSpace Future Constellation Models (FCMs). 4. A notional illustration of workload The highest risk to operational satellites comes from the lethal but non-trackable debris that is depicted in the blue line in Fig. 2. However, operators perform collision avoidance only on the objects that can be tracked and cataloged. Advances in tracking and NewSpace launches will both act to increase this workload. A key element of the problem is that an increase in the LEO population will lead to an increase in close approaches to existing satellites [5], and the potential for accidental collisions. Conjunction prediction, collision probability (Pc), and maneuver planning for most existing satellite operators is a time- and personnel-intensive operation. Orbit analysts, and propulsion, navigation, and communications systems personnel are involved in evaluating and planning maneuvers over several days and must do so even if the ultimate decision is to “fly through” a close approach. Since most existing systems have small numbers of vehicles and the number of conjunctions any given operator experiences is relatively small, COLA remains a manual process. For systems not designed with automated maneuver planning, a COLA assessment that progresses all the way to a maneuver plan can consume considerable effort, whether or not the maneuver is executed. If a large constellation is deployed next to an existing resident system, the existing system may experience many conjunctions and alerts due to its close proximity of the dense new constellation. A sufficiently large constellation will, in effect, form a “shell” where frequent opportunities for conjunctions will be created. For example, Fig. 3 depicts a fictional scenario where 1225 “New” satellites are distributed in 35 planes in circular orbits at 1000 km altitude, at 98° inclination. These are placed near a hypothetical “Old” six-satellite constellation operating in a nearly circular orbit at the same altitude and 63° inclination. Following a common operations practice, we assume that the Old satellite operators flag a conjunction at Pc> 10−7, start COLA assessment with additional tracking at Pc> 10−6, and plan a COLA maneuver when the Pc> 10−5. A conjunction with Pc > 10−4 would typically be considered a significant risk leading most operators to maneuver. Fig 3 Download : Download full-size image Fig. 3. “New” large LEO constellation at same average altitude as “Old” existing constellation. Currently, the Old system in this example would typically see a warning (Pc > 10−6) a few times a month at this altitude, and of those, a few per year might cross the maneuver threshold. For the operations center, this would be multiplied by the number of satellites in the constellation. When the New system parks nearby, the number of COLA alerts jumps substantially. But the number of alerts depends entirely on the error bubble, (covariance) used. If the typical errors of the public external tracking data and the orbit propagation methods that are widely available (General Perturbations, or GP) are used for both constellations, over a 30-day period we see 129 conjunctions that cross the threshold for COLA assessment (Pc> 10−6), and 53 that cross the maneuver planning threshold (Pc> 10−5) (Fig. 4). This is nearly 2 per day. This could be an enormous workload for a manual process. If a high accuracy catalog (Special Perturbations, or “SP”) and a high-fidelity propagator with its typical covariances is used, the number of conjunctions goes from 129 to a more manageable 10. SP data is maintained by the Air Force, but it is not widely available. It is interesting to note that nine of those 10 crossed the maneuver-planning threshold, and of those, four crossed the Pc> 10−4 where many operators would choose to execute a maneuver. Compared to GP, the SP-quality data resulted in far fewer warnings and flagged four very close conjunctions. The operations center would have been able to concentrate on fewer “false alarms”. We also computed the case where GPS-quality owner-operator data was used for both systems, in which we assumed near-real-time owner-operator position data of very high quality was provided by both operators and used in the collision analysis. In this case, NONE of the conjunctions resulted in a warning and no COLA alerts were generated. The closest approach was 99 m, with a Pc of 3.7 × 10−7 using SP. But because of the quality of the GPS-based position data, this conjunction did not raise an alert because the fully-informed operators could be confident that a collision would not occur. Fig 4 Download : Download full-size image Fig. 4. Number of COLA alerts in 30 days for various qualities of position knowledge when a fictional new system is deployed near an existing one. In the example, an operations center for the Old constellation of six satellites could go from about one COLA assessment a week to nearly one per day per satellite, if only the published satellite catalog is available. If a new constellation operates too close to an existing system, the operator workload may become unreasonable using existing processes. But high accuracy data makes this manageable, and GPS-quality owner-operator data for both systems makes the problem vanish. Since these constellations are likely to be operated by different companies or governments, sharing high-quality position data would likely require an active space traffic management organization. Existing operators will not necessarily have large constellations parked nearby, but they will nonetheless be affected by the new activity. The new large constellations’ satellites typically will have relatively short lifetimes and will need frequent replenishment. The traffic transiting up and down will be substantial, and failures could leave stranded objects at intermediate altitudes, permanently increasing the collision risk. 5. Conjunction warning overload NewSpace operators will face a different challenge due to the vast increase in numbers of satellites. While there are likely as many operational plans as there are operators, a large constellation must consider close approaches with itself. Even if there are no neighboring systems, self-conjunctions can occur between two members of the same constellation. Depending on the configuration, a given operator could see hundreds to thousands of self-conjunctions that cross typical warning thresholds each day using current practices. This could be an issue for a space traffic management (STM) agency, even if it is not an issue for the operator. Aerospace models show that for one possible NewSpace constellation, more than 500,000 self-conjunctions each year could result that cross the typical Pc > 10−6 warning threshold. If no action were taken, we would expect 2–3 collisions per year. This is clearly unacceptable. Thus, current tracking accuracy and processes might produce millions of warnings per year for NewSpace operators to prevent half a dozen actual collisions. Under current practices operators would need to sort through an enormous haystack to find the needles, and because a handful of actual collisions will occur, the warnings cannot be ignored.

#### (Impact 1) Space debris creates uncertainty about involvement of adversaries which can create armed conflict, the more space debris, the increased likelihood of conflict.

**Sample**, I. (20**16**, January 22). *Rise in space junk could provoke armed conflict say scientists*. The Guardian. Retrieved December 14, 2021, from <https://www.theguardian.com/science/2016/jan/22/rise-in-space-junk-could-provoke-armed-conflict-say-scientists>. Ian Sample is science editor of the Guardian. Before joining the newspaper in 2003, he was a journalist at New Scientist and worked at the Institute of Physics as a journal editor. He has a PhD in biomedical materials from Queen Mary's, University of London. Ian also presents the [Science Weekly podcast](https://www.theguardian.com/science/series/science). //ech

**The steady rise in space junk that is floating around the planet could provoke a political row and even armed conflict, according to scientists, who warn that even tiny pieces of debris have enough energy to damage or destroy military satellites**. **Researchers said fragments of spent rockets and other hurtling hardware posed a “special political danger” because of the difficulty in confirming that an operational satellite had been struck by flying debris and had not fallen victim to an intentional attack by another nation.** Space agencies in the US and Russia track more than 23,000 pieces of space junk larger than 10cm, but estimates suggest there could be half a billion fragments ranging from one to 10cm, and trillions of even smaller particles. The junk poses the greatest danger to satellites in low Earth orbit, where debris can slam into spacecraft at a combined speed of more than 30,000mph. This realm of space, which stretches from 100 to 1200 miles above the surface, is where most military satellites are deployed. **In a report to be published in the journal Acta Astronautica, Vitaly Adushkin at the Russian Academy of Sciences in Moscow writes that impacts from space junk, especially on military satellites, posed a “special political danger” and “may provoke political or even armed conflict between space-faring nations. The owner of the impacted and destroyed satellite can hardly quickly determine the real cause of the accident.”** Adushkin adds that in recent decades there have been repeated sudden failures of defence satellites which have never been explained. But there are only two possibilities, he claims: either unregistered collisions with space debris, or an aggressive action by an adversary. **“This is a politically dangerous dilemma,”** he writes. The warning comes after an incident in 2013 when a Russian satellite, Blits, was disabled after apparently colliding with debris created when China shot down one of its own old weather satellites in 2007. The Chinese used a missile to destroy its satellite, an act that demonstrated its anti-satellite capabilities, and left 3,000 more pieces of debris in orbit. According to the report, the amount of debris cluttering low Earth orbit has risen dramatically in half a century of spacefaring. Without efforts to clean up the space environment, Adushkin warns of a “cascade process” in which chunks of debris crash into one another and produce ever more smaller fragments. Data in the study from the Russian space agency show that the International Space Station took evasive action five times in 2014 to avoid space debris. Even small flecks of paint that have flaked off spacecraft can be hazardous. Nasa’s space shuttle was struck by flying paint several times in orbit, forcing ground staff to replace some of the spaceship’s windows. The report follows a report commissioned by Nasa in 2011 which warned that **the level of space junk was rising exponentially, and had reached a “tipping point” in the threat it posed to satellites and the International Space Station.**

#### Space Debris infinitely cascades due to the Kessler effect, making entire orbits unusable

**Matignon**, L. D. G. (2019, June **18**). The Kessler syndrome and space debris. Space Legal Issues. //ear <https://www.spacelegalissues.com/space-law-the-kessler-syndrome/> Louis de Gouyon Matignon has a PhD in space law (co-supervised by both Philippe Delebecque, from Université Paris 1 Panthéon-Sorbonne, France, and Christopher D. Johnson, from Georgetown University, Washington D.C.);

**The Kessler syndrome is a theory** proposed by NASA scientist Donald J. Kessler in 1978, **used to describe a self-sustaining cascading collision of space debris in LEO**. In an article published on June 1, 1978 in the American Journal of Geophysical Research, a peer-reviewed – the evaluation of work by one or more people with similar competences as the producers of the work – scientific journal, containing original research on the physical, chemical, and biological processes that contribute to the understanding of the Earth, Sun, and Solar System, **authors Donald J. Kessler and Burton G. Cour-Palais, two NASA experts, identified the risk of an exponential increase in the number of space debris or orbital debris under the effect of mutual collisions**. **The two authors believed that a belt formed by these objects or fragments of objects around the Earth would soon form. Eventually threatening space activities, this phenomenon will be popularized a few years later under the name of Kessler syndrome**. **The Kessler syndrome, also called the Kessler effect, collisional cascading or ablation cascade, is a scenario in which the density of objects in Low Earth Orbit (LEO) is high enough that collisions between objects could cause a cascade where each collision generates space debris that increases the likelihood of further collisions**. **One implication is that the distribution of debris in orbit could render space activities and the use of satellites in specific orbital ranges impractical for many generations.** **Every satellite, space probe, and manned mission has the potential to produce space debris**. **A cascading Kessler syndrome becomes more likely as satellites in orbit increase in number.** The most commonly used orbits for both manned and unmanned space vehicles are Low Earth Orbit (LEO). **Clearly, the number of space debris that naturally falls back into the atmosphere is less than the number of those generated by the collision of existing space debris.** Even if all space activity and launch were halted tomorrow, the debris population would continue to increase exponentially, leading to a situation in which some orbits would become impassable in the long run. “As the number of artificial satellites in earth orbit increases, the probability of collisions between satellites also increases. **Satellite collisions would produce orbiting fragments, each of which would increase the probability of further collisions, leading to the growth of a belt of debris around the earth**. This process parallels certain theories concerning the growth of the asteroid belt. The debris flux in such an earth-orbiting belt could exceed the natural meteoroid flux, affecting future spacecraft designs. Amathematical model was used to predict the rate at which such a belt might form. Under certain conditions the belt could begin to form within this century and could be a significant problem during the next century. The possibility that numerous unobserved fragments already exist from spacecraft explosions would decrease this time interval. However, early implementation of specialized launch constraints and operational procedures could significantly delay the formation of the belt” – Collision frequency of artificial satellites: The creation of a debris belt, Journal of Geophysical Research, Volume 83, Issue A6, p. 2637-2646 (1978).

#### Space Debris would destroy internet and GPS access worldwide

**IBERDROLA**. (20**21**, **June 30**). Space Debris. Retrieved December 7, 2021, //ear from <https://www.iberdrola.com/sustainability/space-debris> //ear Iberdrola SA is a holding company, which engages in the generation, distribution, trading, and marketing of electricity. It operates through the following businesses: Networks, Liberalized, Renewables and Other Businesses.

According to the ESA, since 1961 there have been more than 560 fragmentation incidents, most of them caused by fuel explosions in rocket stages. As for direct collisions, there have only been seven, the most serious of which destroyed an inactive Russian satellite called Kosmos 2251 and the operational satellite Iridium 33. However, **it is the small fragments that pose the greatest danger**. **Micrometeorites** like paint flakes and solidified droplets of antifreeze **can damage** solar panels on **active satellites**. **Other dangerous debris includes vestiges of solid fuel which float about** in space **and are highly flammabl**e. They can cause damage and disperse pollutants into the atmosphere if they explode. Some Russian satellites contain nuclear batteries with radioactive material that could cause dangerous contamination if they returned to Earth. In any case, the heat of reentry destroys the majority of this space debris before it reaches the Earth. On rare occasions, larger fragments have reached the surface and caused considerable damage. SOLUTIONS TO SPACE DEBRIS **The main challenge is not to produce more space waste, particularly since swarms of small satellites are now circulating at low orbits to give high-speed internet access all over the planet.** When it comes to the debris already in orbit, many satellites, as well as the International Space Station, are equipped with Whipple Shields, an outer shell that protects the walls of the object from a possible collision. Here are some of the other strategies used to avoid this problem:

#### Space Debris contaminates environments on earth

**Luke**, C. (20**21**, **September 6**). What is Space Junk and How Does It Affect the Environment? Earth.Org - Past | Present | Future. Retrieved December 6, 2021, from <https://earth.org/space-junk-what-is-it-what-can-we-do-about-it/> //ear Earth.Org is a not-for-profit environmental organization based in Hong Kong. Their aim is to bring attention to what is happening to natural ecosystems worldwide. ... Climate change and environmental degradation create existential risks, caused by our decision to gamble on the outcomes of unsustainable activity.

The >4700 launches that have been conducted across the globe since Sputnik 1 in 1957 [have resulted in a steep upward trend in material mass in Earth orbit](https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20160012733.pdf), which has exceeded 700 metric tons and shows no signs of relenting. According to computer simulations focusing on the next 200 years, over this time [debris larger than approximately 20 cm across will multiply 1.5 times](https://www.nationalgeographic.co.uk/space/2019/04/space-junk-huge-problem-and-its-only-getting-bigger). Debris between 10 inches and 20 cm is set to multiply 3.2 times, and debris smaller than 10 cm will increase by a factor of 13 to 20. The risk this poses to satellites such as the ISS, [which as of 2016 has had to perform 25 debris collision avoidance manoeuvres since 1999,](https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20160012733.pdf) is considerable. **The problem is not confined to the risk posed to space exploration. A proportion of the space junk in low Earth orbit** [**will gradually lose altitude and burn up in Earth’s atmosphere**](https://www.nationalgeographic.co.uk/space/2019/04/space-junk-huge-problem-and-its-only-getting-bigger)**; larger debris, however, can occasionally impact with Earth and have detrimental effects on the environment. For example, debris from Russian Proton rockets,** launched from the Baikonur cosmodrome in Kazakhstan, [**litters the Altai region of eastern** **Siberia**](https://www.bbc.co.uk/news/world-europe-19127713)**.** **This includes debris from old fuel tanks containing highly toxic fuel residue,** unsymmetrical dimethylhydrazine (UDMH), **a carcinogen which is harmful to plants and animals**. While efforts are made to contain fallout from launches within a specified area, [it is extremely difficult to achieve completely](https://ui.adsabs.harvard.edu/abs/2013EGUGA..15.4537A/abstract). Anatoly Kuzin, deputy director of Khrunichev State Research and Production Space Centre, which manufactures Proton rockets, [maintains that thorough testing shows no correlation between reported illnesses in affected areas and the rocket launches](https://www.bbc.co.uk/news/world-europe-19127713). **Testimonies from locals, however, refer to a disproportionate number of cancer cases in the area which many believe is related to the UDMH in the fuel tank debris**; **in 2007, 27 people** [**were hospitalised**](https://www.universetoday.com/13196/space-junk-toxic-fuel-rains-down-on-siberian-region/) **in the Ust-Kansky District of Altai with cancer-related complications, many of them citing the rocket fuel as the suspected cause.**