# AC

## Fwk

#### The value is morality

#### The standard is Utilitarianism. Prefer:

#### [1] Actor specificity: util is the best for governments, which is the actor in the rez – multiple warrants:

#### [a] Governments must aggregate since every policy benefits some and harms others, which also means side constraints freeze action.

#### [b] No act-omission distinction—governments are responsible for everything in the public sphere so inaction is implicit authorization of action: they have to yes/no bills, which means everything collapse to aggregation.

#### [c] No intent-foresight distinction – the actions we take are inevitably informed by predictions from certain mental states, meaning consequences are a collective part of the will.

#### [d] Actor-specificity comes first since different agents have different ethical standings. Takes out util calc indicts since they’re empirically denied and link turns them because the alt would be no action.

#### [2] Ethical frameworks must be theoretically legitimate. All frameworks are functionally topicality interpretations of the word ought so they must theoretically justified. Prefer our standard – a] Ground: Both debaters are guaranteed access to ground – Aff gets plans and advantages, while Neg gets disads and counterplans. Additionally, anything can function as an impact as long as an external benefit is articulated, so all your offense applies. b] Weighing ground: consequences lets us weigh the probability a scenario, its risk, scope, severity, etc. and we can even weigh between these standards. We can still run side constraints but they are compared to other impacts while other frameworks prevent weighing by making them absolute. Ow on resolvability because if there is framing mechanism that we don’t know what offense matters. That’s an independent voter: because the judge literally cannot make a decision

#### [3] Extinction outweighs

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] AT

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 are 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 world, 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 the 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)

#### [4] Util is a lexical pre-requisite to any other framework-threats to bodily security and life preclude the ability for moral actors to effectively utilize and act upon other moral theories since they are in a constant state of crisis that inhibit the ideal moral conditions which other theories presuppose – so, util comes first and my offense outweighs theirs under their own framework.

## C1: Inequality

#### Space development cements inequality by favoring the rich

**Edythe 12’ - Dr. Edythe Weeks in her book on Space Development International Relations and Space Law in 2012** [“Outer space development, international relations and space law : a method for elucidating seeds” Newcastle upon Tyne, Cambridge Scholars Publishing]cdm

The global community is experiencing economic recession, natural disasters, lack of opportunity, employment anxiety, failing K-12 programs, widening inequality gaps, uprisings, revolutions, revolts, unmet educational goals, and a general failure to uplift, inspire, and provide meaningful opportunities for significant portions of our population. In the United States of America, the wars in Iraq and Afghanistan failed to jumpstart the economy; the Dow Jones failed; Wall Street failed; millions of working people lost their houses to foreclosure; tent communities and homeless populations are on the increase; many people are experiencing depression, anxiety, career anxiety; we see alarming rates of people dropping out of high school and college; and there is a general lack of opportunities, along with high rates of job loss. People need something that will allow them to focus anew their talents, energies, abilities, and gifts, and use this bleak climate as an opportunity for positive change. Outer space development is emerging as an answer to this state of crisis. The question is: To whom will the benefits accrue? Many strategic decisions have already been taken regarding space development of which the global general public is unaware. Once legal rights to space resources are granted, only those with the capital to take advantage of new laws and policies will be in a position to profit from the new space industries. Only those who are in a position to know about outer space development will be in position to take advantage of the opportunities. It is important to remember that the global general public has for several decades being paying the start-up costs for space exploration research, science, and technology. It‘s not too late to factor in equality before an infrastructure of inequality is forever with us as we venture to establish the final frontier.

#### The exclusivity of space exploration marginalizes billions and biases scientific efforts

**Edythe 14’ - Dr. Edythe Weeks Acta Astronautica 2014** [Ayodele Adekunle Faiyetoleb “Science, technology and imaginable social and behavioral impacts as outer space develops” Volume 95, February–March 2014, Pages 166–173]cdm

Nations characterized as “developing” and therefore, perceived as uninterested in outer space, may now be very interested in playing a key role in the development of outer space and its vast resources. For example, there is the aspect of information technology, which has brought about unprecedented opportunities for global and peaceful cooperation, and has paradoxically been used to display shows of technological rivalry or war. Here is a telling insight: The world’s first geosynchronous satellites were launched by NASA. The first was launched on February 14, 1963. Syncom 2 was launched July 26, 1963, becoming the world’s first successful geosynchronous satellite. Posi-tioned over the Atlantic, the satellite set new records in long range communications including a telephone con-versation between President John F. Kennedy and Niger-ian Prime Minister Abubakar Tafawa Balewa. The following year, on August 19, 1964, Syncom 3 was hurled into geosynchronous orbit and positioned above the Pacific near the International Date Line. Shortly after the arriving on station, the satellite transmitted a TV relay of the Olympic Games in Tokyo, Japan, the first TV program ever to span the Pacific from synchronous orbit. For several years the two satellites served as primary com-munication links between Southeast Asia and the wes-tern Pacific ( [14]). As communication satellite technology developed, international cooperation grew. Industry growth and international development has fostered peaceful coopera-tion between nations. Cooperation is a more logical and harmonious way for space activities and exploration. “In 1984 President Reagan articulated an interest in construct-ing an international space station for commercial, techno-logical, and scientific purposes. The international community heeded this call in September 1988 by signing the International Space Station Multilateral Intergovern-mental Agreement” ( [34]: 81). Following the success of the International Space Station (ISS), which was built on the peaceful working together of the erstwhile cold war countries of USA and Soviet Russia, it has demonstrated working together with global partners is even more achievable. Therefore, outer space could be better developed using global efforts [6, 10], which could include developed and developing countries. We believe that more of this can occur if we include and involve more people in the process of outer space develop-ment. For example, Nigeria and many other countries of the global South have been “actors” during the first wave of outer space development by the transatlantic testing of long distance communication over satellites, setting a new record significantly occasioned by the communication between President John F. Kennedy and the only prime minister of an independent Nigeria, Prime Minister Abuba-kar Tafawa Balewa. Thus we would like to help effect a shift in the ideology that suggests outer space development is only important for a few people in a few nations. Outer space development is important for all humankind. If we miss this opportunity, all that will remain is more of the negative reflections on what went wrong. The resultant effect will again be that inequality has been further established causing more of the phenomenon aptly described by Seralgedin [30] as “scientific apartheid”. He states: There is a real danger that the benefits of proprietary science will serve to bring more and more to the privileged few rather than serve the needs of the billions of the marginalised poor and their children. That the developing countries will not be able to adjust fast enough to the needs of the competitive global economy of science-based production and knowledge-based income.

#### For example, in the Global South, workers are exploited and overworked because private companies came in and made them work those long hours with little to no pay. Essentially, they took over that underdeveloped country in order to make profits to line their pockets. Private companies take over natural resources and deprive those regions of their reserves --- this is only exacerbated in space exploration where private companies take away from poorer regions of the world to get the materials to even build spacecrafts and rovers. This mindset follows with violence and marginalizes billions who live in developing countries.

#### Wealthy countries getting wealthier worsens the wealth gap and leaves developing countries even further behind than they already are.

## C2: Climate Change

#### Space colonization trades off with terrestrial innovation of green-tech

Etzioni 18 - Amitai Etzioni is a University Professor at The George Washington University, Eli Etzioni is a 2018 graduate of Claremont McKenna College National Interest, August 25th, 2018 “Humanity Would Be Better off Saving Earth, Rather Than Colonizing Mars” [https://nationalinterest.org/blog/buzz/humanity-would-be-better-saving-earth-rather-colonizing-mars-29712] Accessed 1/11/22 SAO

The mission to colonize Mars runs into three major challenges. First, likening a colony on Mars to life insurance is misleading. If the earth does overheat to the point that we all fry or becomes so polluted that we all choke, there will be no way to move the world’s population to Mars. Not even one child per family. Rather, the idea is that the survival of the human species will be ensured; the select few that go to Mars will survive, procreate, and gradually build a new population. Elon Musk’s most optimistic estimate is that SpaceX will transport one million people to Mars in the next 100 years. The proper analogy is to the United States' Cold War plan for nuclear warfare—to rush a few thousand "special" people to bunkers, leaving most of humanity to be nuked. Second, if the colonization of Mars moves beyond the subject of workshops and cocktail party chit-chat into a major project, it brings with it an unavoidable subtext of despair. Despite the fact that what Musk, Hawking, and others propose it as a backup plan, it suggests that we may well fail to save Mother Earth and that it is time to search for another planetary home, to save the species, even if not mankind. But what the droughts, the fires, the hot summers, and the melting glaciers call for is not an escape from Earth, but a redoubling of the efforts to save it. Some hold that the next decade is a critical period, as the window of opportunity to save the earth is rapidly narrowing. Others hold that we have more leeway. However, there is wide agreement that merely dialing down economic activity may be neither sufficient nor politically feasible. What is needed are major technological breakthroughs that will allow for protecting earth while sustaining a healthy level of economic activity. Developing artificial leaves, that can turn carbon dioxide into oxygen, and be mass-produced much more quickly than their natural counterparts, is a telling example. **To make such breakthroughs we need major concentrations of research and development resources, talent, and leadership, all of which are in short supply**. Hence, any serious Mars endeavor will inevitably cut into the drive to save Mother Earth. Even Elon Musk admits that colonizing Mars will require “tremendous entrepreneurial resources.” Musk and his team estimate that just sending the first twelve astronauts to Mars will cost $10 billion per person. A rocket that could transport astronauts to Mars remains to be invented. Once the astronauts do arrive on Mars, they will be confronted with an extremely hostile environment. The water that has been discovered is buried one mile below the surface, the air is saturated with toxic chemicals called perchlorates, and the Mars atmosphere does little to protect from damaging cosmic radiation. Some hold the water could be made to yield oxygen for breathing and hydrogen for fuel. However, first one would have to bring a drill from earth, then pumps, then build a plant to process the water. The same holds for most everything else.

#### Space Billionaires are abandoning the Earth, dooming us to environmental catastrophe.

**Stirone 21** - “Space Billionaires, Please Read the Room” By Shannon Stirone [<https://www.theatlantic.com/science/archive/2021/07/space-billionaires-jeff-bezos-richard-branson/619383/> ] // ahs emi

After Jeff Bezos, the world’s richest person, announced that he would join the first crewed flight by his rocket company, Blue Origin, later this month, Richard Branson just couldn’t let himself be outdone.\* So now Branson, merely the world’s 589th richest person, is joining the crew of his next Virgin Galactic flight on Sunday, nine days before Bezos goes vertical. All of this to go to “space.” Branson will go only about 50 miles up, where the military says space starts. Bezos will go 12 miles higher, just past the internationally recognized Karman Line, but he’ll be there for only four minutes. **Could there be a worse time for two über-rich rocket owners to take a quick jaunt toward the dark**? Especially in the United States, **the climate crisis is** now actually starting to feel like a crisis. **The western U.S. is in the thick of fire season, experiencing record-breaking drought and temperatures.** Last week, Bezos’s hometown of Seattle hit 108 degrees. **Hurricane season is starting early, and a once-in-200-years flood just ravaged northern Mississippi. Oh yeah, then there’s the pandemic that is very much still not over.** Anyone would want a break from this planet, but the billionaires are virtually the only ones who are able to leave. Leaving Earth right now isn’t just bad optics; it’s almost a scene out of a twisted B-list thriller: **The world is drowning and scorching, and two of the wealthiest men decide to ... race in their private rocket ships to see who can get to space a few days before the other.** If this were a movie, these men would be Gordon Gekko and Hal 9000—both venerated and hated. Maybe, I don’t know, delay the missions a bit until people around the world are no longer desperately waiting for vaccines to save them from a deadly virus. To their credit, the two billionaires aren’t totally oblivious. In recent years, Branson has proposed a climate dividend, while Bezos has pledged to spend $10 billion on climate efforts, though we still don’t know where most of that money will go. But given what humanity has been through in the past year and a half, I can’t help but wonder, what are they thinking? (I reached out to both Blue Origin and Virgin Galactic for comment and neither company responded. Branson has insisted that he is not in a competition with Bezos.) And it’s not just them that make this display feel so gross. Their fellow billionaire **Elon Musk (currently the No. 2 richest person, if you’re keeping track) may not be far behind in his own space travels and is in the midst of**[**ruining the night sky**](https://www.vox.com/science-and-health/2020/1/7/21003272/space-x-starlink-astronomy-light-pollution)**with his mega-constellation of satellites.** While Bezos and Branson will be in space—I mean, “space”—for just a few minutes, their departure is yet another reminder of all the other earthly things they can avoid that the rest of us can’t. **Billionaires** have purchased private islands, built underground bunkers, and gotten LASIK to prepare for not having glasses during the climate apocalypse. They can’t truly escape Earth now, and [they likely never will](https://www.theatlantic.com/ideas/archive/2021/02/mars-is-no-earth/618133/), but **they can avoid helping make this planet better.**

## C3: Space Junk

#### **Space debris is rising to dangerous levels**

Choudhury 18’ – Saheli Roy Choudhury, Saheli Roy Choudhury is a reporter for CNBC.com. She reports on technology news in Asia Pacific, with a focus on artificial intelligence, 5G and cybersecurity. She also covers India and writes on market moves in the region, “Space junk is a big problem and it’s going to get worse”, CNBC, 09/18/18 [<https://www.cnbc.com/2018/09/18/wef-tianjin-space-junk-is-a-big-problem-and-its-going-to-get-worse.html>] Accessed 12/12/21 AHS//AP

Space debris has become a huge problem. Their accumulation in Earth’s orbit has become a hindrance and can endanger future missions to the moon or Mars, according to the chief of a company that’s trying to solve the issue. A surge in aggressive space ventures in recent years has seen a build-up of space junk, and they are set to grow exponentially, Nobu Okada, founder and CEO of Astroscale, told CNBC at the [World Economic Forum’s](https://www.cnbc.com/tianjin--world-economic-forum/) Annual Meeting of the New Champions in Tianjin, [China](https://www.cnbc.com/china/). “Over the last 5 to 7 years, we saw (about) 2,000 space ventures in the world. Their plans are so aggressive, they’re going to launch 10,000 to 20,000 satellites over the next 5 to 10 years,” he said. “We see the exponential growth of objects in space.” There are [more than 500,000 pieces of junk](https://www.nasa.gov/mission_pages/station/news/orbital_debris.html) floating around Earth’s orbit, including defunct satellites, rocket boosters, nuts and bolts, all of which pose a substantial threat to astronauts and spacecraft, according to U.S. space agency NASA. [The European Space Agency said](https://www.esa.int/Our_Activities/Operations/Space_Debris/Space_debris_by_the_numbers) that as of January 2018, there are about 29,000 objects larger than 10 centimeters, around 750,000 objects that range between 1 cm to 10 cm and about 166 million objects between 1 millimeter to 1 cm in size. Okada said that pieces of debris fly around the Earth throughout the day, and there are plenty of near-miss situations where two objects almost collide. When they do hit each other, those collisions end up creating even more debris. “Even the small particle caused by the collision has enough power to blow up a satellite,” he said. “If we continue the chain reactions of the collisions, we won’t be able to put our space assets into space. So it’s now (that) we have to remove large objects from space.”

#### **Space exploration increases space debris**

Resilience 18’ – Resilience News, “Space debris poses growing threat to satellite infrastructure”, Global Resilience Institute, Northeastern University, January 16th, 2018, [https://globalresilience.northeastern.edu/space-debris-poses-growing-threat-to-satellite-infrastructure/] Accessed 01/05/22 AHS//AP

NASA and the Department of Defense Space Surveillance Network currently [track](https://www.nasa.gov/offices/nesc/articles/space-debris) about 21,000 pieces of debris in Low Earth and Geosynchronous Orbit, although the most dangerous pieces of debris are the millions that are too small to track. Multiple trends, including the growing usage of small satellites, the growth of private sector investment in space exploration, and the development of anti-satellite military technologies are fueling the growth of space debris. [Testing](http://www.esa.int/Our_Activities/Operations/Space_Debris/FAQ_Frequently_asked_questions) of anti-satellite missiles by China and the United States has resulted in thousands of new fragments in space due to the collision of missiles with target objects. Another major example of where this debris originates from was a collision between a communications satellite owned by the Iridium corporation and an abandoned Russian communication satellite, which resulted in 2,300 new pieces of shrapnel. The [development](https://www.wsj.com/articles/we-need-satellitesa-speeding-mass-of-space-junk-puts-them-at-risk-1505226427) of small and cheap satellites, such as the popular $40,000 4-inch CubeSAT, has led to the proliferation of satellites sent by students, companies, and researchers; SpaceX has taken advantage of this technology to request permission from the FCC to launch 12,000 small satellites into Low Earth Orbit. Long-term growth in space debris creates two major risks; first, that space debris could potentially create unusable regions of orbit due to pollution. Further, there is a growing risk of the [onset](https://www.wsj.com/articles/we-need-satellitesa-speeding-mass-of-space-junk-puts-them-at-risk-1505226427) of the Kessler Syndrome, which occurs when collisions continually create more debris which results in more collisions, creating a positive feedback loop and eventually resulting in new collisions even with no new launches in orbit.

#### Space debris damages lead to war and economic collapse

**Blatt 20 -** Talia M. Blatt, I am a rising sophomore at Harvard, considering a joint concentration in Social Studies and Integrative Biology with a citation in Chinese. I specialize in East Asian geopolitics and security issues, "Anti-Satellite Weapons and the Emerging Space Arms Race," Harvard International Review, May 26th, 2020, [https://hir.harvard.edu/anti-satellite-weapons-and-the-emerging-space-arms-race/] Accessed 12/12/21 recut AHS//AP

ASAT testing, rather than deployment, risks the exponential accumulation of debris, which endangers satellites and creates a host of other problems. KE-ASATs rely on smashing satellites into thousands of pieces, so each test adds tremendous amounts of space debris. The 2007 Chinese KE-ASAT test alone increased the number of objects in orbit by 20 percent, producing more than two thousand pieces of debris large enough to be tracked and likely thousands more too small to be counted that will remain in orbit for centuries. Even the smallest pieces of debris can do great damage; traveling at more than 15,000 miles per hour, they can crash into other debris in a proliferation known as the Kessler Syndrome. The situation in space could approach a critical mass in which collision cascading occurs even if all launches were halted, choking orbits with debris until all satellites are destroyed and spaceflight rendered impossible. Compared to the negligible debris created during commercial launches, ASAT tests—especially if the arms race continues to escalate and countries with less developed space programs join with cruder designs—may accelerate the debris in space closer and closer to this critical mass. If debris knocks out a satellite, an increasingly likely possibility in a world with ASAT tests, then the aforementioned conflict scenarios become more likely. Conflict aside, ASAT-based debris clouds are terrifying in their own right. Public health, transportation, climate science, and a litany of other crucial infrastructures are dependent on satellites that are now at risk. Satellite GPS is a cornerstone of the modern economy; some pundits believe that the slightest glitch in GPS satellites could shock the stock market and further destabilize an unstable global economy. During the pandemic, satellites are playing a crucial role in geospatial data collection for infectious disease modeling. Essentially, it is hard to imagine a world without satellites, but that is a possible outcome given that there are no reliable methods of withdrawing debris from space.

#### When space debris accumulates, it falls down into the Earth’s atmosphere where debris chunks hit satellites owned by other countries. For example, when a piece of space junk from a sate little from the United States hits a satellite from China, conflict arises because our satellite destroys theirs.

## C4: Space Bugs

#### **Spaceflight activates disease and increases spread**

Frontiers 19’ - Frontiers. "Dormant viruses activate during spaceflight: The stress of spaceflight gives viruses a holiday from immune surveillance, putting future deep-space missions in jeopardy." ScienceDaily. [www.sciencedaily.com/releases/2019/03/190316162211.htm] (Accessed January 3, 2022).

"During spaceflight there is a rise in secretion of stress hormones like cortisol and adrenaline, which are known to suppress the immune system. In keeping with this, we find that astronaut's immune cells -- particularly those that normally suppress and eliminate viruses -- become less effective during spaceflight and sometimes for up to 60 days after." In the midst of this stress-induced amnesty on viral killing, dormant viruses reactivate and resurface. "To date, 47 out of 89 (53%) astronauts on short space shuttle flights, and 14 out of 23 (61%) on longer ISS missions shed herpes viruses in their saliva or urine samples," reports Mehta. "These frequencies -- as well as the quantity -- of viral shedding are markedly higher than in samples from before or after flight, or from matched healthy controls." Overall, four of the eight known human herpes viruses were detected. These include the varieties responsible for oral and genital herpes (HSV), chickenpox and shingles (VZV) -- which remain lifelong in our nerve cells -- as well as CMV and EBV, which take permanent but uneventful residence in our immune cells during childhood. CMV and EBV, are two viruses associated with causing different strains of mononucleosis or the "kissing disease."… continued virus shedding post flight could endanger immunocompromised or uninfected contacts on Earth, like newborns. "Infectious VZV and CMV were shed in body fluids up to 30 days following return from the International Space Station." What's more, as we prepare for human deep-space missions beyond the moon and Mars, the risk that herpes virus reactivation poses to astronauts and their contacts could become more crucial. "The magnitude, frequency and duration of viral shedding all increase with length of spaceflight." Developing countermeasures to viral reactivation is essential to the success of these deep-space missions, argues Mehta.

#### Interplanetary contamination risks humanity

Ratner 16’ – Paul Ratner, Paul is a writer, filmmaker, and educator. He has written for years for Big Think and other outlets on transformative scientific research, history, and current events. His award-winning films like the true-life adventure ["Moses on the Mesa"](http://mosesonthemesa.com/) and the science documentary ["The Caveman of Atomic City"](http://micromikefilm.com/) have played at film festivals around the world. Paul also organizes numerous unique educational events, renowned film festivals, and competitions for thousands of people. He has degrees from Cornell University (BA) and Chapman University (MFA), “Humanity Vs Aliens: They Could Wipe Us out with Diseases”, BigThink, April 8th, 2016, [https://bigthink.com/health/could-alien-diseases-wipe-out-humanity/] Accessed 01/04/2021 AHS//AP

But with every scoop of extraterrestrial soil our rovers dig up, come some fears.  The scoop could contain alien bacteria that might thrive here on earth in ways that are unexpected, unknown and possibly very deadly. We could potentially have no immunity to extraterrestrial microbes. They could quickly wipe out large chunks of the human population, like a modern-day Black Plague. And that’s not the only threat.  Such bacteria could go after animals, plants and earthly microbes. Our food sources could be gone before we do. The encounter between us and aliens or alien bacteria could be similar to [what happened to Native Americans when Europeans arrived in the 15th century](http://bigthink.com/paul-ratner/devastating-new-evidence-of-how-early-native-americans-were-brought-to-extinction-by-europeans). Over 95% of possibly 54 million people were killed due to lack of immunity to such illnesses as smallpox and flu. NASA and other space agencies [instituted decontamination programs](http://www.space.com/27599-ebola-outbreak-mars-sample-lessons.html) to make sure the samples are quarantined. The international Outer Space Treaty of 1967 states in its article IX that “States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose.” But back contamination practices like quarantines and all types of sterilizations have their own limitations, as what they are looking for is limited to what we know to look for. An unknown life form would behave unknowingly.

## C5: China Heg

#### China is rapidly increasing space involvement.

**Campbell 19**

Campbell, C. (2019, 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 **[is] 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 [has] 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 tech**nologies. “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.

#### China overtaking US superiority is disastrous

Harding 21, [(Luke, a Guardian foreign correspondent. His book Shadow State is published by Guardian Faber. Click here for Luke's public key) “The space race is back on – but who will win?” The Guardian, 7/16/21.

https://www.theguardian.com/science/2021/jul/16/the-space-race-is-back-on-but-who-will-win] RR **The biggest challenge to US space supremacy comes** not from Russia – heir to the Soviet Union’s pioneering space programme, which launched the Sputnik satellite and got the first human into space in the form of Yuri Gagarin – **but from China.** In 2011 Congress prohibited US scientists from cooperating with Beijing. Its fear: scientific espionage. Taikonauts are banned from visiting the ISS, which has hosted astronauts from 19 countries over the past 20 years. The station’s future beyond 2028 is uncertain. Its operations may yet be extended in the face of increasing Chinese competition. In its annual threat assessment this April, the office of the US Director of National Intelligence (DNI) described China as a “near-peer competitor” pushing for global power. It warns: **“Beijing is working to match or exceed US capabilitiesin space to gain the military, economic, and prestige benefits that Washington has accrued from space leadership.”** The Biden administration suspects Chinese satellites are being used for non-civilian purposes. The People’s Liberation Army integrates reconnaissance and navigation data in military command and control systems, the DNI says. “Satellites are inherently dual use. It’s not like the difference between an F15 fighter jet and a 737 passenger plane,” Hilborne says. Once China completes the Tiangong space station next year, it is likely to invite foreign astronauts to take part in missions. One goal: to build new soft-power alliances. Beijing says interest from other countries is enormous. The low Earth orbit station is part of an ambitious development strategy in the heavens rather than on land – a sort of belt and rocket initiative. According to Alanna Krolikowski, an assistant professor at the Missouri University of Science and Technology, a “bifurcation” of space exploration is under way. In one emerging camp are states led by China and Russia, many of them authoritarian; in the other are democracies and “like-minded” countries aligned with the US. Russia has traditionally worked closely with the Americans, even when terrestrial relations were bad. Now it is moving closer to Beijing. In March, China and Russia announced plans to co-build an international lunar research station. The

agreement comes at a time when Vladimir Putin’s government has been increasingly isolated and subject to western sanctions. In June, Putin and his Chinese counterpart Xi Jinping renewed a friendship treaty. Moscow is cosying up to Beijing out of necessity, at a time of rising US-China bipolarity. These rival geopolitical factions are fighting over a familiar mountainous surface: the moon. In 2019 a Chinese rover landed on its far side – a first. China is now planning a mission to the moon’s south pole, to establish a robotic research station and an eventual lunar base, which would be intermittently crewed. Nasa, meanwhile, has said it intends to put a woman and a person of colour on the moon by 2024. SpaceX has been hired to develop a lander. The return to the moon – after the last astronaut, commander Eugene Cernan, said goodbye in December 1972 – would be a staging post for the ultimate “giant leap”, Nasa says: sending astronauts to Mars. Krolikowski is sceptical that China will quickly overtake the US to become the world’s leading spacefaring country. “A lot of what China is doing is a reprisal of what the cold war space programmes did in the 1960s and 1970s,” she said. Beijing’s recent feats of exploration have as much to do with national pride as scientific discovery, she says. But there is no doubting Beijing’s desire to catch up, she adds. “The Chinese government has established, or has plans for, programmes or missions in every major area, whether it’s Mars missions, building mega constellations of telecommunications satellites, or exploring asteroids. There is no single area of space activity they are not involved in.” “We see a tightening of the Russia-China relationship,” Krolikowski says. “In the 1950s the Soviet Union provided a wide range of technical assistance to Beijing. Since the 1990s, however, the Russian space establishment has experienced long stretches of underfunding and stagnation. China now presents it with new opportunities.”

#### The impact is war. China is developing anti satellite weapons

DNI 21

Office of the Director of National Intelligence. (2021, 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 // 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.

**Development of Chinese anti-satellite emboldens China to invade Taiwan which inevitably leads to US-China war due to deep alliance ties.**

**Chow and Kelley 21**

[(Brian G., policy analyst for the Institute of World Politics, Ph.D in physics from Case Western Reserve University, MBA and Ph.D in finance from the University of Michigan, and Brandon, graduate of Georgetown’s School of Foreign Service) “China’s Anti-Satellite Weapons Could Conquer Taiwan—Or Start a War,” National Interest, 8/21/2021] JL

If current trends hold, then**China**’s Strategic Support Force **will be capable by the late 2020s of holding key U.S. space assets at risk**. Chinese military doctrine, statements by senior officials, and past behavior all suggest that China may well believe threatening such assets to be an effective means of deterring U.S. intervention. If so,then **the U**nited **S**tates **would face a** type of “Sophie’s **Choice**”: decline **to intervene**, potentially leading allies to follow suit and Taiwan to succumb without a fight, thereby enabling Xi to achieve his goal of “peacefully” snuffing out Taiwanese independence; or start a war that would at best be long and bloody **and** might well even **cross the nuclear threshold**. This emerging crisis has been three decades in the making. In 1991, China watched from afar as the United States used space-enabled capabilities to obliterate the Iraqi military from a distance in the first Gulf War. The People’s Liberation Army quickly set to work developing capabilities targeted at a perceived Achilles’ heel of this new American way of war: reliance on vulnerable space systems. This project came to fruition with a direct ascent ASAT weapons test in 2007, but the test was limited in two key respects. First, it only reached low Earth orbit. Second, it generated thousands of pieces of long-lasting space junk, provoking immense international ire. This backlash appears to have taken **China** by surprise, driving it to **seek new, more usable ASAT types** with minimal debris production. Now, one such ASAT is nearing operational status: spacecraft capable of rendezvous and proximity operations (RPOs). Such spacecraft are inevitable and cannot realistically be limited. The United States, European Union, China, and others are developing them to provide a range of satellite services essential to the new space economy, such as in situ repairs and refueling of satellites and active removal of space debris. But RPO capabilities are dual-use: if a satellite can grapple space objects for servicing, then it might well be capable of grappling an adversary’s satellite to move it out of its servicing orbit. Perhaps it could degrade or disable it by bending or disconnecting its solar panels and antennas all while producing minimal debris. This is a serious threat, primarily because**no international rules presently exist to limit close approaches in space**. Left unaddressed,this lacuna in international law and space policy could enable a prospective attacker to pre-position, during peacetime, as many spacecraft as they wish as close as they wish to as many high-value targets as they wish. The result would be an ever-present possibility of sudden, bolt-from-the-blue attacks on vital space assets—and worse, on many of them at once. China has conducted at least half a dozen tests of RPO capabilities in space since 2008, two of which went on for years. Influential space experts have noted that these tests have plausible peaceful purposes and are in many cases similar to those conducted by the United States. This, however, does not make it any less important to establish effective legal, policy, and technical counters to their offensive use.**Even if it were certain that these capabilities are intended purely for peaceful applications—and it is not at all clear that that is the case—China (or any other country) could at any time decide to repurpose these capabilities for ASAT use. There is still time to get out ahead of this threat, but likely not for much longer**. China’s RPO capabilities have, thus far, lagged about five years behind those of the United States. There are reasons to believe this gap may close, but even assuming that it holds,we should expect to see China demonstrate an operational dual-use rendezvous spacecraft by around 2025. (The first instance of a U.S. commercial satellite docking with another satellite to change its orbit occurred in February 2020.) At the same time,**China is expanding its capacity for rapid spacecraft manufacturing**. The Global Times reported in January that China’s first intelligent mass production line is set to produce 240 small satellites per year. In April, Andrew Jones at SpaceNews reported that China is developing plans to quickly produce and loft a thirteen thousand-satellite national internet megaconstellation. It is not unreasonable to assume that China could manufacture two hundred small rendezvous ASAT spacecraft by 2029, possibly more. If this happens, and Beijing was to decide in 2029 to launch these two hundred small RPO spacecraft and position them in close proximity to strategically vital assets, then**China would be able to simultaneously threaten disablement of the entire constellations of U.S.satellites for missile early warning**(about a dozen satellites with spares included); **communications**in a nuclear-disrupted environment (about a dozen); **and positioning, navigation, and timing** (about three dozen); along with several dozen key communications, imagery, and meteorology satellites. **Losing these assets would severely degrade** U.S. **deterrence** and warfighting capabilities, yet once close pre-positioning has occurred such losses become almost impossible to prevent. For this reason,such **pre-positioning could conceivably deter the United States from coming to Taiwan’s aid** due to the prospect that intervention would spur China to disable these critical space systems. Without their support,the war would be much bloodier and costlier—a daunting proposition for any president. Should the United States fail to intervene, the **consequences would be disastrous for both Washington and its allies**

**in East Asia, and potentially the credibility of U.S. defense commitments around the globe. Worse yet,** however, might be what could happen if China believes that such a threat will succeed but proves to be wrong. History is rife with examples of **major wars arising from miscalculati**ons such as this, and there are many pathways by which such a situation **could easily escalate** out of control to a full-scale conventional conflict or even **to nuclear use**.

## C6: Korean War

#### South Korea has started a new space race fueled by the private sector

Si-Soo 21 [Park Si-Soo, 9-8-2021, Park Si-soo covers space industries in South Korea, Japan and other Asian countries. Park worked at The Korea Times — South Korea's leading English language newspaper — from 2007 to 2020. He earned a master’s degree in science journalism from Korea Advanced Institute of Science and Technology and a bachelor’s degree in business from Hanyang University. "South Korea to spend $593 million on public-to-private transfer of rocket technologies," SpaceNews, https://spacenews.com/south-korea-to-spend-593-million-on-public-to-private-transfer-of-rocket-technologies/ accessed 1/12/2022] Adam/ Recut SAO 2/26/22

SEOUL, South Korea – Starting next year, South Korea’s government will transfer state-owned space launch vehicle technologies to domestic aerospace companies in a move to help them penetrate an expanding global space launch market. To that end, the government will spend 687 billion won ($593 million) from 2022 through 2027, said the Ministry of Science and ICT, Sept. 7. Korea Aerospace Research Institute (KARI) — a state-run space technology developer that has played a central role in developing the nation’s first domestic space launch vehicle, KSLV-2 — will be responsible for the public-to-private transfer, according to the ministry. KSLV-2, nicknamed Nuri, is a three-stage liquid-propellant rocket capable of sending a 1.5-ton satellite into low Earth orbit. The rocket is set to make its first demonstration flight in October from Naro Space Center in Goheung, the only launch site in South Korea. The transfer will be done in a way KARI and selected companies do joint development and launch tests. “The time has come to make a departure from state-led development of space launch vehicles toward one in which the private sector plays an expanded and more active role,” said Yong Hong-taek, the science ministry’s vice minister, in the statement. The policy reconfirms the government’s commitment to accelerating public-to-private transfer of space technologies. It comes as SpaceX and other innovative private companies play increasingly important roles in the global space industry. In the first move of this kind, since May, KARI and Korea Advanced Institute of Science and Technology (KAIST) have transferred their satellite-manufacturing technologies to a handful of major aerospace companies here. While the science ministry didn’t identify the companies that would benefit from the latest tech transfer, the most likely beneficiaries include [Hanwha Aerospace](https://spacenews.com/hanwha-aerospace-bets-big-on-space-business/), [Innospace](https://biz.chosun.com/industry/company/2021/08/26/B73DAPWKMBFAHCPFK2ME6NM6H4/?utm_source=naver&utm_medium=original&utm_campaign=biz), [Perigee Aerospace](https://spacenews.com/backed-by-samsung-south-korean-startup-perigee-aims-for-2020-maiden-launch/) and [Korean Air](https://spacenews.com/south-koreas-top-airline-to-develop-propellant-tank-for-smallsat-launcher/). Hanwha is a major rocket engine developer here, which contributed to KSLV-2’s development with engine assembly and supply of key components. Innospace is a hybrid rocket startup, and Perigee is developing a methane-fueled smallsat launcher. Korea Air, South Korea’s biggest airline, is developing technologies to launch small satellites from its Boeing 747-400 cargo planes — the same way Virgin Orbit launches customers’ satellites into orbit.

**North Korea sees rocket launches as a double standard – that emboldens the regime and increases aggression.**

Parry 21 [Richard Lloyd Parry, Richard Lloyd Parry has lived since 1995 in Tokyo, where he is the Asia editor of The Times. He has reported from 29 countries, including Afghanistan, Iraq and North Korea, and has been named Foreign Correspondent of the Year Asia Editor, 10-21-2021, "South Korea heightens tensions with space launch," The Times, https://www.thetimes.co.uk/article/south-korea-heightens-tensions-with-space-launch-jb8mnwwdp accessed 1/12/2022] Adam Recut 2/26/22 SAO

South Korea launched a domestically built rocket into space today in a breakthrough that will embolden North Korean accusations of hypocrisy. The three-stage KSLV-II Nuri entered orbit after being launched from the Naro Space Centre on a small island off the country’s southwest coast, although it failed in its final task — putting into orbit a dummy satellite. Even so, it was a welcome half-success after years of setbacks and failures. The mission is likely to be seized upon by [North Korea](https://archive.is/o/a0crs/https:/www.thetimes.co.uk/article/north-korea-demands-end-to-joint-military-exercises-amid-further-missile-tests-hgwhg3jwf) as an example of double standards. Beginning in 1998 the North fired off a series of what it called civilian rockets, which were denounced by the US and South Korea as a front for developing long-range missiles. These predictions turned out to be correct and North Korea now has an arsenal of ballistic missiles, including weapons with the range to potentially strike the mainland United States. South Korea says its programme is intended for nothing more than launching civilian satellites. It was a nervous day for South Korea. In 2010 an earlier version of the Nuri exploded two minutes after take off, and until this afternoon the failure rate for the country’s rockets was 70 per cent. The launch was postponed by an hour as engineers checked valves in the rocket — among its three million separate parts. But just after 5pm local time the Nuri lifted off smoothly into clear skies and jettisoned its first and second stages on schedule. The launch confirms South Korea as only the seventh country in the world to have developed a domestic space vehicle that can carry a payload heavier than a tonne, after China, France, India, Japan, Russia and the United States. However, Nuri failed to launch its 1.5-tonne dummy satellite of steel and aluminium, which was supposed to have been placed into a low earth orbit of 600km to 800km. “It’s very difficult for newcomers to achieve this,” President Moon said at the Space Centre after the launch. “But we achieved it, with no help from other countries.” A version of the Nuri was successfully launched in 2013, though its first stage was manufactured in Russia. There is no immediate prospect that South Korea will convert its rocket technology to military use. It already has short and medium-range ballistic missiles although it is bound by an agreement with its US ally to limit these in range to 800km. Last month South Korea joined the small group of countries able to fire ballistic missiles from a submarine. With a range of 500km, the Hyunmoo 4-4 missile fired from a 3,000-tonne Dosan Ahn Chang-ho class submarine has all of North Korea within its range. But when North Korea carried out its [own submarine missile launch](https://archive.is/o/a0crs/https:/www.thetimes.co.uk/article/north-korea-tests-unidentifed-ballistic-missile-lw5fh0t8k) this week, the South expressed its “regret” and the US condemned the action. “To criticise [North Korea] for developing and test-firing the same weapon system as the one the US possesses or is developing is a clear expression of double standards and it only excites our suspicion about the ‘authenticity’ of its statement that it does not antagonise [North Korea],” a spokesman in Pyongyang said.

#### South Korean space rocket development increases misperceptions

Panda 20 (, A., 2020. Solid Ambitions: The U.S.–South Korea Missile Guidelines and Space Launchers. [online] Carnegie Endowment for International Peace. Available at: <https://carnegieendowment.org/2020/08/25/solid-ambitions-u.s.-south-korea-missile-guidelines-and-space-launchers-pub-82557> [Accessed 13 January 2022] rahulpenu Accessed 2/26/22 SAO

Solid Ambitions: The U.S.–South Korea Missile Guidelines and Space Launchers Seoul’s missile activities have long been constrained by decades-old limits that South Korea agreed on with its longtime ally, the United States. At various junctures, these limits have gradually been loosened, though the latest such change may not upset the regional security balance as much as it may appear to at first blush. Most recently, following nine months of negotiations, the United States and South Korea agreed to further revise these bilateral missile guidelines in the summer of 2020. On July 28, 2020, South Korean Deputy National Security Adviser Kim Hyun-chong announced that, pursuant to the newly agreed revisions, South Korean individuals and entities will be, for the first time, capable of “developing, producing, and possessing” space launch vehicles (SLVs) making use of solid rocket motors without restrictions. Kim went on to announce, “As of July 28, 2020, limits on the use of solid fuel in space launch vehicles are completely removed.” The decision opens a new era for South Korean space launch activities and has raised questions about possible military applications for large-diameter solid rocket boosters. While these technologies hold economic promise for a country that seeks to scale its space program quickly, they can also contribute to a long-range missile program. Ballistic missiles that use solid propellants are generally more operationally nimble than their liquid-propellant counterparts and, as a result, can be more militarily useful. The revised guidelines were announced during the start of a new era of possible missile proliferation in the Asia-Pacific region, and these revisions coincide with a deteriorating geopolitical environment amid growing U.S.-China frictions. Moscow’s and Washington’s scrapping of the 1987 Intermediate-Range Nuclear Forces Treaty in 2019 has introduced the possibility of new U.S. short- and intermediate-range conventional missile deployments in Asia.[1] Meanwhile, Japan and Australia are both exploring standoff strike capabilities to better deter perceived threats, China continues to expand its large arsenal of conventional and dual-capable missiles, and North Korea keeps on qualitatively refining and quantitatively expanding its missile capabilities. The revised U.S.–South Korea guidelines have sparked some concerns that Seoul may harbor other motives beyond facilitating civilian spacefaring activities and that this revision may ultimately set up Seoul for a longer-range, more capable missile arsenal. But a closer look at South Korea’s objectives suggests the July 2020 guideline revisions are not what should really draw attention. Instead, Seoul’s indigenous ballistic missile programs, which have continued apace under gradually slackening bilateral guidelines over the years, should be the primary focus. South Korea’s Agency for Defense Development (ADD) is already pursuing capabilities, within the confines of a prior revision to the guidelines, that open up new missile possibilities for Seoul and that may heighten the odds of misperceptions in the region. EARLIER REVISIONS TO THE GUIDELINES The U.S.–South Korea missile guidelines have been revised before. The July 2020 decision represents the third significant revision to the forty-one-year-old guidelines—originally agreed upon in a classified 1979 bilateral understanding—in the last decade. In 2012, a previous conservative South Korean government, led by then president Lee Myung-bak, clinched an agreement allowing Seoul to develop ballistic missiles capable of delivering 500-kilogram payloads to ranges of up to 800 kilometers (sufficient to strike all of North Korea from Daegu, a southern city in South Korea). Seoul had requested the range extension to augment its autonomous strike capabilities following twin provocations in 2010: a North Korean torpedo sunk a South Korean corvette, ROKS Cheonan, and North Korean artillery shelled the South Korean–controlled Yeonpyeong Island. The 2012 revision followed a 2001 extension of the original 180-kilometer range limit to 300 kilometers. This earlier revision was linked to Seoul’s accession to the Missile Technology Control Regime (MTCR), a cartel of states capable of producing technologies necessary for manufacturing advanced ballistic missiles; at that time, this revised limit matched the regime’s Category I range and payload limits. Fast-forwarding to the near present, in 2017, the administration of U.S. President Donald Trump, amid breakneck North Korean qualitative advances in missile technology, reached an agreement with South Korean President Moon Jae-in’s administration to eliminate the payload weight limit entirely while maintaining the 800-kilometer missile range restriction. Yet none of these revisions had affected South Korea’s space launch technologies—until the July 2020 announcement. SOUTH KOREAN SOLID PROPELLANTS Until now, South Korean indigenous SLVs have relied on liquid-bipropellant combinations that would be poorly suited for anything but orbital launches. For instance, the Korea Aerospace Research Institute’s (KARI) Nuri, also known as Korea Satellite Launch Vehicle-II (KSLV-II), employs liquid oxygen (LOX) and a kerosene variant as its oxidizer-fuel combination across all three missile stages. Cryogenic liquid oxidizers, like LOX, have several advantages, but major operational drawbacks in terms of their handling and storage have kept them from being used in modern ballistic missiles. First-generation U.S. and Soviet intercontinental ballistic missiles (ICBMs)—like the Atlas and the R-7, for instance—employed LOX, but their successors quickly moved to noncryogenic hypergolic liquid bipropellants before eventually settling on solid propellants. Solid propellants for long-range, large-diameter rockets have a similar appeal when used for orbital and suborbital applications whether they are employed for civilian or military purposes. With the fuel cast directly into their airframes, solid rocket motors can be readied for use with considerably less pre-launch preparation, assuming proper handling and storage. (Proper storage and transportation of solid rocket motors are nontrivial considerations.) This characteristic makes solid propellants often preferable for military applications—especially for small-diameter missiles. Solid fuels do have their drawbacks, however. For instance—unlike liquid-propellant engines, which can be remotely shut off—once ignited, solid-fuel engines will burn until all available fuel is consumed. Seoul’s presented rationale for pursuing solid-propellant SLVs does not rule out the possibility that new solid boosters may eventually be used as ballistic missiles, but the main focus for now is on enabling cheaper surveillance satellite launches. Kim, South Korea’s deputy national security adviser, was quite open in his July press conference that Seoul envisages potentially using new, solid-propellant orbital launchers to send observation satellites into low-Earth orbit. “Theoretically, we can launch a low-Earth orbit satellite via liquid-fuel rockets, but it’s like delivering a dish of jjajangmyeon [a Korean noodle dish] by [way of] a 10-ton truck,” he added, apparently seeking to make the case for the economical nature of delivering smaller payloads in this manner. This point bears emphasizing: it can be more economical for a space program to scale around solid rocket boosters, depending on the types of payloads and desired orbits. As South Korea looks to improve its indigenous intelligence, surveillance, and reconnaissance (ISR) capabilities against North Korea in the coming years, military surveillance satellites will come to play a more important role in South Korean military planning. Such capabilities are also an important barometer for facilitating larger alliance goals, namely the transfer of wartime operational control (OPCON) from the U.S. military to South Korea’s own forces. The South Korean forces under the alliance’s Combined Forces Command have been led by U.S. military generals for some time, but Seoul has long aspired to regain the operational prerogative to lead these forces on South Korean soil in wartime. One of the conditions for such a transfer is that the South Korean military meet certain benchmarks when it comes to its military capabilities. Addressing this point, Kim was open about Seoul’s desire to deploy such satellites into low-Earth orbit, but he also made clear that existing liquid propellant–based launch vehicles are uneconomical for this application. South Korea’s strategic goal, per Kim, is to realize persistent space-based surveillance of North Korea, granting Seoul what he referred to as an “unblinking eye.” In July 2020, the commercial firm SpaceX launched South Korea’s first exclusive military communications satellite, the Army Navy Air Force Satellite Information System-II (ANASIS-II). Other countries make varied use of solid-propellant SLVs for varied payload delivery to low-Earth orbit when conducting commercial and state-run space activities. Liquid-propellant boosters can be more energetic and efficient, so they tend to be favored for most missions. In the United States, repurposed solid-fueled LGM-118 Peacekeeper ICBMs are used for delivering certain government payloads to low-Earth orbit. Similarly, China’s Kuaizhou-11 program is somewhat unique in how it uses a vehicle called a transporter erector launcher to facilitate mobile launches of light satellites (an approach that could be employed for purposes such as enabling the rapid replacement of satellites that may be lost to anti-satellite weapons during a conflict). Future launches of surveillance satellites would reduce Seoul’s dependence on U.S. technical surveillance capabilities to monitor North Korean activities and help the South Korean military achieve conditions-based OPCON transfer.[2] (After several delays, the current timeline for such a transfer is set for 2022.) Shortly before the announcement of the updated guidelines, U.S. Secretary of Defense Mark Esper and his South Korean counterpart Jeong Kyeong-doo “expressed their unwavering support for a conditions-based OPCON transition, consistent with the bilaterally-agreed Conditions-Based OPCON Transition Plan,” according to a Pentagon statement. The latest July 2020 revision to the guidelines will facilitate these goals and was largely driven by Seoul’s space-based ISR ambitions. However, some analysis on the latest revision suggests that Seoul may now seek to build larger-diameter, longer-range solid-propellant rockets to possibly hold at risk targets in North Korea and perhaps even in China. North Korea historically has been and continues to be the primary driver of South Korea’s missile program. During previous rounds of bilateral consultations with the United States, South Korean officials sought to ideally win approval to possess 1,000-kilometer-range missiles—capable of reaching almost all of North Korea from the island of Jeju off the southernmost tip of South Korea. New, heavy-payload ballistic missiles already in development could range much farther than 800 kilometers with a lighter payload, so South Korea already technically possesses the capability to reach all of North Korea with a 500-kilogram payload. The chief constraint preventing Seoul from officially unveiling and deploying this capability remains the bilateral missile guidelines. Although Seoul could repurpose these capabilities to hold at risk targets in northern China and parts of eastern China, South Korea holds quite nuanced views of China and does not view it as a major categorical threat, making this outcome unlikely. NEW SOUTH KOREAN BALLISTIC MISSILE DEVELOPMENTS What should moderate any immediate concerns on the possible consequences of South Korea’s shift to solid-propellant SLVs is the primary concern hiding in plain sight. South Korea continues to develop solid-propellant ballistic missiles that are already capable of not only reaching all of North Korea but of doing so with heavy conventional payloads. The Hyunmoo-4 is an 800-kilometer-range system that entered testing for the first time earlier in 2020. Moon applauded it recently for exhibiting “close to the world’s heaviest warhead weight,” making full use of the 2017 update to the missile guidelines. While this missile is thought to feature a 2,000-kilogram payload, if it were to be launched with a payload half that weight, the Hyunmoo-4 would perform as a medium-range missile (using the U.S. government definition of missiles with ranges between 1,000 and 3,000 kilometers). Little is known authoritatively about the Hyunmoo-4 beyond the fact that it entered testing this year. Its reported payload weight has appeared in multiple South Korean press reports and is consistent with the general direction of the Hyunmoo program under ADD’s auspices. For instance, the Hyunmoo-2C—also an 800-kilometer-range system, but with a smaller payload—was publicized during testing in 2017 at the height of tensions on the Korean Peninsula. ADD emphasized the system’s earth-penetrating warhead and its precision. The suggestion was that this capability would be useful in striking tunnel-based missile launchers, hardened command-and-control targets in North Korea, or perhaps even Kim Jong Un himself. The Hyunmoo-4 appears to be a bigger and more explosive version of the Hyunmoo-2C: this new model is capable of executing that same mission against ever-harder targets that would necessitate more explosive power. In the near term, South Korea is likely to continue investing in the Hyunmoo-4 program. This system represents the most serious challenge to the spirit of the principles that drove the missile guidelines, which were first implemented in 1979 and were primarily concerned with building confidence that South Korea could not build plausible nuclear-delivery systems. (Seoul’s indigenous nuclear weapons program had ended in the mid-1970s.) The guidelines were designed—and updated in 2001 and 2012—with the understanding that it is reasonable to control missile capabilities by manipulating either payload or range limits. For a given payload constraint (500 kilograms, for example), extending range limits would allow Seoul to develop new boosters, but only to a point. With the scrapping of payload limits altogether in 2017, the Hyunmoo-4 was allowed to surface, raising the specter of possible longer-range South Korean systems. Seoul’s apparent acquisition of some components from older Russian ICBMs has left lingering concerns that South Korea may seek longer-range missile capabilities. In today’s context, these concerns deserve to be taken seriously. Although South Korea continues to abide by its obligations under the Nuclear Non-Proliferation Treaty, and though its government leaders do not seek nuclear weapons, the growth of North Korean nuclear capabilities in the last five years combined with growing unease about the credibility of U.S. alliance assurances in the Trump era have renewed debates in Seoul on pursuing nuclear weapons capabilities in the future. The military balance on the Korean Peninsula has changed dramatically since 1979, when South Korea’s missile ambitions outranged those of North Korea, which at the time had yet to flight-test its first Scud missiles. Despite this—in the spirit of the original 1979 guidelines, which sought to assuage concerns about South Korean nuclearization in the 1970s—Seoul should transparently help build confidence that its existing missile programs are no cause for concern beyond contributing to necessary conventional deterrence vis-à-vis North Korea. This confidence building would have salutary effects on regional stability amid intensifying geopolitical competition between the United States and China. NEXT STEPS South Korea’s expanding space launch ambitions, sealed by the July 2020 revisions to the bilateral missile guidelines, need not heighten Northeast Asian insecurity. Seoul’s interest in more economical space launch activities and an expanded space-based layer of military surveillance is understandable. South Korean measures to increase transparency, however, could reduce the chance of misperceptions about Seoul’s intentions. Similarly, South Korea could help build confidence around its ongoing missile programs. To mitigate a worsening security dilemma with Pyongyang and potentially Beijing, Seoul should declare the scope of applications for government-sponsored research and development in larger solid rocket boosters. While publicizing existing capabilities, like the Hyunmoo-4, may be undesirable due to the current South Korean government’s inter-Korean diplomatic efforts, Seoul can do so without provocative messaging (such as threatening North Korea with decapitation attacks or strikes on hardened military sites). Beyond this, South Korea should also transparently release plans for specific KARI-led civilian spacefaring projects and military satellites that may make use of larger solid-propellant boosters. Such transparency would reinforce Seoul’s stated plans and build confidence. At a higher level, the South Korean government should take steps to clarify its ongoing commitment to the terms of the MTCR and the Hague Code of Conduct Against Ballistic Missile Proliferation. Meanwhile, as testing of the Hyunmoo-4 continues, South Korea should limit development on larger payload conventional missiles that could technically be compliant with the 800-kilometer-range restriction in the bilateral missile guidelines. Separately, the United States and South Korea should work to build confidence in the region that the 2017 and 2020 changes to the guidelines will not adversely affect regional stability. To this end, they should open an ongoing bilateral consultative review of the missile guidelines. While Seoul is not seeking further changes to the guidelines, it would be productive for the allies to establish a semiannual or quarterly review of the guidelines and discuss related matters, including any issues of concern stemming from South Korean missile activities and civilian rocket research. South Korea has seen its security environment deteriorate sharply over the last decade as its northern neighbor has reached significant missile and nuclear milestones. Meanwhile, political malaise over cost-sharing has begun to seep into the foundations of the bilateral alliance with the United States since 2017. In this environment, precision strike missiles and a robust, indigenous space-based constellation of military surveillance satellites can plug important perceived gaps in conventional deterrence and even hedge against plausible shifts in how the United States postures its forces on the Korean Peninsula. But Seoul’s ability to now use solid-propellant boosters to deliver satellite payloads to low-Earth orbit should not be the primary concern in the short term. Given the already impressive capabilities embodied in the Hyunmoo-4 and its predecessor, South Korea has already made itself stand out as a leader in missile technology. But as Seoul embarks into a new era as a spacefaring nation, it should take precautions to dispel concerns about its intentions and work to build confidence while practicing effective deterrence against North Korea.

#### Millions would die from a North Korean attack

Zagurek 17 - Michael Zagurek Jr., Writing for The US-Korean Institute, October 4th, 2017 “A Hypothetical Nuclear Attack on Seoul and Tokyo: The Human Cost of War on the Korean Peninsula” [http://www.38north.org/2017/10/mzagurek100417/] Accessed 10/5/17 SAO

At various times over the past few weeks, US President Donald Trump and other members of his administration have threatened to use military force to prevent North Korea from conducting additional nuclear or ballistic missile tests. The US carrying out any military option raises a significant risk of military escalation by the North, including the use of nuclear weapons against South Korea and Japan. According to the calculations presented below, if the “unthinkable” **happened,** nuclear detonations over Seoul and Tokyo **with North** Korea’s current estimated weapon yields could result in as many as 2.1 million fatalities and 7.7 million injuries.