

# Framing

## Extinction outweighs

**GPP 17** (Global Priorities Project, Future of Humanity Institute at the University of Oxford, Ministry for Foreign Affairs of Finland, “Existential Risk: Diplomacy and Governance,” Global Priorities Project, 2017, <https://www.fhi.ox.ac.uk/wp-content/uploads/Existential-Risks-2017-01-23.pdf>)

1.2. THE ETHICS OF EXISTENTIAL RISK In his book *Reasons and Persons*, Oxford philosopher Derek Parfit advanced an influential argument about the importance of avoiding extinction: I believe that if we destroy mankind, as we now can, this outcome will be much worse than most people think. Compare three outcomes: (1) Peace. (2) A nuclear war that kills 99% of the world’s existing population. (3) A nuclear war that kills 100%. (2) would be worse than (1), and (3) would be worse than (2). Which is the greater of these two differences? Most people believe that the greater difference is between (1) and (2). I believe that the difference between (2) and (3) is very much greater. ... The Earth will remain habitable for at least another billion years. Civilization began only a few thousand years ago. If we do not destroy mankind, these few thousand years may be only a tiny fraction of the whole of civilized human history. The difference between (2) and (3) may thus be the difference between this tiny fraction and all of the rest of this history. If we compare this possible history to a day, what has occurred so far is only a fraction of a second.<sup>65</sup> In this argument, it seems that Parfit is assuming that the survivors of a nuclear war that kills 99% of the population would eventually be able to recover civilisation without long-term effect. As we have seen, this may not be a safe assumption – but for the purposes of this thought experiment, the point stands. What makes existential catastrophes especially bad is that they would “destroy the future,” as another Oxford philosopher, Nick Bostrom, puts it.<sup>66</sup> This future could potentially be extremely long and full of flourishing, and would therefore have extremely large value. In standard risk analysis, when working out how to respond to risk, we work out the expected value of risk reduction, by weighing the probability that an action will prevent an adverse event against the severity of the event. Because the value of preventing existential catastrophe is so vast, even a tiny probability of prevention has huge expected value.<sup>67</sup> Of course, there is persisting reasonable disagreement about ethics and there are a number of ways one might resist this conclusion.<sup>68</sup> Therefore, it would be unjustified to be overconfident in Parfit and Bostrom’s argument. In some areas, government policy does give significant weight to future generations. For example, in assessing the risks of nuclear waste storage, governments have considered timeframes of thousands, hundreds of thousands, and even a million years.<sup>69</sup> Justifications for this policy usually appeal to principles of intergenerational equity according to which future generations ought to get as much protection as current generations.<sup>70</sup> Similarly, widely accepted norms of sustainable development require development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs.<sup>71</sup> However, when it comes to existential risk, it would seem that we fail to live up to principles of intergenerational equity. Existential catastrophe would not only give future generations less than the current generations: it would give them nothing. Indeed, reducing existential risk plausibly has a quite low cost for us in comparison with the huge expected value it has for future generations. In spite of this, relatively little is done to reduce existential risk. Unless we give up on norms of intergenerational equity, they give us a strong case for significantly increasing our efforts to reduce existential risks. 1.3. WHY EXISTENTIAL RISKS MAY BE SYSTEMATICALLY UNDERINVESTED IN, AND THE ROLE OF THE INTERNATIONAL COMMUNITY In spite of the importance of existential risk reduction, it probably receives less attention than is warranted. As a result, concerted international cooperation is required if we are to receive adequate protection from existential risks. 1.3.1. Why existential risks are likely to be underinvested in There are several reasons why existential risk reduction is likely to be underinvested in. Firstly, it is a global public good. Economic theory predicts that such goods tend to be underprovided. The benefits of existential risk reduction are widely and indivisibly dispersed around the globe from the countries responsible for taking action. Consequently, a country which reduces existential risk gains only a small portion of the benefits but bears the full brunt of the costs. Countries thus have strong incentives to free ride, receiving the benefits of risk reduction without contributing. As a result, too few do what is in the common interest. Secondly, as already suggested above, existential risk reduction is an intergenerational public

good: most of the benefits are enjoyed by future generations who have no say in the political process. For these goods, the problem is temporal free riding: the current generation enjoys the benefits of inaction while future generations bear the costs. Thirdly, many existential risks, such as machine superintelligence, engineered pandemics, and solar geoengineering, pose an unprecedented and uncertain future threat. Consequently, it is hard to develop a satisfactory governance regime for them: there are few existing governance instruments which can be applied to these risks, and it is unclear what shape new instruments should take. In this way, our position with regard to these emerging risks is comparable to the one we faced when nuclear weapons first became available. Cognitive biases also lead people to underestimate existential risks. Since there have not been any catastrophes of this magnitude, these risks are not salient to politicians and the public.<sup>72</sup> This is an example of the misapplication of the availability heuristic, a mental shortcut which assumes that something is important only if it can be readily recalled. Another cognitive bias affecting perceptions of existential risk is scope neglect. In a seminal 1992 study, three groups were asked how much they would be willing to pay to save 2,000, 20,000 or 200,000 birds from drowning in uncovered oil ponds. The groups answered \$80, \$78, and \$88, respectively.<sup>73</sup> In this case, the size of the benefits had little effect on the scale of the preferred response. People become numbed to the effect of saving lives when the numbers get too large.<sup>74</sup> Scope neglect is a particularly acute problem for existential risk because the numbers at stake are so large. Due to scope neglect, decision-makers are prone to treat existential risks in a similar way to problems which are less severe by many orders of magnitude. A wide range of other cognitive biases

**Vote off of extinction first in this round as it also applies to my opponents framework**

## OFF - Brazil

**Brazil's commercial space industry is flourishing.**

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Lately, there has been a surge of interest in commercial space in Brazil due to institutional development, private sector engagement, and entrepreneurial activities. A Committee of Development of the Brazilian Space Program (CDPEB) was established in 2018 and comprises representatives of several Ministries. The CDPEB has the mandate to advise the President on the implementation of the Brazilian Space Program. Among its primary responsibilities is the elaboration of the General Law of Space, which is expected to provide the guidelines for commercial space activities.<sup>13</sup> In May 2020, Brazilian Space Agency (AEB) issued a public call inviting local and foreign companies to use its civilian launch facilities.<sup>14</sup> The private sector has been actively promoting commercial space. An industrial cluster now constitutes a "Space Valley" around the Sao Jose dos Campos Technology Park (PqTec), with spin-off companies impacting both

space and nonspace sectors. The Aerospace Industries Association of Brazil (AIAB) is a trade organization of traditional space companies and defense contractors such as Avibras, Akaer (Opto), Atech, Fibraforte, Orbital, and SIATT. According to its website, AIAB has 30 members working in small satellites, satellite structures, payloads, satellite equipment, ground systems, propulsion, sounding rockets, and launchers.<sup>15</sup> Braskem, the world's leading biopolymer producer, has partnered with Silicon Valley-born startup Made in Space to produce recyclable plastic objects in the ISS.<sup>16</sup> Since 2017, AEB has organized the Brazilian Space Industry Forum, an annual event that congregates stakeholders, fosters the exchange of ideas, and promotes collaboration between domestic and international participants. The U.S.-Brazil CEO Forum, which brings together 12 U.S. and 12 Brazilian CEOs to develop joint recommendations for both governments on how to increase bilateral trade, proposed the development of a framework for joint space research programs in 2019. A small but vibrant New Space startup community is rapidly forming. The Alliance of Brazilian Space Startups was launched in 2020. Although some companies target low earth orbit and beyond, others are creating solutions to our planet using space technologies. PION has commercial products focusing on space and education. CRON and EMSIS have developed software and hardware for CubeSat missions, whereas Alya Nanosatellites aims to launch a constellation and tap into the earth's observation market. DeltaV, a spin-off from INPE, specializes in propulsion systems. ACRUX and VSAT are working on small satellite launchers. Airvantis sent multiple educational experiments to the ISS and has partnerships with companies and space agencies worldwide. The startup is carrying out Brazil's first lunar mission.<sup>17</sup> In parallel, Agrosmart, Solinftec, and Strider are harnessing the power of space assets to provide remote sensing, weather forecast, and image processing services to the agricultural sector.<sup>18</sup> Data companies such as Storm have incorporated open source algorithms developed by NASA for security applications.<sup>19</sup>

## Strong space sector cements Brazilian prestige and international influence

Dr. Robert C. **Harding 17**, Professor of Political Science at Valdosta State University, PhD in Political Science from the University of Miami, MA from the University of Louisville, Space Policy in Developing Countries: The Search for Security and Development on the Final Frontier, Paperback Edition, p. 1-4

Change in the post-Cold War period has become the standard of our time. Whether it be the changing power structure of the international system, climate change, the speed of technological innovation, or changes within our societies, the current international situation is one of constant, accelerating transformation. One area that has certainly evolved is the importance and priority given to space-related programs by a growing number of countries around the world. As the various captains of Star Trek fame have somberly declared, space really is the final frontier. But while it has been the basis for engaging science fiction, outer space nonetheless has a very down-to-Earth feature—it has become the ultimate venue for the growth of national power and socioeconomic development among a number of the world's emergent states. This new paradigm of international relations has been evolving for over 50 years. From the Soviet Union's launch of Sputnik in 1957, many states began to include space-based security concerns in their foreign policies, which forced them to consider what the then-new operations in space meant for national security; they also began to integrate space-based assets into their approaches to a wide range of national development challenges, from agriculture to health improvement to the development of natural resources. Though the importance of space to national power, prestige, and potential has been less obvious in the intervening years since the heady days of the Cold War's space race, its significance has never waned and continues to increase as many states increase national space budgets. Space has, in fact, earned a permanent place at the table in matters of international conflict, peace, national and international development, and international law. Space was at one time the sole domain of the wealthiest developed countries. The United States and the Soviet Union/Russia, and to some extent the European Union, dominated the use of space and the associated technology in the first decades after World War II. But the last couple of decades of the twentieth century and the first decade of the twenty-first witnessed an increase in the number of countries with state-supported space programs. At this writing, no fewer than 25 developing states, including the rapidly emerging economic powers of Brazil (the sixth largest), China (second largest), and India (fourth largest), possess active national space programs with proven independent launch capability or concrete plans to achieve it soon. Space programs and their related technologies are now an integral part of the strategic and developmental policies of many relatively wealthy developing states that aspire to elevate their international status, security, and economic future. A multitude of other developing states as diverse as Mexico, Nigeria, and Malaysia have established and elevated their own space policy through the creation of national space agencies and the purchase and/or production of satellites and related space technology either through state, private, or joint efforts. For these smaller and rising middle powers, the acquisition of space capabilities is now an integral component of their national policies. Though commercial enterprise is not a focus of this study, it must be noted that as the cost of space-related technology has decreased dramatically, the expanding number of national state actors in space has been paced by the equally impressive expansion in the number of strictly commercial space companies. Communications, geospatial information, and a wide variety of other services provided by

commercial satellites affect much of modern life, and also provide vital information to governments, their agencies, and business interests worldwide. This information covers many of the same areas that national governments find important to national well-being, such as weather and climate monitoring, water management, environmental observation, topographic mapping, natural disaster planning, and crop management. These services are provided commercially by a growing cadre of companies that build satellites, create the associated technologies, and are beginning to provide basic launch services, all areas that were previously the exclusive domain of state-owned space agencies. The growth of commercial space services has been a double-edged sword for states. By 2010, the global space industry was estimated to be worth US\$276.52 billion, an 18 percent increase over 2009.<sup>2</sup> Of this total, worldwide commercial satellite industry revenues rose 11 percent to US\$160.9 billion in 2010.<sup>3</sup> Despite sporadic attempts to control its proliferation, commercial satellite imagery has become so good and so broadly disseminated that many national governments, for example Israel, have complained that its existence endangers national security because potential terrorists now have access to the detailed satellite imagery necessary to plan precise attacks. Until the 1990s, such high-resolution satellite imagery was almost exclusively the domain of the militaries of developed space powers, which, for national security reasons, did not generally make their data public. And since there were a limited number of states with the capability to launch surveillance satellites, the potential sources were likewise limited. Those civilian satellites that did operate before the 1990s provided imagery of a much lower spatial resolution than their military counterparts, typically not showing clear images of objects smaller than 10 meters across. However, that situation changed with the launch of the US company Lockheed Martin's Ikonos satellite in 1999. Its spatial resolution of one meter meant that for the first time, no country could depend on geographic distance and national borders to ensure state secrets. The situation became even more fluid through the 1990s and into the 2000s as the transfer of space technology—satellites and associated technology—became a commercially viable avenue for major satellite producers. Today, imagery services such as Google Earth have revolutionized access to satellite imagery in the same way that cell phones have changed communications access for hundreds of millions of people around the world—they have democratized it. Nonetheless, the growing actual importance of space policy stands in stark contrast to the popular perception of the significance of space in the modern world. Indeed, more than 50 years after the launch of Sputnik, the exploration of near space via the moon-landings, and various robotic missions to the solar system's planets, surveys have shown that few people in the West still consider space as anything novel. The popular mindset has moved on to the wonders of the "information age" and the benefits (or detriments) of globalization. The generations of technology spawned by those earlier days of space exploration have been indispensable in the creation of our high-tech, instantaneous world, but space and its benefits are now so integrated into our daily infrastructure that most people do not give it a second thought. The reactions to the Challenger and Columbia space shuttle tragedies aside, public complacency

toward the importance of space has become the rule, rather than the exception. Despite these popular sentiments, the recent expansion of space programs in the developing world demonstrates that national governments have never altered their view of the importance of space for achieving and expanding national power—militarily or socioeconomically. This expansion of space programs is especially noteworthy because it reflects an emergent democratization of space, which is one of the most important factors in the changing distribution of power in the current international arena. Many countries now use satellites for communications and obtaining weather data, through ownership or simply purchase of the data. In fact, this

broadening and expansion of the usage of space and the attendant transformation of power distribution is seen by some observers as leading to a new space race, albeit one that has yet to gain the high profile that the previous contest had during the Cold War. This competition is emerging as the catalyst for a new generation of space-related policies and innovations in both established and emerging space-faring countries. Consider how one recent space-related event affected the dynamic of interstate relations. In January 2007, the news that China had successfully tested an anti-satellite ballistic missile sent shockwaves around the world's foreign policy community. By shooting down one of its own aging satellites from low Earth orbit, China—a country that only a generation before was seen as poor by most measures—demonstrated its intent to join the existing space powers, thus attracting attention, if not commanding respect as a potential world power. China plans to land a nuclear-powered unmanned rover on the moon by 2013, and to have in place an orbital military space station later in the second decade of this century.<sup>4</sup> But while China's space policy is more ambitious and better funded than those of other developing states, it is by no means unique. The next year of this twenty-first century space race saw India following up on the Chinese success by launching its own successful probe to the moon. Around the world, increasing numbers of developing countries are investing in space-related technologies, seeking partners for space projects, and even constructing launch facilities that may one day rival the established space powers of the United States, Russia, the European Union, and more recently Japan. But what motivates a developing country, which by definition is relatively poor, to spend the comparatively large amounts of money

required for these space adventures? The short answer is that, like the United States and the Soviet Union before them, developing countries pursue active space policies because of the recognition that space is, in many ways, the ultimate measure of national power, international prestige, and demonstrated national potential. Moreover, space-based assets allow states to more fully utilize their national resources and to expand the reach of domestic socioeconomic programs into areas as

diverse as agriculture, education, medicine, and economic development. Thus a space program figures as an integral facet of any capable state's national security and developmental policies. The benefits of a successful space program include advanced communications, a platform for technology improvement, greatly enhanced geographic information, and, for some, expanded defensive and intelligence capabilities. Equally important, space programs can provide the host state with increased international prestige, which accrues both domestic and international advantages. Hence, developing countries are merely being rational state actors

and following the path pioneered by those space-faring states that preceded them.

## It's key to project success AND overcome historical domination

Dr. Robert C. **Harding 17**, Professor of Political Science at Valdosta State University, PhD in Political Science from the University of Miami, MA from the University of Louisville, Space Policy in Developing Countries: The Search for Security and Development on the Final Frontier, Paperback Edition, p. 23 Space programs bestow equally important soft power, especially those that involve human space flight. Every major space power has spent considerable funds to achieve the ability to put humans in space for both tangible and intangible benefits. Logsdon (2007) has argued that human space flight ranks among the most intensely patriotic symbols of modern times.<sup>27</sup> Some of the emerging space actors have pursued or are pursuing human space flight as a demonstration of their programs' sophistication, and their astronauts are held up by their governments as national patriotic

icons. As will be discussed in Chapter 3, for the largest EMSAs—Brazil, China, and India—their space programs have been touted not only as national accomplishments but as a national catharsis to overcome histories of direct and indirect domination by outside powers and to project to others a sense of greatness.

## **Brazilian leadership solves every threat**

**Huck 20** [Luciano Huck, from the Law School of the University of São Paulo, Host of Rede Globo, Founder of Joá Investments 1/15/2020, "This country is vital to 'global survival'," World Economic Forum, <https://www.weforum.org/agenda/2020/01/what-happens-next-in-brazil-has-global-consequences-here-are-three-priorities-for-the-next-decade/> accessed 12/14/21]

From spiralling geopolitical tensions in the Middle East to raging forest fires in Australia, 2020 certainly started with a bang. A shortlist of some of our biggest existential threats includes accelerating climate change, staggering inequalities and the failure of nation-states to cooperate to mitigate shared global risks. With all the bad news, it is hard to see the incredible possibilities on the horizon, not least advances in health, education and the boundless potential of new technologies. A growing number of businesses including huge asset managers like BlackRock are also becoming greener. All of these challenges and opportunities are apparent in Brazil, the world's fourth-largest democracy and its ninth biggest economy. Brazil will play a leading role in how the next decade unfolds. A big reason for this is its immense natural resources - including over 40% of the world's tropical forests and 20% of the planet's fresh-water supply. The Amazon is often described as the "lungs of the world" - for good reason. But the lungs are collapsing as a result of man-made fires and runaway deforestation. With more than 210 million citizens, Brazil also has an impressive stock of human resources. But it is also convulsed by breathtaking inequality and grinding poverty. Complicating matters, we are facing a crisis of political leadership and shirking our international responsibilities. What happens next in Brazil has far-reaching consequences for global survival. The decisions adopted by Latin America's largest country - whether in relation to protecting the Amazon, reducing inequality or strengthening multilateral cooperation - will help determine whether this is the world's best century or its last one. The sheer scope of the challenges facing Brazilians can feel overwhelming. Without a transformative vision and narrative, a renewal of political leadership, and tangible improvement, people feel rudderless and afraid. For the past 20 years, I've been taking the pulse of Brazil. I produce and present a popular television program reaching roughly 30 million Brazilians every week. Most of the time, I travel across the country listening to the inspiring and heartbreaking stories of my countrymen and women. They remind me every day why I need to contribute to building a better Brazil. So here are three challenges that I firmly believe Brazilians can turn into opportunities. Amazon 4.0 Dramatic fires and deforestation in the Amazon made global headlines in 2019. Despite the best efforts of the Brazilian authorities to conceal the problem, the Science Ministry's own satellite data showed that deforestation rates were at the highest levels in two decades. While falling out of the international news cycle, the destruction continues. If deforestation persists at current rates, irreversible die-off could convert the world's largest tropical forests into its largest savannah. This would release up to 140 billion tons of stored carbon into the atmosphere, effectively scuppering efforts to meet the Paris Agreement targets. A radical new paradigm is needed to ensure the sustainable stewardship of Brazil's stunning cultural and biodiversity. It must harness the Amazon's most powerful resource - the 25 million people who live there. For one, there has to be zero tolerance for deforestation and a concerted focus on improving the productivity of areas where forests have already been cut down. Roughly 90% of deforestation in the Amazon is illegal and at least two-thirds of the 80 million hectares of cleared land are under-used, degraded and abandoned. Just as important as sustainable agri-business, the expansion of eco-tourism, investment in biotechnology research and the development of fairly-traded rainforest products. In a survey conducted in August of 2019, the majority of Brazilians thought that the Amazon rainforest was a reason for national pride. At that time, up to 68 percent of respondents in Brazil strongly agreed with the sentence Reducing inequality Deepening social and economic inequality within countries is fundamentally reconfiguring domestic and international politics. In some cases, governments are retreating from multilateral cooperation and reverting to reactionary nationalism and protectionism. These dynamics are apparent in Brazil, among the world's most unequal countries. Although Brazil made important advances in reducing poverty since the 2000s, inequality remained stubbornly high. And in recent years, per capita income plunged and the gap between the rich and poor started rising, wiping out many social gains of the previous three decades. Today, the average monthly income of the wealthiest one per cent is more than 33 times the income of the poorest 50%. Inequality not only hinders economic growth, but it also fuels polarization and populism. Brazil needs to put inequality reduction at the top of the national agenda in 2020. A combination of common-sense interventions are required: ensuring the fairer collection of taxes, reducing subsidies for the wealthy, rolling-out more equal opportunity policies, and stimulating opportunities for the most vulnerable. Most important of all is dramatically improving the quality of basic public education, especially early childhood schooling. Brazil's education system is failing poorer families. Wealth inequality is reinforcing inequality of opportunity for the next generation. To win the war on inequality, Brazil needs an inclusive growth strategy, one that is not limited to growing income and smart deregulation but also ensures that quality public services delivering security, education, health, sanitation and transportation reach all

citizens, not just those who pay a premium for them. Restoring leadership After years of corruption and stagnation, Brazil is suffering from sharp societal divisions and simmering tensions. In 2013, well before the street protests that flared up in Bolivia, Chile, Colombia and Ecuador, Brazil experienced the largest demonstrations since the restoration of democracy in 1985. The impeachment of President Dilma in 2016, the unprecedented unpopularity of the Temer administration and the election of far-right Jair Bolsonaro in 2018 revealed the extent of dissatisfaction with the status quo. Bolsonaro was partly elected because the credibility of Brazil's political establishment was demolished by ongoing "Car Wash" investigations into government corruption. Exhausted by scandal and stagnation, Brazilians voted for change. To tackle the big challenges of the next decade, Brazil needs to restore and renew its political leaders from the top to bottom. Accountable, responsible and representative leadership and public service are fundamental to revitalizing the social contract. This won't happen spontaneously. It requires a conscious effort to attract and invest in talent. It also demands that each and every Brazilian gets involved. In 2017, I joined Agora, one of several dynamic civic movements investing in a new generation of leaders committed to a more inclusive and sustainable Brazil. And in 2018, I co-founded RenovaBR, attracting over 4,600 submissions from people who'd never been involved in politics for training in governance and ethics. Of the 120 successful applicants, 17 were elected to federal office that year. Brazil is a country of infinite possibility. It has achieved breathtaking gains over the last generation - bringing tens of millions of people out of poverty. But these improvements were fragile. As we've seen in other parts of the world, when societies and living standards start moving backwards, social protest and unrest are not far behind. This is dangerous. Irresponsible leaders can take advantage of the fear and uncertainty that result. But we can also fight back. We will start rewriting the Brazilian story in 2020, first by acknowledging our most intractable problems and then by leveraging our tremendous creativity, scientific prowess and expertise. This means stepping out of our comfort zones. Powered by civic and social entrepreneurs from across the political spectrum, we can rebuild a positive vision for the future in Brazil.

## OFF - XI

**Xi's regime is stable now, but its success depends on strong growth and private sector development.**

**Mitter and Johnson 21** [Rana Mitter and Elsbeth Johnson, [Rana Mitter](#) is a professor of the history and politics of modern China at Oxford. [Elsbeth Johnson](#), formerly the strategy director for Prudential PLC's Asian business, is a senior lecturer at MIT's Sloan School of Management and the founder of SystemShift, a consulting firm. May-June 2021, "What the West Gets Wrong About China," Harvard Business Review, <https://hbr.org/2021/05/what-the-west-gets-wrong-about-china> accessed 12/14/21]

In China, however, growth has come in the context of stable communist rule. Suggesting that democracy and growth are not inevitably mutually dependent. In fact, many Chinese believe that the country's recent economic achievements—large-scale poverty reduction, huge infrastructure investment, and development as a world-class tech innovator—have come about because of, not despite, China's authoritarian form of government. Its aggressive handling of Covid-19—in sharp contrast to that of many Western countries with higher death rates and later, less-stringent lockdowns—has, if anything, reinforced that view.

China has also defied predictions that its authoritarianism would inhibit its capacity to innovate. It is a global leader in AI, biotech, and space exploration. Some of its technological successes have been driven by market forces: People wanted to buy goods or communicate more easily, and the likes of Alibaba and Tencent have helped them do just that. But much of the technological progress has come from a highly innovative and well-funded military that has invested heavily in China's burgeoning new industries. This, of course, mirrors the role of U.S. defense and intelligence spending in the development of Silicon Valley. But in China the consumer applications have come faster, making more obvious the link between government investment and products and services that benefit individuals. That's why ordinary Chinese people see Chinese companies such as Alibaba, Huawei, and TikTok as sources of national pride—international vanguards of Chinese success—rather than simply sources of jobs or GDP, as they might be viewed in the West.

Thus July 2020 polling data from the Ash Center at Harvard's Kennedy School of Government revealed 95% satisfaction with the Beijing government among Chinese citizens. Our own experiences on the ground in China confirm this. Most ordinary people we meet don't feel that the authoritarian state is solely oppressive, although it can be that; for them it also provides opportunity. A cleaner in Chongqing now owns several apartments because the CCP reformed property laws. A Shanghai journalist is paid by her state-controlled magazine to fly around the world for stories on global lifestyle trends. A young student in Nanjing can study propulsion physics at Beijing's Tsinghua University thanks to social mobility and the party's significant investment in scientific research.

## **Xi has committed to the commercial space industry as the linchpin of China's rise – the plan is seen as a complete 180**

**Patel 21** [Neel V. Patel, Neel is a space reporter for MIT Technology Review. 1-21-2021, "China's surging private space industry is out to challenge the US," MIT Technology Review, <https://www.technologyreview.com/2021/01/21/1016513/china-private-commercial-space-industry-dominance/> accessed 12/14/21]

Until recently, China's space activity has been overwhelmingly dominated by two state-owned enterprises: the China Aerospace Science & Industry Corporation Limited (CASIC) and the China Aerospace Science and Technology Corporation (CASC). A few private space firms have been allowed to operate in the country for a while: for example, there's the China Great Wall Industry Corporation Limited (in reality a subsidiary of CASC), which has provided commercial launches since it was established in 1980. But for the most part, China's commercial space industry has been nonexistent. Satellites were expensive to build and launch, and they were too heavy and large for anything but the biggest rockets to actually deliver to orbit. The costs involved were too much for anything but national budgets to handle.

That all changed this past decade as the costs of making satellites and launching rockets plunged. In 2014, a year after Xi Jinping took over as the new leader of China, the Chinese government decided to treat civil space development as a key area of innovation, as it had already begun doing with AI and solar power. It issued a policy directive called Document 60 that year to enable large private investment in companies interested in participating in the space industry.

"Xi's goal was that if China has to become a critical player in technology, including in civil space and aerospace, it was critical to develop a space ecosystem that includes the private sector," says Namrata Goswami, a geopolitics expert based in Montgomery, Alabama, who's been studying China's space program for many years. "He was taking a cue from the American private sector to encourage innovation from a talent pool that extended beyond state-funded organizations."

As a result, there are now 78 commercial space companies operating in China, according to a [2019 report by the Institute for Defense Analyses](#). More than half have been founded since 2014, and the vast majority focus on satellite manufacturing and launch services.

For example, Galactic Energy, founded in February 2018, is building its Ceres rocket to offer rapid launch service for single payloads, while its Pallas rocket is being built to deploy entire constellations. Rival company i-Space, formed in 2016, became the first commercial Chinese company to make it to space with its Hyperbola-1 in July 2019. It wants to pursue reusable first-stage boosters that can land vertically, like those from SpaceX. So does LinkSpace (founded in 2014), although it also hopes to use rockets to deliver packages from one terrestrial location to another.

Spacety, founded in 2016, wants to turn around customer orders to build and launch its small satellites in just six months. In December it launched a miniaturized version of a satellite that uses 2D radar images to build 3D reconstructions of terrestrial landscapes. Weeks later, it [released the first images taken by the satellite](#), Hisea-1, featuring three-meter resolution. Spacety wants to launch a constellation of these satellites to offer high-quality imaging at low cost.

## Changes in governmental perception threaten the CCP's legitimacy

**Weiss 19** Jessica Weiss 1-29-2019 "Authoritarian Audiences, Rhetoric, and Propaganda in International Crises: Evidence from China" <http://www.jessicachenweiss.com/uploads/3/0/6/3/30636001/19-01-24-elite-statements-isq-ca.pdf> (Associate Professor of Government at Cornell University)//

Public support—or the appearance of it—matters to many autocracies. As Ithiel de Sola Pool writes, modern dictatorships are “*highly conscious of public opinion and make major efforts to affect it.*”<sup>6</sup> Mao Zedong told his comrades: “When you make revolution, you must first manage public opinion.”<sup>7</sup> Because **autocracies** often **rely on nationalist mythmaking**,<sup>8</sup> **success or failure in defending the national honor in international crises could** burnish the leadership’s patriotic credentials or **spark opposition**. **Shared outrage at the regime’s foreign policy failures could galvanize street protests or elite fissures, creating intraparty upheaval** or inviting military officers to step in to restore order. **Fearing a domestic backlash, authoritarian leaders may feel compelled to take a tough international stance.** Although authoritarian leaders are rarely held accountable to public opinion through free and fair elections, fears of popular unrest and irregular ouster often weigh heavily on autocrats seeking to maximize their tenure in office. Considering the harsh consequences that authoritarian elites face if pushed out of office, **even a small increase in the probability of ouster could alter** authoritarian **incentives in international crises**.<sup>9</sup> A **history of nationalist uprisings make Chinese** citizens and leaders especially **aware of the linkage** between international disputes and domestic unrest. The weakness of the PRC’s predecessor in defending Chinese sovereignty at the Paris Peace Conference in 1919 galvanized protests and a general strike, forcing the government to sack three officials and reject the Treaty of Versailles, which awarded territories in China to Japan. **These precedents have made Chinese officials particularly sensitive to the appearance of hewing to public opinion.** As the People’s Daily chief editor wrote: “History and reality have shown us that public opinion and regime safety are inseparable.”<sup>10</sup> One Chinese scholar even claimed: “the Chinese government probably knows the public’s opinion better and reacts to it more directly than even the U.S. government.”<sup>11</sup>

## Xi will go to war to distract from governmental issues which escalates

**Norris 17** William J. Geostategic Implications of China’s Twin Economic Challenges. CFR Discussion Paper, 2017. (Associate professor of Chinese foreign and security policy at Texas A&M University’s Bush School of Government and Public Service)//

Populist pressures might tempt the **party leadership** to encourage **diversionary nationalism**. The logic of this concern is straightforward: the **Communist Party might seek to distract a restless domestic population with adventurism abroad**.<sup>19</sup> The **Xi administration wants to appear tough in its defense of foreign encroachments against China’s interests**. This need stems from a long-running narrative about how a weak Qing dynasty was unable to defend China in the face of European imperial expansion, epitomized by the Opium Wars and the subsequent treaties imposed on China in the nineteenth century. **The party is particularly sensitive to perceptions of weakness because much of its claim to legitimacy—manifested in Xi’s Chinese Dream campaign today—stems from the party’s claims on leading the restoration of Chinese greatness.** For example, the May Fourth Movement, a popular protest in 1919 that helped catalyze the CPC, called into question the legitimacy of the Republic of China government running the country at that time because the regime was seen as not having effectively defended China’s territorial and sovereignty interests at the Versailles Peace Conference. **Diversionary nationalist frictions would likely occur if the Chinese leadership portrayed a foreign adversary as having made the first move, thus forcing Xi to stand up for China’s interests.** An example is the 2012 attempt by the nationalist governor of Tokyo, Shintaro Ishihara, to buy the Senkaku/Diaoyu Islands from a private owner.<sup>20</sup> Although the Japanese central government sought to avert a crisis by stepping in to purchase the islands—having them bought and administered by Ishihara’s Tokyo metropolitan government would have dragged Japan into a confrontation with China—China saw this move as part of a deliberate orchestration by

Japan to nationalize the islands. Xi seemingly had no choice but to defend China's claims against an attempt by Japan to consolidate its position on the dispute.<sup>21</sup> This issue touched off a period of heated tensions between China and Japan, lasting more than two years.<sup>22</sup> Such dynamics are not limited to Japan. Other possible areas of conflict include Taiwan, India, and the South China Sea (especially with the Philippines and Vietnam). The Chinese government will use such tactics if it believes that the costs are relatively low. Ideally, China would like to appear tough while avoiding material repercussions or a serious diplomatic breakdown. Standing up against foreign encroachment—without facing much blowback—could provide Xi's administration with a tempting source of noneconomic legitimacy. However, over the next few years, Xi will probably not be actively looking to get embroiled abroad. Cushioning the fallout from slower growth while managing a structural economic transition will be difficult enough. Courting potential international crises that distract the central leadership would make this task even more daunting. Even if the top leadership did not wish to provoke conflict, a smaller budgetary allotment for security could cause military interests in China to deliberately instigate trouble to justify their claims over increasingly scarce resources. For example, an air force interested in ensuring its funding for a midair tanker program might find the existence of far-flung territorial disputes to be useful in making its case. Such a case would be made even stronger by a pattern of recent frictions that highlights the necessity of greater air power projection. Budgetary pressures may be partly behind a recent People's Liberation Army reorganization and headcount reduction. A slowing economy might cause a further deceleration in China's military spending, thus increasing such pressures as budgetary belts tighten. Challenges to Xi's Leadership Xi Jinping's efforts to address economic challenges could fail, unleashing consequences that extend well beyond China's economic health. For example, an economic collapse could give rise to a Vladimir Putin-like redemption figure in China. Xi's approach of centralizing authority over a diverse, complex, and massive social, political, and economic system is a recipe for brittleness. Rather than designing a resilient, decentralized governance structure that can gracefully cope with localized failures at particular nodes in a network, a highly centralized architecture risks catastrophic, system-level failure. Although centralized authority offers the tantalizing chimera of stronger control from the center, it also puts all the responsibility squarely on Xi's shoulders. With China's ascension to great power status, the consequences of internecine domestic political battles are increasingly playing out on the world stage. The international significance of China's domestic politics is a new paradigm for the Chinese leadership, and one can expect an adjustment period during which the outcome of what had previously been relatively insulated domestic political frictions will likely generate unintended international repercussions. Such dynamics will influence Chinese foreign policy and security behavior. Domestic arguments over ideology, bureaucratic power struggles, and strategic direction could all have ripple effects abroad. Many of China's party heavyweights still employ a narrow and exclusively domestic political calculus. Such behavior increases the possibility of international implications that are not fully anticipated, raising the risks of strategic miscalculation on the world stage. For example, the factional power struggles that animated the Cultural Revolution were largely driven by domestic concerns, yet manifested themselves in Chinese foreign policy for more than a decade. During this period, China was not the world's second largest economy and, for much of this time, did not even have formal representation at the United Nations. If today's globally interconnected China became engulfed in similar domestic chaos, the effects would be felt worldwide.<sup>23</sup> **Weakened Fetters of Economic Interdependence** If China successfully transitioned away from its export-driven growth model toward a consumption-driven economic engine over the next four or five years, it could no longer feel as constrained by economic interdependence. To the extent that such constraints are loosened, the U.S.-China relationship will be more prone to conflict and friction.<sup>24</sup> While China has never been the archetypal liberal economic power bent on benign integration with the global economy, its export-driven growth model produced a strong strategic preference for stability. Although past behavior is not necessarily indicative of future strategic calculus, China's "economic circuit breaker" logic seems to have held its most aggressive nationalism below the threshold of war since 1979. A China that is both comparatively strong and less dependent on the global economy would be a novel development in modern geopolitics. As China changes the composition of its international economic linkages, global integration could place fewer constraints on it. Whereas China has been highly reliant on the import of raw materials and semifinished goods for reexport, a consumption-driven China could have a different international trade profile. China could still rely on imported goods, but their centrality to the country's overall economic growth would be altered. Imports of luxury goods, consumer products, international brands, and services may not exert a significant constraining influence, since loss of access to such items may not be seen as strategically vital. If these flows were interrupted or jeopardized, the result would be more akin to an inconvenience than a strategic setback for China's rise. That said, China is likely to continue to highly depend on imported oil even if the economic end to which that energy resource is directed shifts away from industrial and export production toward domestic consumption.

**US-China war goes nuclear – crisis mis-management ensures conventional escalation - extinction**

**Kulacki 20** [Dr. Gregory Kulacki focuses on cross-cultural communication between the United States and China on nuclear and space arms control and is the China Project Manager for the Global Security Program at the Union of Concerned Scientists, 2020. Would China Use Nuclear Weapons First In A War With The United States?, Thediplomat.com, <https://thediplomat.com/2020/04/would-china-use-nuclear-weapons-first-in-a-war-with-the-united-states/>]

Admiral Charles A. Richard, the head of the U.S. Strategic Command, recently told the Senate Armed Service Committee he “could drive a truck” through the holes in China’s no first use policy. But when Senator John Hawley (R-MO) asked him why he said that, Commander Richard backtracked, described China’s policy as “very opaque” and said his assessment was based on “very little” information. That’s surprising.

**China** has been exceptionally clear about its intentions on the possible first use of nuclear weapons. On the day of its first nuclear test on October 16, 1964, China declared it “will never at any time or under any circumstances be the first to use nuclear weapons.” That unambiguous statement has been a cornerstone of Chinese nuclear weapons policy for 56 years and has been repeated frequently in authoritative Chinese publications for domestic and international audiences, including a highly classified training manual for the operators of China’s nuclear forces. Richard should know about those publications, particularly the training manual. A U.S. Department of Defense translation has been circulating within the U.S. nuclear weapons policy community for more than a decade. The commander’s comments to the committee indicate a familiarity with the most controversial section of the manual, which, in the eyes of some U.S. analysts, indicates there may be some circumstances where **China would use nuclear weapons first in a war with the United States**. This U.S. misperception is understandable, especially given the difficulties the Defense Department encountered translating the text into English. The language, carefully considered in the context of the entire book, articulates a strong reaffirmation of China’s no first use policy. But it also reveals **Chinese military planners are struggling with crisis management and considering steps that could create ambiguity with disastrous consequences**. Towards the end of the 405-page text on the operations of China’s strategic rocket forces, in a chapter entitled, “Second Artillery Deterrence Operations,” the authors explain what China’s nuclear forces train to do if **“a strong military power possessing nuclear-armed missiles and an absolute advantage in high-tech conventional weapons is carrying out intense and continuous attacks against our major strategic targets and we have no good military strategy to resist the enemy.”** The military power **they’re talking about** is **the United States**. The authors indicate China’s nuclear missile forces train to take specific steps, including increasing readiness and conducting launch exercises, to “dissuade the continuation of the strong enemy’s conventional attacks.” The manual refers to these steps as an “adjustment” to China’s nuclear policy and a “lowering” of China’s threshold for brandishing its nuclear forces. Chinese leaders would only take these steps in extreme circumstances. The text highlights several **triggers such as U.S. conventional bombing of China’s nuclear and hydroelectric power plants, heavy conventional bombing of large cities like Beijing and Shanghai, or other acts of conventional warfare that “seriously threatened” the “safety and survival” of the nation**. U.S. Misunderstanding Richard seems to believe this planned adjustment in China’s nuclear posture means **China is preparing to use nuclear weapons first under these circumstances**. He told Hawley that there are a “number of situations where they may conclude that first use has occurred that do not meet our definition of first use.” The head of the U.S. Strategic Command appears to assume, as do other U.S. analysts, that the **Chinese would interpret these types of U.S. conventional attacks as equivalent to a U.S. first use of nuclear weapons against China**. But that’s not what the text says. “Lowering the threshold” refers to China putting its nuclear weapons on alert — it does not indicate Chinese leaders might lower their threshold for deciding to use nuclear weapons in a crisis. Nor does the text indicate Chinese nuclear forces are training to launch nuclear weapons first in a war with the United States. China, unlike the United States, keeps its nuclear forces off-alert. Its warheads are not mated to its missiles. China’s nuclear-armed submarines are not continuously at sea on armed patrols. The manual describes how China’s nuclear warheads and the missiles that deliver them are controlled by two separate chains of command. Chinese missileers train to bring them together and launch them after China has been attacked with nuclear weapons. All of these behaviors are consistent with a no first use policy. The “adjustment” Chinese nuclear forces are preparing to make if the United States is bombing China with impunity is to place China’s nuclear forces in a state of readiness similar to the state the nuclear forces of the United States are in all the time. This step is intended not only to end the bombing, but also to convince U.S. decision-makers they cannot expect to destroy China’s nuclear retaliatory capability if the crisis escalates. Chinese Miscalculation Unfortunately, alerting Chinese nuclear forces at such a moment could have terrifying consequences. Given the relatively small size of China’s nuclear force, a U.S. president might be tempted to try to

limit the possible damage from a Chinese nuclear attack by destroying as many of China's nuclear weapons as possible before they're launched, especially if the head of the U.S. Strategic Command told the president China was preparing to strike first. One study concluded that if the United States used nuclear weapons to attempt to knock out a small fraction of the Chinese ICBMs that could reach the United States it may kill tens of millions of Chinese civilians. The authors of the text assume alerting China's nuclear forces would "create a great shock in the enemy's psyche." That's a fair assumption. But they also assume this shock could "dissuade the continuation of the strong enemy's conventional attacks against our major strategic targets." That's highly questionable. There is a substantial risk the United States would respond to this implicit Chinese threat to use nuclear weapons by escalating, rather than halting, its conventional attacks. If China's nuclear forces were targeted, it would put even greater strain on the operators of China's nuclear forces. A slippery slope to nuclear war Chinese military planners are aware that attempting to coerce the United States into halting conventional bombardment by alerting their nuclear forces could fail. They also know it might trigger a nuclear war. But if it does, they are equally clear China won't be the one to start it. Nuclear attack is often preceded by nuclear coercion. Because of this, in the midst of the process of a high, strong degree of nuclear coercion we should prepare well for a nuclear retaliatory attack. The more complete the preparation, the higher the credibility of nuclear coercion, the easier it is to accomplish the objective of nuclear coercion, and the lower the possibility that the nuclear missile forces will be used in actual fighting. They assume if China demonstrates it is well prepared to retaliate the United States would not risk a damage limitation strike using nuclear weapons. And even if the United States were to attack China's nuclear forces with conventional weapons, China still would not strike first. In the opening section of the next chapter on "nuclear retaliatory attack operations" the manual instructs, as it does on numerous occasions throughout the entire text: According to our country's principle, its stand of no first use of nuclear weapons, the Second Artillery will carry out a nuclear missile attack against the enemy's important strategic targets, according to the combat orders of the Supreme Command, only after the enemy has carried out a nuclear attack against our country. Richard is wrong. There are no holes in China's no first use policy. But the worse-case planning articulated in this highly classified military text is a significant and deeply troubling departure from China's traditional thinking about the role of nuclear weapons. Mao Zedong famously called nuclear weapons "a paper tiger." Many assumed he was being cavalier about the consequences of nuclear war. But what he meant is that they would not be used to fight and win wars. U.S. nuclear threats during the Korean War and the Taiwan Strait Crisis in the 1950s – threats not followed by an actual nuclear attack – validated Mao's intuition that nuclear weapons were primarily psychological weapons. Chinese leaders decided to acquire nuclear weapons to free their minds from what Mao's generation called "nuclear blackmail." A former director of China's nuclear weapons laboratories told me China developed them so its leaders could "sit up with a straight spine." Countering nuclear blackmail – along with compelling other nuclear weapons states to negotiate their elimination – were the only two purposes Chinese nuclear weapons were meant to serve. Contemporary Chinese military planners appear to have added a new purpose: compelling the United States to halt a conventional attack. Even though it only applies in extreme circumstances, it increases the risk that a war between the United States and China will end in a nuclear exchange with unpredictable and catastrophic consequences. Adding this new purpose could also be the first step on a slippery slope to an incremental broadening the role of nuclear weapons in Chinese national security policy. Americans would be a lot safer if we could avoid that. The United States government should applaud China's no first use policy instead of repeatedly calling it into question. And it would be wise to adopt the same policy for the United States. If both countries declared they would never use nuclear weapons first it may not guarantee they can avoid a nuclear exchange during a military crisis, but it would make one far less likely.

## Nuke war causes extinction AND outweighs *other* existential risks

**PND 16.** internally citing Zbigniew Brzezinski, Council of Foreign Relations and former national security adviser to President Carter, Toon and Robock's 2012 study on nuclear winter in the Bulletin of Atomic Scientists, Gareth Evans' International Commission on Nuclear Non-proliferation and Disarmament Report, Congressional EMP studies, studies on nuclear winter by Seth Baum of the Global Catastrophic Risk Institute and Martin Hellman of Stanford University, and U.S. and Russian former Defense Secretaries and former heads of nuclear missile forces, brief submitted to the United Nations General Assembly, Open-Ended Working Group on nuclear risks. A/AC.286/NGO/13. 05-03-2016.

<http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/OEWG/2016/Documents/NGO13.pdf>

Consequences human survival 12. Even if the 'other' side does NOT launch in response the smoke from 'their' burning cities (incinerated by 'us') will still make 'our' country (and the rest of the world) uninhabitable, potentially inducing global famine lasting up to decades. Toon and Robock note in 'Self Assured Destruction', in the Bulletin of Atomic Scientists 68/5, 2012, that: 13. "A nuclear war between Russia and the United States, even after the arsenal reductions planned under New START, could produce a nuclear winter. Hence, an attack by

either side could be suicidal, resulting in self assured destruction. Even a 'small' nuclear war between India and Pakistan, with each country detonating 50 Hiroshima-size atom bombs--only about 0.03 percent of the global nuclear arsenal's explosive power--as air bursts in urban areas, could produce so much smoke that temperatures would fall below those of the Little Ice Age of the fourteenth to nineteenth centuries, shortening the growing season around the world and threatening the global food supply. Furthermore, there would be massive ozone depletion, allowing more ultraviolet radiation to reach Earth's surface. Recent studies predict that agricultural production in parts of the United States and China would decline by about 20 percent for four years, and by 10 percent for a decade." 14. A conflagration involving USA/NATO forces and those of Russian federation would most likely cause the deaths of most/nearly all all humans (and severely impact/extinguish other species) as well as destroying the delicate interwoven techno-structure on which latter-day 'civilization' has come to depend. Temperatures would drop to below those of the last ice-age for up to 30 years as a result of the lofting of up to 180 million tonnes of very black soot into the stratosphere where it would remain for decades. 15. Though human ingenuity and resilience shouldn't be underestimated, human survival itself is arguably problematic, to put it mildly, under a 2000+ warhead USA/Russian federation scenario. 16. The Joint Statement on Catastrophic Humanitarian Consequences signed October 2013 by 146 governments mentioned 'Human Survival' no less than 5 times. The most recent (December 2014) one gives it a highly prominent place. Gareth Evans' ICNND (International Commission on Nuclear Non-proliferation and Disarmament) Report made it clear that it saw the threat posed by nuclear weapons use as one that at least threatens what we now call 'civilization' and that potentially threatens human survival with an immediacy that even climate change does not, though we can see the results of climate change here and now and of course the immediate post-nuclear results for Hiroshima and Nagasaki as well.

## On case

### No debris cascades, but even a worst case is confined to low LEO with no impact

Daniel Von Fange 17, Web Application Engineer, Founder and Owner of LeanCoder, Full Stack, Polyglot Web Developer, "Kessler Syndrome is Over Hyped", 5/21/2017, [http://braino.org/essays/kessler\\_syndrome\\_is\\_over\\_hyped/](http://braino.org/essays/kessler_syndrome_is_over_hyped/)

So even in the worst case, we don't lose access to space.

Now though you can travel through the debris, you couldn't keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits.

In real life, there's a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment.

- Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely.
- Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner.
- Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided.
- The planned big new constellations are not in High LEO, but in Low LEO for faster communications

with the earth. They **aren't an issue** for Kessler.

- Most importantly, **all new** satellite **launches** since the 19**90's** are required to **include a plan to** get rid of the satellite at the end of its useful life (usually by **deorbiting**)

so the realistic worst case is that **insurance premiums on satellites go up a bit**. Given the **current trend toward much smaller, cheaper micro satellites**, this wouldn't even have a huge effect.

I'm removing Kessler Syndrome from my list of things to worry about.

### **It takes centuries and adaptation solves**

Ted **Muelhaupt 19**, Associate Principal Director of the Systems Analysis and Simulation Subdivision (SASS) and Manager of the Center for Orbital and Reentry Debris Studies at The Aerospace Corporation, M.S., B.S. Aerospace and Aeronautical Engineering & Mechanics, University of Minnesota - Twin Cities, Senior Member of the American Institute of Aeronautics and Astronautics, "How Quickly Would It Take For the Kessler Syndrome To Destroy All The Satellites In LEO? And Could You See This Happening From Earth?", Quora, 2/28/2019,

<https://www.quora.com/How-quickly-would-it-take-for-the-Kessler-Syndrome-to-destroy-all-the-satellites-in-LEO-And-could-you-see-this-happening-from-Earth>

The dynamics of the **Kessler** Syndrome are real, and most people studying it agree on the concept: if there is sufficient density of objects and mass, a chain reaction of debris breaking up objects and creating more debris can occur. But the **timescale** of this process **takes** decades and **centuries**. There are many assumptions that go into these models. Though there is still argument about this, many people in the field think that the process is already underway in low earth orbit. But others, including myself, think we can stop it if we take action. This is a **slow motion disaster** that we can prevent.

But in **spite of hype** to the contrary, **we will never** "lose access to space". **Certain missions may become impractical** or too expensive, and we may decide that some orbits are too risky for humans. **Even that depends on the **tolerance** for the risk. But **robots** don't have mothers, and if we feel it is worthwhile **we will take the risk and fly the satellites** where **we need to**.**

To the specifics of the question, it will take many decades. **It will not destroy all satellites in LEO**. You won't be able to see it from the ground unless you were extraordinarily lucky, and you happened to see a flash from a collision in the instant you were looking, with just the right lighting.

### **Squo tracking, shielding, and removal plans solve**

Dr. Brian **Koberlein 16**, Professor of Physics at the Rochester Institute of Technology and PhD in Astrophysics from the University of Connecticut, "Cascade Effect", 5-4, <https://archive.briankoberlein.com/2016/05/04/cascade-effect/index.html>

In the movie Gravity the driving force of the plot is a catastrophic **cascade** of space debris. An exploding satellite sends high speed debris into the path of other satellites, and the resulting collisions create more space debris until everything from a space shuttle to the International Space Station faces an eminent threat of destruction. Not unexpectedly, the movie portrayal of such a situation is not particularly **accurate**, but the risk of a debris cascade is very real.

It's known as the Kessler syndrome, after Donald Kessler, who first imagined the scenario in the 1970s. The problem comes down to the fact that small objects in Earth orbit can stay in orbit for a very long time. If an astronaut drops a bolt, it can stay in orbit for decades or centuries. Because the relative speed of two objects in orbit can be quite large, it doesn't take a big object to pose a real threat to your spacecraft. On the highway a small pebble can chip your car windshield. In space it can be done by a chip of paint traveling at thousands of kilometers per hour. In the history of the space shuttle missions, there were more than 1,600 debris strikes. Because of such strikes, more than 90 space shuttle windows had to be replaced over the lifetime of shuttle missions.

While that might sound alarming, it's actually quite manageable. Upgrades and maintenance were quite common on the shuttle missions, and we tend to err on the side of caution when it comes to replacing parts. Modern spacecraft also have ways to mitigate the risk of small impacts, such as Whipple shields made of thin layers of material spaced apart so that objects disintegrate when hitting the shield rather than the spacecraft itself. We also have a tracking system that currently tracks more than 300,000 objects bigger than 1 cm, so we can make sure that most spacecraft avoid these objects.

But the risk of big collisions isn't negligible. In 2009 the Iridium 33 and Kosmos-2251 satellites collided at high speed, destroying both spacecraft and creating more dangerous debris. It wouldn't take many collisions like this for the debris numbers to rise dramatically, and more debris means a greater risk of collisions. In Gravity the cascade happens very quickly, triggered by a single event. The reality is not quite so grave. Instead of happening overnight, Kessler syndrome would occur gradually, raising collision risks to the point where certain orbits become logistically impractical. It could occur so gradually that we might not notice it early on, and there are some that argue it's already underway.

The good news is that we're aware of the threat. And, as the old saying goes, knowing is half the battle. Already we take steps to limit the amount of debris created. New spacecraft include end of life plans to remove them from orbit, either by sending them into Earth's atmosphere to burn up, or sending them to a "graveyard orbit" that poses little risk to other spacecraft. There are also plans on the drawing board to clear orbits of debris, particularly in low-Earth orbit where the risk is greatest. The cascade effect is a real risk, but it's also one we can likely manage with a bit of ingenuity.

**Monitoring networks are robust and ensure no collisions**

Dave **Mosher 9-3**, Deputy Editor of Science Coverage and Senior Correspondent at Business Insider, Former Contributor at Wired, "Satellite Collisions May Trigger A Space-Junk Disaster That Could End Human Access To Orbit. Here's How.", Business Insider, 9/3/2019, <https://www.businessinsider.com/space-junk-kessler-syndrome-chain-reaction-prevention-2018-3>

The Kessler syndrome plays center-stage in the movie "Gravity," in which an accidental space collision endangers a crew aboard a large space station. But Gossner said that type of a runaway space-junk catastrophe is unlikely.

"Right now I don't think we're close to that," he said. "I'm not saying we couldn't get there, and I'm not saying we don't need to be smart and manage the problem. But I don't see it ever becoming, anytime soon, an unmanageable problem."

There is no current system to remove old satellites or sweep up bits of debris in order to prevent a Kessler event. Instead, space debris is monitored from Earth, and new rules require satellites in low-Earth orbit be deorbited after 25 years so they don't wind up adding more space junk.

"Our current plan is to manage the problem and not let it get that far," Gossner said. "I don't think that we're even close to needing to actively remove stuff." There's lots of research being done on that, and maybe some day that will happen, but I think that — at this point, and in my humble opinion — an unnecessary expense."

A major part of the effort to prevent a Kessler event is the Space Surveillance Network (SSN). The project, led by the US military, uses 30 different systems around the world to identify, track, and share information about objects in space.

Many objects are tracked day and night via a network of radar observatories around the globe.

Optical telescopes on the ground also keep an eye out, but they aren't always run by the government. "The commercial sector is actually putting up lots and lots of telescopes," Gossner said. The government pays for their debris-tracking services.

Gossner said one major debris-tracking company is called Exoanalytic. It uses about 150 small telescopes set up around the globe to detect, track, and report space debris to the SSN.

Telescopes in space track debris, too. Far less is known about them because they're likely top-secret military satellites.

Objects detected by the government and companies get added to a catalog of space debris and checked against the orbits of other known bits of space junk. New orbits are calculated with supercomputers to see if there's a chance of any collisions.

Diana McKissock, a flight lead with the US Air Force's 18th Space Control Squadron, helps track space debris for the SSN. She said the surveillance network issues warnings to NASA, satellite companies, and other groups with spacecraft, based on two levels of emergency: basic and advanced.

The SSN issues a basic emergency report to the public three days ahead of a 1-in-10,000 chance of a collision. It then provides multiple updates per day until the risk of a collision passes.

To qualify for such reporting, a rogue object must come within a certain distance of another object. In low-Earth orbit, that distance must be less than 1 kilometer (0.62 mile); farther out in deep space, where the precision of orbits is less reliable, the distance is less than 5 kilometers (3.1 miles).

Advanced emergency reports help satellite providers see possible collisions much more than three days ahead. "In 2017, we provided data for 308,984 events, of which only 655 were emergency-reportable," McKissock told Business Insider in an email. Of those, 579 events were in low-Earth orbit (where it's relatively crowded with satellites).

When a space company receives a SSN alert, they typically move their satellite into a different orbit — and out of harm's way — by burning a little propellant.

Although companies like SpaceX are launching more and more objects into space, McKissock said "our everyday concern isn't something as catastrophic as the Kessler syndrome."

## No impact to warming - empirics, adaptation, and their science is flawed.

Shani, Amir. "There Is Always Time For Rational Skepticism: Reply To Hall Et Al.". April, 2015.

Web. December 11, 2021.

<[https://www.sciencedirect.com/science/article/pii/S0261517714001836?casa\\_token=YyiNztGuRL8AAAAA:dV8Gx8Lvk6vu-g55FBzStVEdlWpZogozjDq7pClTt4liGschbPS8kNq4zTetDnU0o81OGU9UtCk](https://www.sciencedirect.com/science/article/pii/S0261517714001836?casa_token=YyiNztGuRL8AAAAA:dV8Gx8Lvk6vu-g55FBzStVEdlWpZogozjDq7pClTt4liGschbPS8kNq4zTetDnU0o81OGU9UtCk)>.

The uncertainty that encompasses current climate change assessments is strengthened in light of the studies indicating that over earth's history there have been distinct warm periods with temperatures exceeding the current ones (Esper et al., 2012, McIntyre and McKittrick, 2003 and

Soon and Baliunas, 2003). Reviewing the relevant scientific literature, Khandekar, Murty, and Chittibabu (2005) concluded that "in the context of the earth's climate through the last 500

million years, the recent (1975–2000) increase in the earth's mean temperature does not appear to be unusual or unprecedented as claimed by IPCC and many supporters of the global warming hypothesis" (p. 1568). Other studies challenged the mainstream climate change narrative, according to which CO2 levels in the earth's atmosphere play a prominent role in rising temperatures. One notable example is the research by Shaviv and Veizer (2003), which demonstrates that the earth's temperature correlates well with variations in cosmic ray flux, rather than changes in atmospheric CO2. These findings and others stir contentious debates within the climate scientific community, but are nevertheless largely overlooked by the IPCC, which ignores alternative explanations for climate change. Regrettably, Hall et al. scornfully dismiss this evidence, presented in our research note, based on cherry-picking of a few "non-peer-reviewed" references that were cited, some vague claims about "misreading" and "selective citing," as well as other semantic nitpicking. 4. Impacts of climate change The IPCC warns that climate change is likely to have severe consequences, particularly for poor countries, such as increased hunger, water shortages, vulnerability to extreme weather events and debilitating diseases. However, these estimations have been heavily criticized for failing to properly account for substantial improvements in adaptive capacity (i.e., the capability of coping with the impact of global warming) that are likely to occur due to advances in economic development, technological change and human capital over the next century (Goklany, 2007). Fostering economic growth and technological development, largely achievable through the use of fossil fuels, will strengthen both industrialized and developing countries' adaptive capacity to deal not just with possible future climate change consequences, but also with other environmental and public health problems. Such policy will provide greater benefits at lower costs than drastic climate change mitigation efforts involving substantially cutting greenhouse gas emissions (Goklany, 2004 and Goklany, 2012). Furthermore, the analyses of Galiana and Green (2009) exemplify that in the current state of energy technologies, the suggested plans for ambitious emission reductions will likely severely clobber the global economy, especially in view of present economic conditions. In order to stabilize atmospheric CO2 at accepted levels, there is a need for enormous advances in efficient energy technology, which is currently missing (Pielke, Wigley & Green, 2008). In any case, even if every industrialized nation meets the most ambitious emissions targets set by the Kyoto Protocol, such efforts are likely to have little effect, particularly in the light of the considerable increases in greenhouse gas emissions by rising economic superpowers as China and India, as well as the remaining developing world (Wigley, 1998). Hall et al. criticized us for choosing "selective citations...that discuss natural processes potentially affect climate in specific locations and times." Yet the purpose of referring to such studies was to refute the claims made by the IPCC and other climate change alarmists to the effect that recent extreme weather events (e.g., floods, droughts and storms) are the consequences of anthropogenic emissions of greenhouse gases. Moreover, data shows that despite claims that the number and intensity of extreme weather has increased, between 1900 and 2010 the average annual death and death rates from extreme weather events has declined by 93% and 98%, respectively (Goklany, 2009). This is mostly due to economic and technological factors, such as improved global food production, increase globalized food trade and better disaster preparedness. IPCC's exaggerated estimations of climate change impacts were also noted in an op-ed in Financial Times written by climate economist Richard Tol (2014), a week following his demand that his name as one of the leading authors be removed from the IPCC's AR5 due to its over alarmist assessments of the impacts of AGW and underestimation of humanity's adaptive capacity. As concluded by Tol, "Humans are a tough and adaptable species. People live on the equator and in the Arctic, in the desert and in the rainforest. We survived ice ages with primitive technologies. The idea that climate change poses an existential threat to humankind is laughable" (2014, para 1).

## No impact to ozone

**Lieberman**, 9/14/2007 (Ben – Senior Policy Analyst on Energy and the Environment at the Heritage Foundation, Ozone: The Hole Truth, p. <http://www.heritage.org/research/commentary/2007/09/ozone-the-hole-truth>)

Environmentalists have made numerous apocalyptic predictions over the past several decades, virtually none of which has come to pass. Yet each time, the greens and their political allies proclaim victory, arguing that their preventive prescriptions averted disaster. Such is the case with the 1987 Montreal Protocol On Substances That Deplete The Ozone Layer (Montreal Protocol). The lurid predictions of ozone depletion-induced skin cancer epidemics, ecosystem destruction and others haven't come true, for which Montreal Protocol proponents congratulate themselves. But in retrospect, the evidence shows that ozone depletion was an exaggerated threat in the first place. As the treaty parties return to Montreal for their 20th anniversary meeting it should be cause for reflection, not celebration, especially for those who hope to repeat this "success story" in the context of global warming. The treaty came about over legitimate but overstated concerns that chlorofluorocarbons (CFCs, a then-widely used class of refrigerants) and other compounds were rising to the stratosphere and destroying ozone molecules. These molecules, collectively known as the ozone layer, shield the earth from excessive ultraviolet-B radiation (UVB) from the sun. The Montreal Protocol's provisions were tightened in 1990 and again in 1992, culminating with a CFC ban in most developed nations by 1996. So what do we know now? As far as ozone depletion is concerned, the thinning of the ozone layer that occurred throughout the 1980s apparently stopped in the early 1990s, too soon to credit the Montreal Protocol. A 1998 World Meteorological Organization (WMO) report said that, "since 1991, the linear [downward] trend observed during the 1980s has not continued, but rather total column ozone has been almost constant ..." However, the same report noted that the stratospheric concentrations of the offending compounds were still increasing through 1998. This lends credence to the skeptical view, widely derided at the time of the Montreal Protocol, that natural variations better explain the fluctuations in the global ozone layer. More importantly, the feared increase in ground level UVB radiation has also failed to materialize. Keep in mind that ozone depletion, in and of itself, doesn't really harm human health or the environment. It's the concern that an eroded ozone layer will allow more of the sun's damaging UVB rays to reach the earth that led to the Montreal Protocol. But WMO concedes that no statistically significant long-term trends have been detected, noting earlier this year that "outside the polar regions, ozone depletion has been relatively small, hence, in many places, increases in UV due to this depletion are difficult to separate from the increases caused by other factors, such as changes in cloud and aerosol." In short, the impact of ozone depletion on UVB over populated regions is so small that it's hard to detect. Needless to say, if UVB hasn't gone up, then the fears of increased UVB-induced harm are unfounded. Indeed, the much-hyped acceleration in skin cancer rates hasn't been documented. U.S. National Cancer Institute statistics show that malignant melanoma incidence and mortality, which had been undergoing a long-term increase that predates ozone depletion, has actually been leveling off during the putative ozone crisis. Further, no ecosystem or species was ever shown to be seriously harmed by ozone depletion. This is true even in Antarctica, where the largest seasonal ozone losses, the so-called Antarctic ozone hole, occur annually. Also forgotten is a long list of truly ridiculous claims, such as the one from Al Gore's 1992 book "Earth in the Balance" that, thanks to the Antarctic ozone hole, "hunters now report finding blind rabbits; fisherman catch blind salmon."