### AC – Plan

#### Plan – states ought to ban the appropriation of outer space for mining activities by private entities.

#### Normal means is ratification of the Moon Treaty

**Mallick and Rajagopalan 19** [(Senjuti Mallick, graduated from ILS Law College, Pune, in 2016. She was a Law Researcher at the High Court of Delhi from 2016 to 2018 and is currently pursuing LL.M in International Law at The Fletcher School of Law and Diplomacy, USA. She has been doing research on Outer Space Law since she was a student at ILS. Presently, she is working on different aspects of Space Law, in particular, Space debris mitigation and removal, and the law of the commons. She has published articles on Space Law in the All India Reporter Law Journal and The Hindu.)( Dr Rajeswari (Raji) Pillai Rajagopalan is the Director of the Centre for Security, Strategy and Technology (CSST) at the Observer Research Foundation, New Delhi.  Dr Rajagopalan was the Technical Advisor to the United Nations Group of Governmental Experts (GGE) on Prevention of Arms Race in Outer Space (PAROS) (July 2018-July 2019).  She was also a Non-Resident Indo-Pacific Fellow at the Perth USAsia Centre from April-December 2020.  As a senior Asia defence writer for The Diplomat, she writes a weekly column on Asian strategic issues.) “If space is ‘the province of mankind’, who owns its resources?” Occasional Papers, January 24, 2019, https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/] TDI   
A third possible option is to get a larger global endorsement of the Moon Treaty, which highlights the common heritage of mankind. The Moon Treaty is important as it addresses a “loophole” of the OST “by banning any ownership of any extraterrestrial property by any organization or private person, unless that organization is international and governmental.”[[lxiv]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn64) But the fact that it has been endorsed only by a handful of countries makes it a “failure” from the international law perspective.[[lxv]](https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/#_edn65) Nevertheless, efforts must be made to strengthen the support base for the Moon Agreement given the potential pitfalls of resource extraction and space mining activities in outer space. Signatories to the Moon Treaty can take the lead within multilateral platforms such as the UN to debate the usefulness of the treaty in the changed context of technological advancements and new geopolitical dynamics, and potentially find compromises where there are disagreements.

### 1AC – Framing

***Only* pleasure and pain are intrinsically valuable.**

**Moen 16** [Ole Martin Moen, Research Fellow in Philosophy at University of Oslo “An Argument for Hedonism” Journal of Value Inquiry (Springer), 50 (2) 2016: 267–281] SJDI

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

#### Thus, the standard is maximizing expected well-being – prefer:

#### 1] Actor specificity

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

#### B] States lack wills or intentions since policies are collective actions. Actor-specificity comes first since different agents have different ethical standings. Link turns calc indites because the alt would be *no* action.

#### 2] **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.**

#### 3] Only consequentialism explains degrees of wrongness—if I break a promise to meet up for lunch, that is not as bad as breaking a promise to take a dying person to the hospital via intuitions. Intuitions outweigh—they’re the foundational basis for any argument and theories that contradict our intuitions are most likely false even if we can’t deductively determine why.

#### Existential risks outweigh.

Farquhar et al. 17 – Sebastian Farquhar, Computer Science DPhil Student at the University of Oxford. John Halstead, Political Philosophy DPhil at the University of Oxford. Dr. Owen Cotton-Barratt, Pure Math DPhil at the University of Oxford. Dr. Stefan Schubert, Philosophy PhD at Lund University. Haydn Belfield, a BA. Andrew Snyder-Beattie, Philosophy PhD Student at the University of Oxford. [Existential Risk: Diplomacy and Governance, Global Priorities Project, 1-23-17, [https://www.fhi.ox.ac.uk/wp-content/uploads/Existential-Risks-2017-01-23.pdf]//BPS](https://www.fhi.ox.ac.uk/wp-content/uploads/Existential-Risks-2017-01-23.pdf%5d//BPS)

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.66 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.67 Of course, there is persisting reasonable disagreement about ethics and there are a number of ways one might resist this conclusion.68 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.69 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.70 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.71 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.72 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.73 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. 74 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 are likely to affect the evaluation of existential risks.75

#### Util is good – existential threats outweigh

**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**.65 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.66 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.67 Of course, there is persisting reasonable disagreement about ethics and there are a number of ways one might resist this conclusion.68 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.69 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.70 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.71 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.72 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. 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### AC – Debris Advantage

#### Private space mining and ownership allowed now

Williams 20 [(Matt Williams, Reporter) “Trump signs an executive order allowing mining the moon and asteroids,” Phys Org, April 13, 2020, <https://phys.org/news/2020-04-trump-moon-asteroids.html>] TDI

Trump signs an executive order allowing mining the moon and asteroids

In 2015, the Obama administration signed the [U.S. Commercial Space Launch Competitiveness Act](https://www.congress.gov/bill/114th-congress/house-bill/2262/text) (CSLCA, or H.R. 2262) into law. This bill was intended to "facilitate a pro-growth environment for the developing commercial space industry" by making it legal for American companies and citizens to own and sell resources that they extract from asteroids and off-world locations (like the moon, Mars or beyond).

On April 6th, the Trump administration took things a step further by signing an [executive order](https://www.space.com/trump-moon-mining-space-resources-executive-order.html) that formally recognizes the rights of private interests to claim resources in [space](https://phys.org/tags/space/). This order, titled "[Encouraging International Support for the Recovery and Use of Space Resources](https://www.whitehouse.gov/presidential-actions/executive-order-encouraging-international-support-recovery-use-space-resources/)," effectively ends the decades-long debate that began with the signing of [the Outer Space Treaty](https://www.universetoday.com/20590/moon-for-sale/) in 1967.

#### New investments coming and companies are launching – economic incentives make it alluring

Tosar 20 [(Borja Tosar, reporter) “Asteroid Mining: A New Space Race,” OpenMind BBVA, May 18, 2020, <https://www.bbvaopenmind.com/en/science/physics/asteroid-mining-a-new-space-race/>] TDI

This is not science fiction. There are now space mining companies, such as [Planetary Resources,](https://www.consensys.space/pr) which has already launched several mini-satellites to test several of its patents. Other companies like [Asteroid Mining Corporation](https://asteroidminingcorporation.co.uk/) or [Trans Astronautica Corporation,](https://www.transastracorp.com/) although still far from their goal, are already attracting millions of dollars of private investment interested in being on the front line of a possible future space business.

Is asteroid mining possible? This new space race already began back when the Hayabusa missions successfully returned a few grams of an asteroid’s regolith, so the technology to harvest asteroid material exists, we just have to change the scale. It is no longer a technological problem.

Is it economically viable? We are increasingly dependent on rare elements (such as those in the palladium group), which are expensive to exploit on Earth and come with a high environmental cost, so the sum of these two factors could make it profitable to travel to the asteroids to extract these raw materials. Astrophysicist Neil deGrasse argues that [the planet’s first trillionaire will undoubtedly be a space miner.](https://www.cnbc.com/2015/05/01/build-the-economy-here-on-earth-by-exploring-space-tyson.html)

#### Asteroid mining spikes the risk of satellite-dust collisions

Scoles 15 [(Sarah Scoles, freelance science writer, contributor at Wired and Popular Science, author of the books Making Contact and They Are Already Here) “Dust from asteroid mining spells danger for satellites,” New Scientist, May 27, 2015, <https://www.newscientist.com/article/mg22630235-100-dust-from-asteroid-mining-spells-danger-for-satellites/>] TDI

* Study this is citing – Javier Roa, Space Dynamic Group, Applied Physics Department, Technical University of Madrid. Casey J Handmer, Theoretical Astrophysics, California Institute of Technology. Both PhD Candidates. “Quantifying hazards: asteroid disruption in lunar distant retrograde orbits,” arXiv, Cornell University, May 14, 2015, <https://arxiv.org/pdf/1505.03800.pdf>

NASA chose the second option for its [Asteroid Redirect Mission](http://www.nasa.gov/content/what-is-nasa-s-asteroid-redirect-mission/), which aims to [pluck a boulder from an asteroid’s surface](https://www.newscientist.com/article/dn27243-rock-grab-from-asteroid-will-aid-human-mission-to-mars) and relocate it to a stable orbit around the moon. But an asteroid’s gravity is so weak that it’s not hard for surface particles to escape into space. Now a new model warns that debris shed by such transplanted rocks could intrude where many defence and communication satellites live – in geosynchronous orbit.

According to [Casey Handmer](http://www.caseyhandmer.com/) of the California Institute of Technology in Pasadena and Javier Roa of the Technical University of Madrid in Spain, 5 per cent of the escaped debris will end up in regions traversed by satellites. Over 10 years, it would cross geosynchronous orbit 63 times on average. A satellite in the wrong spot at the wrong time will suffer a damaging high-speed collision with that dust.

The study also looks at the “catastrophic disruption” of an asteroid 5 metres across or bigger. Its total break-up into a pile of rubble would increase the risk to satellites by more than 30 per cent ([arxiv.org/abs/1505.03800](http://arxiv.org/abs/1505.03800)).

#### Space dust wrecks satellites and debris exponentially spirals

Intagliata 17 [(Christopher Intagliata, MA Journalism from NYU, Editor for NPRs All Things Considered, Reporter/Host for Scientific American’s 60 Second Science) “The Sneaky Danger of Space Dust,” Scientific American, May 11, 2017, <https://www.scientificamerican.com/podcast/episode/the-sneaky-danger-of-space-dust/>] TDI

When tiny particles of space debris slam into satellites, the collision could cause the emission of hardware-frying radiation, Christopher Intagliata reports.

Aside from all the satellites, and the space station orbiting the Earth, there's a lot of trash circling the planet, too. Twenty-one thousand [baseball-sized chunks](https://www.scientificamerican.com/article/orbital-debris-space-fence/) of debris, [according to NASA](https://www.orbitaldebris.jsc.nasa.gov/faq.html). But that number's dwarfed by the number of small particles. There's hundreds of millions of those.

"And those smaller particles tend to be going fast. Think of picking up a grain of sand at the beach, and that would be on the large side. But they're going 60 kilometers per second."

Sigrid Close, an applied physicist and astronautical engineer at Stanford University. Close says that whereas mechanical damage—like punctures—is the worry with the bigger chunks, the dust-sized stuff might leave more insidious, invisible marks on satellites—by causing electrical damage.

"We also think this phenomenon can be attributed to some of the failures and anomalies we see on orbit, that right now are basically tagged as 'unknown cause.'"

Close and her colleague Alex Fletcher modeled this phenomenon mathematically, based on plasma physics behavior. And here's what they think happens. First, the dust slams into the spacecraft. Incredibly fast. It vaporizes and ionizes a bit of the ship—and itself. Which generates a cloud of ions and electrons, traveling at different speeds. And then: "It's like a spring action, the electrons are pulled back to the ions, ions are being pushed ahead a little bit. And then the electrons overshoot the ions, so they oscillate, and then they go back out again.”

That movement of electrons creates a pulse of electromagnetic radiation, which Close says could be the culprit for some of that electrical damage to satellites. The study is in the journal Physics of Plasmas. [Alex C. Fletcher and Sigrid Close, [Particle-in-cell simulations of an RF emission mechanism associated with hypervelocity impact plasmas](http://aip.scitation.org/doi/full/10.1063/1.4980833)]

#### Scenario 1 is Climate

#### Earth observation satellites key to warming adaptation

* Monitoring deforestation/ice caps
* ECV essential climate variables

Alonso 18 [(Elisa Jiménez Alonso, communications consultant with Acclimatise, climate resilience organization) “Earth Observation of Increasing Importance for Climate Change Adaptation,” Acclimatise, May 2, 2018, <https://www.acclimatise.uk.com/2018/05/02/earth-observation-of-increasing-importance-for-climate-change-adaptation/>] TDI

Earth observation (EO) satellites are playing an increasingly important role in assessing climate change. By providing a constant and consistent stream of data about the state of the climate, EO is not just improving scientific outcomes but can also inform climate policy.

Managing climate-related risks effectively requires accurate, robust, sustained, and wide-ranging climate information. Reliable observational climate data can help scientists test the accuracy of their models and improve the science of attributing certain events to climate change. Information based on projections from models and historic data can help decision makers plan and implement adaptation actions.

Providing information in data-sparse regions

Ground-based weather and climate monitoring systems only cover about 30% of the Earth’s surface. In many parts of the world such data is incomplete and patchy due to poorly maintained weather stations and a general lack of such facilities.

EO satellites and rapidly improving satellite technology, especially data from open access programmes, offer a valuable source information for such data-sparse regions. This is especially important since countries and regions with a lack of climate data are often particularly vulnerable to climate change impacts.

International efforts for systematic observation

The importance of satellite-based observations is also recognised by the international community. Following the recommendations of the World Meteorological Organization’s (WMO) Global Climate Observing System (GCOS) programme, the UNFCCC strongly encourages countries that support space agencies with EO programmes to get involved in GCOS and support the programme’s implementation. The Paris Agreement highlights the need for and importance of effective and progressive responses to the threat of climate change based on the best available scientific knowledge. This implies that climate knowledge needs to be strengthened, which includes continuously improving systematic observations of the Earth’s climate.

To meet the need of such systematic climate observations, GCOS developed the concept of the Essential Climate Variable, or ECV. According to WMO, an ECV “is a physical, chemical or biological variable or a group of linked variables that critically contributes to the characterization of Earth’ s climate.” In 2010, 50 ECVs which would help the work of the UNFCCC and IPCC were defined by GCOS. The ECVs, which can be seen below, were identified due to their relevance for characterising the climate system and its changes, the technical feasibility of observing or deriving them on a global scale, and their cost effectiveness.

The 50 Essential Climate Variables as defined by GCOS.

One effort supporting the systemic observation of the climate is the European Space Agency’s (ESA) Climate Change Initiative (CCI). The programme taps into its own and its member countries’ EO archives that have been established in the last three decades in order to provide a timely and adequate contribution to the ECV databases required by the UNFCCC.

Robust evidence supporting climate risk management

Earth observation satellites can observe the entire Earth on a daily basis (polar orbiting satellites) or continuously monitor the disk of Earth below them (geostationary satellites) maintaining a constant watch of the entire globe. Sensors can target any point on Earth even the most remote and inhospitable areas which helps monitor deforestation in vast tropical forests and the melting of the ice caps.

Without insights offered by EO satellites there would not be enough evidence for decision makers to base their climate policies on, increasing the risk of maladaptation. Robust EO data is an invaluable resource for collecting climate information that can inform climate risk management and make it more effective.

#### Warming causes extinction

Klein 14[(Naomi Klein, award-winning journalist, syndicated columnist, former Miliband Fellow at the London School of Economics, member of the board of directors of 350.org), *This Changes Everything: Capitalism vs. the Climate*, pp. 12-14]

In a 2012 report, the World Bank laid out the gamble implied by that target. “As global warming approaches and exceeds 2-degrees Celsius, there is a risk of triggering nonlinear tipping elements. Examples include the disintegration of the West Antarctic ice sheet leading to more rapid sea-level rise, or large-scale Amazon dieback drastically affecting ecosystems, rivers, agriculture, energy production, and livelihoods. This would further add to 21st-century global warming and impact entire continents.” In other words, once we allow temperatures to climb past a certain point, where the mercury stops is not in our control.¶ But the bigger problem—and the reason Copenhagen caused such great despair—is that because governments did not agree to binding targets, they are free to pretty much ignore their commitments. Which is precisely what is happening. Indeed, emissions are rising so rapidly that unless something radical changes within our economic structure, 2 degrees now looks like a utopian dream. And it’s not just environmentalists who are raising the alarm. The World Bank also warned when it released its report that “we’re on track to a 4-C warmer world [by century’s end] marked by extreme heat waves, declining global food stocks, loss of ecosystems and biodiversity, and life-threatening sea level rise.” And the report cautioned that, “there is also no certainty that adaptation to a 4-C world is possible.” Kevin Anderson, former director (now deputy director) of the Tyndall Centre for Climate Change, which has quickly established itself as one of the U.K’s premier climate research institutions, is even blunter; he says 4 degrees Celsius warming—7.2 degrees Fahrenheit—is “incompatible with an organized, equitable, and civilized global community.”¶ We don’t know exactly what a 4 degree Celsius world would look like, but even the best-case scenario is likely to be calamitous. Four degrees of warming could raise global sea levels by 1 or possibly even 2 meters by 2100 (and would lock in at least a few additional meters over future centuries). This would drown some island nations such as the Maldives and Tuvalu, and inundate many coastal areas from Ecuador and Brazil to the Netherlands to much of California and the northeastern United States as well as huge swaths of South and Southeast Asia. Major cities likely in jeopardy include Boston, New York, greater Los Angeles, Vancouver, London, Mumbai, Hong Kong, and Shanghai.¶ Meanwhile, brutal heat waves that can kill tens of thousands of people, even in wealthy countries, would become entirely unremarkable summer events on every continent but Antarctica. The heat would also cause staple crops to suffer dramatic yield losses across the globe (it is possible that Indian wheat and U.S. could plummet by as much as 60 percent), this at a time when demand will be surging due to population growth and a growing demand for meat. And since crops will be facing not just heat stress but also extreme events such as wide-ranging droughts, flooding, or pest outbreaks, the losses could easily turn out to be more severe than the models have predicted. When you add ruinous hurricanes, raging wildfires, fisheries collapses, widespread disruptions to water supplies, extinctions, and globe-trotting diseases to the mix, it indeed becomes difficult to imagine that a peaceful, ordered society could be sustained (that is, where such a thing exists in the first place).¶ And keep in mind that these are the optimistic scenarios in which warming is more or less stabilized at 4 degrees Celsius and does not trigger tipping points beyond which runaway warming would occur. Based on the latest modeling, it is becoming safer to assume that 4 degrees could bring about a number of extremely dangerous feedback loops—an Arctic that is regularly ice-free in September, for instance, or, according to one recent study, global vegetation that is too saturated to act as a reliable “sink”, leading to more carbon being emitted rather than stored. Once this happens, any hope of predicting impacts pretty much goes out the window. And this process may be starting sooner than anyone predicted. In May 2014, NASA and the University of California, Irvine scientists revealed that glacier melt in a section of West Antarctica roughly the size of France now “appears unstoppable.” This likely spells down for the entire West Antarctic ice sheet, which according to lead study author Eric Rignot “comes with a sea level rise between three and five metres. Such an event will displace millions of people worldwide.” The disintegration, however, could unfold over centuries and there is still time for emission reductions to slow down the process and prevent the worst. ¶ Much more frightening than any of this is the fact that plenty of mainstream analysts think that on our current emissions trajectory, we are headed for even more than 4 degrees of warming. In 2011, the usually staid International Energy Agency (IEA) issued a report predicting that we are actually on track for 6 degrees Celsius—10.8 degrees Fahrenheit—of warming. And as the IEA’s chief economist put it: “Everybody, even the school children, knows that this will have catastrophic implications for all of us.” (The evidence indicates that 6 degrees of warming is likely to set in motion several major tipping points—not only slower ones such as the aforementioned breakdown of the West Antarctic ice sheet, but possibly more abrupt ones, like massive releases of methane from Arctic permafrost.) The accounting giant PricewaterhouseCoopers as also published a report warning businesses that we are headed for “4-C , or even 6-C” of warming.¶ These various projections are the equivalent of every alarm in your house going off simultaneously. And then every alarm on your street going off as well, one by one by one. They mean, quite simply, that climate change has become an existential crisis for the human species. The only historical precedent for a crisis of this depth and scale was the Cold War fear that we were headed toward nuclear holocaust, which would have made much of the planet uninhabitable. But that was (and remains) a threat; a slim possibility, should geopolitics spiral out of control. The vast majority of nuclear scientists never told us that we were almost certainly going to put our civilization in peril if we kept going about our daily lives as usual, doing exactly what we were already going, which is what climate scientists have been telling us for years. ¶ As the Ohio State University climatologist Lonnie G. Thompson, a world-renowned specialist on glacier melt, explained in 2010, “Climatologists, like other scientists, tend to be a stolid group. We are not given to theatrical rantings about falling skies. Most of us are far more comfortable in our laboratories or gathering data in the field than we are giving interviews to journalists or speaking before Congressional committees. When then are climatologists speaking out about the dangers of global warming? The answer is that virtually all of us are now convinced that global warming poses a clear and present danger to civilization.”

#### Scenario 2 is Nuke War

#### Early warning satellites going dark signals attacks – causes miscalc and goes nuclear

Orwig 16 [(Jessica, MS in science and tech journalism from Texas A&M, BS in astronomy and physics from Ohio State) “Russia says a growing problem in space could be enough to spark a war,” Insider,’ January 26, 2016, <https://www.businessinsider.com/russia-says-space-junk-could-spark-war-2016-1>] TDI

NASA has already warned that the large amount of space junk around our planet is growing beyond our control, but now a team of Russian scientists has cited another potentially unforeseen consequence of that debris: War.

Scientists estimate that anywhere from 500,000 to 600,000 pieces of human-made space debris between 0.4 and 4 inches in size are currently orbiting the Earth and traveling at speeds over 17,000 miles per hour.

If one of those pieces smashed into a military satellite it "may provoke political or even armed conflict between space-faring nations," Vitaly Adushkin, a researcher for the Institute of Geosphere Dynamics at the Russian Academy of Sciences, reported in a paper set to be published in the peer-reviewed journal Acta Astronautica, which is sponsored by the International Academy of Astronautics.

Say, for example, that a satellite was destroyed or significantly damaged in orbit — something that a 4-inch hunk of space junk could easily do traveling at speeds of 17,500 miles per hour, Adushkin reported. (Even smaller pieces no bigger than size of a pea could cause enough damage to the satellite that it would no longer operate correctly, he notes.)

It would be difficult for anyone to determine whether the event was accidental or deliberate.

This lack of immediate proof could lead to false accusations, heated arguments and, eventually, war, according to Adushkin and his colleagues.

A politically dangerous dilemma

In the report, the Adushkin said that there have already been repeated "sudden failures" of military spacecraft in the last two decades that cannot be explained.

"So, there are two possible explanations," he wrote. The first is "unregistered collisions with space objects." The second is "machinations" [deliberate action] of the space adversary.

"This is a politically dangerous dilemma," he added.

But these mysterious failures in the past aren't what concerns Adushkin most.

It's a future threat of what experts call the cascade effect that has Adushkin and other scientists around the world extremely concerned.

The Kessler Syndrome

In 1978, American astrophysicist Donald Kessler predicted that the amount of space debris around Earth would begin to grow exponentially after the turn of the millennium.

Kessler 's predictions rely on the fact that over time, space junk accumulates. We leave most of our defunct satellites in space, and when meteors and other man-made space debris slam into them, you get a cascade of debris.

The cascade effect — also known as the Kessler Syndrome — refers to a critical point wherein the density of space junk grows so large that a single collision could set off a domino effect of increasingly more collisions.

For Kessler, this is a problem because it would "create small debris faster than it can be removed," Kessler said last year. And this cloud of junk could eventually make missions to space too dangerous.

For Adushkin, this would exacerbate the issue of identifying what, or who, could be behind broken satellites.

The future

So far, the US and Russian Space Surveillance Systems have catalogued 170,000 pieces of large space debris (between 4 and 8 inches wide) and are currently tracking them to prevent anymore dilemmas like the ones Adushkin and his colleagues cite in their paper.

But it's not just the large objects that concern Adushkin, who reported that even small objects (less than 1/3 of an inch) could damage satellites to the point they can't function properly.

Using mathematical models, Adushkin and his colleagues calculated what the situtation will be like in 200 years if we continue to leave satellites in space and make no effort to clean up the mess. They estimate we'll have:

1.5 times more fragments greater than 8 inches across

3.2 times more fragments between 4 and 8 inches across

13-20 times more smaller-sized fragments less than 4 inches across

"The number of small-size, non-catalogued objects will grow exponentially in mutual collisions," the researchers reported.

#### That triggers missile radars.

Hoots ’15 [Felix; Fall 2015; Distinguished Engineer in the System Analysis and Simulation Subdivision, Ph.D. in Mathematics from Auburn University, M.S. in Mathematics from Tennessee Tech University; Crosslink, “Keeping Track: Space Surveillance for Operational Support,” <https://aerospace.org/sites/default/files/2019-04/Crosslink%20Fall%202015%20V16N1%20.pdf>; RP]

The launch of Sputnik on October 4, 1957, marked the beginning of the Space Age. It also marked the beginning of an intense space race that brought a remarkable rate of rocket launches. In a very short time, the number of objects in orbit grew dramatically. This created a host of strategic challenges, including the need for space surveillance. In particular, the Air Force needed a way to prevent false alarms as satellites came within view of missile-warning radars, while the Navy needed a way to alert deployed units of possible reconnaissance by satellites overhead. These needs led to the establishment of a military mission to maintain a catalog of all Earth-orbiting objects—active payloads, rocket bodies, and debris—along with detailed information about trajectory and point of origin. Such a catalog could be used to filter normal orbital passages from potential incoming missiles and predict the passage of suspected spy satellites. The first catalog was relatively small in comparison with today’s version, which lists more than 22,000 items (as of May 2015). Also, the current version supports much more than the original military mission—and Aerospace is helping to extend its utility even further. The Space Catalog The Space Catalog is maintained by the Joint Space Operations Center (JSpOC) at Vandenberg Air Force Base, part of U.S. Strategic Command. One of the missions of JSpOC is to detect, track, and identify all artificial objects in Earth orbit. A key component of this mission is the Space Surveillance Network, a worldwide system of ground-based radars along with ground-based and orbital telescopes. The radars are used primarily for tracking near-Earth satellites with orbital period of 225 minutes or less, as well as some eccentric orbits that come down to near-Earth altitudes as they go towards their perigee. Ground-based telescopes are used for tracking more distant satellites, with orbital period greater than 225 minutes, and space-based sensors are used to track both near and distant satellites. The JSpOC tasks these sensors to track specific satellites and to record data such as time, azimuth, elevation, and range. This data is used to create orbital element sets or state vectors that represent the observed position of the satellite. The observed position can then be compared with the predicted position. The dynamic models used for predicting satellite motion are not perfect; factors such as atmospheric density variation caused by unmodeled solar activity can cause the predicted position to gradually stray from the true position. The observations are used to correct the predicted trajectory so the network can continue to track the satellite. This process of using observations to correct and refine an orbit in an ongoing feedback loop is called catalog maintenance, and it continues as long as the satellite remains in orbit. Ideally, the process is automatic, with manual inter vention only required when satellites maneuver or get near to reentry due to atmospheric drag. Sometimes, however, more effort is required. For example, a sensor may encounter a satellite trajectory that does not correspond well to anything in the catalog. Such observations are known as partially correlated observations if they are somewhat close to a known orbit or uncorrelated observations (or uncorrelated tracks) if they are far from any known orbit. Also, if a satellite is not tracked for five days, it is placed on an attention list for manual intervention. In that case, an analyst will attempt to match the wayward satellite to one of these partially correlated or uncorrelated tracks. If that effort succeeds, then the element sets are updated, and the object is returned to automatic catalog maintenance. On the other hand, if the satellite cannot be matched to a partially correlated or uncorrelated track, the satellite information continues to age. If it reaches 30 days without a match, the satellite is placed on the lost list. Risk Prediction One of the most visible uses of the catalog is to warn about collision risks for active payloads. This function predicts potential close approaches three to five days in advance to allow time to plan avoidance maneuvers, if necessary. Unplanned maneuvers may disturb normal operations and deplete resources for future maneuvers, so one would like to have high confidence in the collision-risk predictions. The reliability of the predictions depends directly on the accuracy of the orbit calculation, which in turn depends on the quality and quantity of the tracking data, which is limited by the capability of the Space Surveillance Network. Simply put, there are not enough tracking resources in the network to achieve high-quality orbits for every object in the catalog. Furthermore, many smaller objects can only be tracked by the most sensitive radars, and this tracking is infrequent. Most objects in the catalog are considered debris, which can neither maneuver nor broadcast telemetry. On the other hand, some satellite operators depend exclusively on the satellite catalog to know where their satellites are, and users of the satellite orbital data depend on the catalog to know when the satellites will be within view. This situation creates a challenging problem in balancing Space Surveillance Network resources to support the collision-warning task (tracking as many potential hazards as possible) while also providing highly accurate support to operational satellites (tracking the spacecraft as precisely as possible). The practical solution is to perform collision risk assessment using a large screening radius to ensure no close approaches are missed despite lower-quality predictions. Once an object is identified as having a potentially close approach, then the tasking level is raised, with the expectation that more tracking data will be obtained to refine the collision risk calculations. When the danger has passed, the object reverts to a normal tracking level. Collisions and spontaneous breakups do happen. The first satellite breakup occurred on June 29, 1961, when residual fuel in an Ablestar rocket body exploded, creating 296 trackable pieces of debris. Since that time, there have been more than 200 satellite breakups, the most notable being the missile intercept of the Fengyun-1C satellite, which created more than 3300 trackable fragments. In most cases, these breakups are first detected by the phased-array radars in the Space Surveillance Network. When multiple objects are observed where only one was expected, the downstream sensors are alerted, but no tasking is issued because specific debris orbits are not yet established. Tracks are taken and tagged as uncorrelated. Analysts at JSpOC then attempt to link uncorrelated tracks from different sensors to form a candidate orbit. Subsequent tracking improves the orbit to the point that the object can be named and numbered and moved into the catalog for automatic maintenance.

#### Anti-Satellite Weapons and Space Debris Collisions Lead to Arms Race and War

**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]., 26.MAY.2020, "Anti-Satellite Weapons and the Emerging Space Arms Race," Harvard International Review, https://hir.harvard.edu/anti-satellite-weapons-and-the-emerging-space-arms-race/

Despite their deterrent functions, ASATs are more likely to provoke or exacerbate conflicts than dampen them, especially given the risk they pose to early warning satellites. These satellites are a crucial element of US ballistic missile defense, capable of detecting missiles immediately after launch and tracking their paths. Suppose a US early warning satellite goes dark, or is shut down. Going dark could signal a glitch, but in a world in which other countries have ASATs, it could also signal the beginning of an attack. Without early warning satellites, the United States is much more susceptible to nuclear missiles. Given the strategy of counterforcing—targeting nuclear silos rather than populous cities to prevent a nuclear counterattack—the Americans might believe their nuclear weapons are imminently at risk. It could be twelve hours before the United States regains satellite function, which is too long to wait to put together a nuclear counterattack. The United States, therefore, might move to mobilize a nuclear attack against Russia or China over what might just be a piece of debris shutting off a satellite. Additionally, accidental warfare, or strategic miscalculation, is uniquely likely in space. It is much easier to hold an adversary’s space systems in jeopardy with destructive ASATs than it is to sustainably defend a system, which is expensive and in some cases not technologically feasible because of limitations on satellite movement. Space is therefore considered offense-dominant; offensive tactics like weapons development are prioritized over defensive measures, such as improving GPS or making satellites more resistant to jamming. As a result, countries are left with poorly defended space systems and rely on offensive posturing, which increases the risk that their actions are perceived as aggressive and incentivizes rapid, risky counterattacks because militaries cannot rely on their spaced-based systems after first strikes. There are several hotspots in which ASATs and offensive-dominant systems are particularly relevant. Early warning satellites play a central role in US readiness in the event of a conflict involving North Korea. News of North Korean missile launches comes from these satellites. Given North Korea’s history of nuclear provocations, unflinchingly hostile rhetoric towards the United States and South Korea, and diplomatic opacity, North Korea is always a threatening, unknowable adversary, but recent developments have magnified the risk. With the health of Kim Jong-un potentially in jeopardy, a succession battle or even civil war on the peninsula raises the chances of loose nukes. If the regime is terminal, traditional MAD risk calculus will become moot; with nothing to lose, North Korea would have no reason to hold back its nuclear arsenal. Or China might decide to seize military assets and infrastructure of the regime. If the US does not have its early warning satellites because they have been taken out in an ASAT attack, the US, South Korea, and Japan are all in imminent nuclear peril, while China could be in a position to fundamentally reshape East Asian geopolitics. The South China Sea is another hotspot in which ASATs could risk escalation. China is developing Anti-Access Area Denial (A2/AD) in the South China Sea, a combination of long range radar with air and maritime defense meant to deny US freedom of navigation in the region. Given the disputed nature of territory in the South China Sea, the United States and its allies do not want China to successfully close off the region. But the most effective way to break an A2/AD system would be with anti-satellite weapons. ASATs could neutralize the maritime surveillance China relies upon to deny access to the region and guide cruise missiles. Thus, China is extremely wary of US ASAT development: risks to Beijing’s South China Sea strategy are seen as threats to China itself because of territorial sovereignty claims that are deeply important to the regime and have only become more pronounced under President Xi Jinping. If a Chinese satellite went dark, Beijing might perceive it as a US ASAT designed to undermine the A2/AD approach, and escalate with conventional force. Many of these conflict scenarios start with the loss of satellite function, which may seem unlikely. But ASATs threaten satellites through more than just direct attack. 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.

#### Nuclear war.

Rogoway ’15 [Tyler; November 12; Defense Journalist and Editor of Time Inc’s The War Zone; Jalopnik, “These Are The Doomsday Satellites That Detected The Explosion Of Metrojet 9268,” <https://foxtrotalpha.jalopnik.com/these-are-the-doomsday-satellites-that-detected-the-exp-1737434876>; RP]

For over 50 years the Pentagon has had early warning satellites in orbit aimed at spotting launches of ballistic missiles, especially the big intercontinental kind that can fly around the globe in less than 30 minutes and bring about nuclear Armageddon. Recently, these satellites have made news for their “secondary capabilities,” spotting the downing of Metrojet Flight 9268 and Malaysian Airlines Flight 17. These are the shadowy satellites that are capable of such amazing feats, and an idea of how they work. In 1960, at the height of the Cold War and at the dawn of the space age, the first Missile Defense Alarm System (MiDAS) satellite was launched into low earth orbit. Six years later there was a constellation of nine of these satellites roaming the heavens, each scanning the Soviet Union for large infrared plumes, the tell-tale sign of a ballistic missile or rocket launch. These fairly crude, low-earth orbit satellites, along with the radar-based Ballistic Missile Early Warning System, would be the basis for a Cold War ballistic missile surveillance system that would become ever more complex and capable as the years went by. If ballistic missile launches were detected and deemed a threat, the decision to retaliate would mean the National Command Authority making the call to do so within half an hour, an act that could bring an the end of humanity’s reign on Earth, permanently. The first really reliable and full coverage space-based ballistic missile early warning capability came with the launch of the first Defense Support Program (DSP) satellite in 1970. These new satellites were much more capable than their MiDAS predecessors. Early DSP satellite design was relatively straight forward, with the satellites’ spinning around their center axis while in geosynchronous orbit. This allows their telescopic infrared sensor to continuously sweep an area of the planet in a relatively brief amount of time, around six times in one minute. If something were detected, the information would immediately be data-linked to controllers on the ground at the 460th Space Wing located at Buckley AFB in in Colorado. A total of 23 of these satellites have been launched over the program’s life, with constant upgrades made along the way. A DSP satellite was launched by the Space Shuttle on STS-44 in 1991, and the last one was launched by a Delta IV Heavy in 2007. Most famously, the Defense Support Program constellation of satellites were used to detect launches of SCUD missiles during Operation Desert Storm.

#### Nuke war causes extinction – it won’t stay limited

Edwards 17 [(Paul N. Edwards, CISAC’s William J. Perry Fellow in International Security at Stanford’s Freeman Spogli Institute for International Studies. Being interviewed by EarthSky/card is only parts of the interview directly from Paul Edwards.) “How nuclear war would affect Earth’s climate,” EarthSky, September 8, 2017, earthsky.org/human-world/how-nuclear-war-would-affect-earths-climate] TDI

We are not talking enough about the climatic effects of nuclear war.

The “nuclear winter” theory of the mid-1980s played a significant role in the arms reductions of that period. But with the collapse of the Soviet Union and the reduction of U.S. and Russian nuclear arsenals, this aspect of nuclear war has faded from view. That’s not good. In the mid-2000s, climate scientists such as Alan Robock (Rutgers) took another look at nuclear winter theory. This time around, they used much-improved and much more detailed climate models than those available 20 years earlier. They also tested the potential effects of smaller nuclear exchanges.

The result: an exchange involving just 50 nuclear weapons — the kind of thing we might see in an India-Pakistan war, for example — could loft 5 billion kilograms of smoke, soot and dust high into the stratosphere. That’s enough to cool the entire planet by about 2 degrees Fahrenheit (1.25 degrees Celsius) — about where we were during the Little Ice Age of the 17th century. Growing seasons could be shortened enough to create really significant food shortages. So the climatic effects of even a relatively small nuclear war would be planet-wide.

What about a larger-scale conflict?

A U.S.-Russia war currently seems unlikely, but if it were to occur, hundreds or even thousands of nuclear weapons might be launched. The climatic consequences would be catastrophic: global average temperatures would drop as much as 12 degrees Fahrenheit (7 degrees Celsius) for up to several years — temperatures last seen during the great ice ages. Meanwhile, smoke and dust circulating in the stratosphere would darken the atmosphere enough to inhibit photosynthesis, causing disastrous crop failures, widespread famine and massive ecological disruption.

The effect would be similar to that of the giant meteor believed to be responsible for the extinction of the dinosaurs. This time, we would be the dinosaurs.

Many people are concerned about North Korea’s advancing missile capabilities. Is nuclear war likely in your opinion?

At this writing, I think we are closer to a nuclear war than we have been since the early 1960s. In the North Korea case, both Kim Jong-un and President Trump are bullies inclined to escalate confrontations. President Trump lacks impulse control, and there are precious few checks on his ability to initiate a nuclear strike. We have to hope that our generals, both inside and outside the White House, can rein him in.

North Korea would most certainly “lose” a nuclear war with the United States. But many millions would die, including hundreds of thousands of Americans currently living in South Korea and Japan (probable North Korean targets). Such vast damage would be wrought in Korea, Japan and Pacific island territories (such as Guam) that any “victory” wouldn’t deserve the name. Not only would that region be left with horrible suffering amongst the survivors; it would also immediately face famine and rampant disease. Radioactive fallout from such a war would spread around the world, including to the U.S.

It has been more than 70 years since the last time a nuclear bomb was used in warfare. What would be the effects on the environment and on human health today?

To my knowledge, most of the changes in nuclear weapons technology since the 1950s have focused on making them smaller and lighter, and making delivery systems more accurate, rather than on changing their effects on the environment or on human health. So-called “battlefield” weapons with lower explosive yields are part of some arsenals now — but it’s quite unlikely that any exchange between two nuclear powers would stay limited to these smaller, less destructive bombs.

### AC – Africa Mining Advantage

#### Space mining destroys the African economy

Oni 19 [(David, a space industry and technology analyst at Space in Africa. He’s a graduate of Mining Engineering from the Federal University of Technology Akure.) “The Effect of Asteroid Mining on Mining Activities in Africa,” Africa News, 9/24/19, <https://africanews.space/the-effect-of-asteroid-mining-on-mining-activities-in-africa/>]

At the moment, Asteroid mining poses no threat to terrestrial mining; however, this will not hold for long. The space industry is progressing at such a rapid pace, and the prospects are unequivocally mouth-watering. The big question is, will asteroid mining lure away investors in Africa? The planetary resources company estimates that a single 30-m asteroid may contain 30 billion dollars in platinum alone and a 500m rock could contain half the entire world resources of PGM. Considering the abundance of minerals in asteroids, once asteroid mining materialises, it will severely affect the precious metals market, usurp the prices of rare earth minerals, and a whole lot more because minerals that are usually somewhat scarce on earth will be easily accessible on asteroids. While foreign investors run the majority of the large-scale mining activities in the region, reports say that many African countries are dangerously dependent on mining activities. For some African countries, despite massive mineral wealth, their mining sectors are underdeveloped, and this is as a result of much focus on oil resources and a couple of other challenges. The million-dollar question is, what will become of the mining activities in Africa?

#### Economic decline causes Africa war

Tollefsen 17 [(Andreas Forø, Peace Research Institute Oslo (PRIO) and Ph.D. in Human Geography from the University of Oslo) “Experienced poverty and local conflict violence," Conflict Management and Peace Science, 12/21/17, <https://www.researchgate.net/publication/320740608_Experienced_poverty_and_local_conflict_violence>]

Civil wars are more frequent than any other type of conflict in the modern era, with the majority occurring in low-income countries (Hegre and Sambanis, 2006; Jakobsen et al., 2013). While most country-level studies find that poverty and inadequate economic development increase the risk of conflict—a relationship that appears to be causal (Braithwaite et al., 2016)—we lack consensus on the precise mechanisms driving this phenomenon (Justino, 2009). Researchers have explained a correlation between low GDP per capita and conflict using diverse hypotheses, including lowered opportunity costs for individuals to rebel (Collier et al., 2009) and responses to a state’s weak capacity (Fearon and Laitin, 2003).

However, as argued by Hegre (2016), development’s highly correlated indicators make it difficult to distinguish between the theoretical mechanisms underlying the development– conflict nexus. Moreover, previously proposed models often represent processes operating on various geographical scales at individual, group, and state levels. Few researchers have backed up theoretical expectations with data at scientifically fitting levels of analysis, consequently ignoring intra-country variations of explanatory variables and outcomes. Furthermore, aggregated measures are incapable of capturing significant variations in economic conditions (Elbers et al., 2003) and conflict intensity (Rustad et al., 2011) within countries. In addition, conflict areas are, in general, atypical of a nation as a whole (Buhaug and Lujala, 2005), which calls for a subnational level analysis.

Addressing these disconnects—and the fact that most conflict operates at a local level (Rustad et al., 2011)—a recent body of studies has focused on how subnational variations in poverty determine the locations within a country where conflicts break out (Buhaug et al., 2011; Hegre et al., 2009; Østby et al., 2009). To date, their findings are largely mixed, with no consensus yet on strength, direction, or mechanisms behind the relationship. The problem here may be the use of varying proxies for poverty that are only loosely linked to the rationale for conflict and/or insufficient attention on the local sociopolitical context.

The present study’s empirical contributions seek to help rectify the inadequate measures of poverty that have come to characterize the literature. To begin with, the article improves our understanding of whether and where a local poverty–conflict nexus exists by deploying experiential data on individuals’ actual wellbeing—which I argue is more closely connected to people’s motives and rationale for taking up arms. Second, the article examines the sociopolitical context’s conditioning effect on the poverty–conflict nexus. This is achieved by including data on individuals’ perceptions surrounding the quality of their local institutions, the presence of group grievances, and local unemployment rates. These factors, I argue, are more closely linked to reasons for fighting than are common proxies such as night-time luminosity and estimates of economic activity, both of which are often derived from dividing GDP per capita by local population counts.

Poverty—a state in which individuals’ basic needs go unmet—has been shown to motivate people to join rebellions. Humphreys and Weinstein (2008), for instance, found that poverty predicted inscription in the Revolutionary United Front during Sierra Leone’s civil war. Barrett (2011) similarly saw how promises of loot lured the poor to enlist in the 1997– 1998 dispute in Nigeria’s local government area known as Toto. Combatants of the Toto conflict were also more likely to join the rebellion if they stood to gain personal protection, food, and shelter.

For the present study, I developed a dataset by aggregating survey responses from the pan-African Afrobarometer survey to subnational districts and combining the results with information on post-survey violent conflicts. The dataset consists of 4008 subnational districts, spanning 35 African countries. As most districts were only assessed once, thus restricting study of within-unit variation, survey responses were also aggregated to higher-order subnational regions, resulting in a dataset of 111 regions that were surveyed at least twice; this permitted a region-level fixed-effects model design.

Using a pooled cross-sectional dataset of districts, I found that high levels of poverty were linked to increases in local conflict-based violence. Districts with a large share of poor individuals, both in absolute terms and relative to country average, had a higher risk ofconflict than more affluent areas. This relationship held in a coarsened exact matching setup, as well as in a region-level fixed effects design with repeated measurements across time. While the results reveal a local poverty–conflict link, they do not aid in uncovering underlying mechanisms.

Using interactions models, I found that poverty increased the risk of conflict, although only where local institutions are weak. The results also show that poverty-stricken areas in which individuals strongly perceive group injustice have a greater risk of conflict than similarly impoverished regions with no aggrieved population. A departure from the local individual opportunity cost explanation, local economic opportunities do not seem to condition the poverty–conflict nexus. In sum, the results suggest that while poverty is significantly connected to conflict, high-quality institutions and inclusiveness of ethnic groups can prevent violence. Although a wide range of robustness checks and alternative model specifications were implemented, including matching and fixed-effects models, the issue of endogeneity could not be ruled out; doing so would require some kind of exogenous instrument, which I have been unable to identify.

The remainder of this article elaborates on the theoretical framework linking subnational poverty to local conflict-based violence. This is followed by a discussion of existing methods for measuring local poverty and their potential shortcomings. Next presented is the study’s research design and modeling strategy, followed by a discussion of empirical results. The conclusion considers the study’s limitations and proposes avenues for future research on poverty in locations that support rebel groups.

Poverty and conflict

A direct link

A connection between low income and risk of conflict is among the most robust findings in the literature on civil wars (Hegre and Sambanis, 2006). However, there is little consensus on the mechanisms through which poverty may produce conflict. Collier and Hoeffler (1998) claimed that low per-capita income lowers the opportunity cost of rebellion because when they have less to lose from taking up arms, poorer individuals become more inclined to rebel. Fearon and Laitin (2003) observed that poorer countries experience more conflict because they are unable to monitor and control all of their territory, thereby creating pockets of hospitable conditions for insurgents; Tollefsen and Buhaug (2015) identified a similar scenario at the local level.

#### Horn of Africa conflicts cause great power war

Glick 7 (Caroline – senior Middle East fellow at the Center for Security Policy, Condi’s African holiday, p. http://www.centerforsecuritypolicy.org/home.aspx?sid=56&categoryid=56&subcategoryid=90&newsid=11568)

The Horn of Africa is a dangerous and strategically vital place. Small wars, which rage continuously, can easily escalate into big wars. Local conflicts have regional and global aspects. All of the conflicts in this tinderbox, which controls shipping lanes from the Indian Ocean into the Red Sea, can potentially give rise to regional, and indeed global conflagrations between competing regional actors and global powers. Located in and around the Horn of Africa are the states of Eritrea, Djibouti, Ethiopia, Somalia, Sudan and Kenya. Eritrea, which gained independence from Ethiopia in 1993 after a 30-year civil war, is a major source of regional conflict. Eritrea has a nagging border dispute with Ethiopia which could easily ignite. The two countries fought a bloody border war from 1998-2000 over control of the town of Badme. Although a UN mandated body determined in 2002 that the disputed town belonged to Eritrea, Ethiopia has rejected the finding and so the conflict festers. Eritrea also fights a proxy war against Ethiopia in Somalia and in Ethiopia's rebellious Ogaden region. In Somalia, Eritrea is the primary sponsor of the al-Qaida-linked Islamic Courts Union which took control of Somalia in June, 2006. In November 2006, the ICU government declared jihad against Ethiopia and Kenya. Backed by the US, Ethiopia invaded Somalia last December to restore the recognized Transitional Federal Government to power which the ICU had deposed. Although the Ethiopian army successfully ousted the ICU from power in less than a week, backed by massive military and financial assistance from Eritrea, as well as Egypt and Libya, the ICU has waged a brutal insurgency against the TFG and the Ethiopian military for the past year. The senior ICU leadership, including Sheikh Hassan Dahir Aweys and Sheikh Sharif Ahmed have received safe haven in Eritrea. In September, the exiled ICU leadership held a nine-day conference in the Eritrean capital of Asmara where they formed the Alliance for the Re-Liberation of Somalia headed by Ahmed. Eritrean President-for-life Isaias Afwerki declared his country's support for the insurgents stating, "The Eritrean people's support to the Somali people is consistent and historical, as well as a legal and moral obligation." Although touted in the West as a moderate, Ahmed has openly supported jihad and terrorism against Ethiopia, Kenya and the West. Aweys, for his part, is wanted by the FBI in connection with his role in the bombing of the US embassies in Kenya and Tanzania in 1998. Then there is Eritrea's support for the Ogaden separatists in Ethiopia. The Ogaden rebels are Somali ethnics who live in the region bordering Somalia and Kenya. The rebellion is run by the Ogaden National Liberation Front (ONLF) which uses terror and sabotage as its preferred methods of warfare. It targets not only Ethiopian forces and military installations, but locals who wish to maintain their allegiance to Ethiopia or reach a negotiated resolution of the conflict. In their most sensationalist attack to date, in April ONLF terror forces attacked a Chinese-run oil installation in April killing nine Chinese and 65 Ethiopians. Ethiopia, for its part has fought a brutal counter-insurgency to restore its control over the region. Human rights organizations have accused Ethiopia of massive human rights abuses of civilians in Ogaden. Then there is Sudan. As Eric Reeves wrote in the Boston Globe on Saturday, "The brutal regime in Khartoum, the capital of Sudan, has orchestrated genocidal counter-insurgency war in Darfur for five years, and is now poised for victory in its ghastly assault on the region's African populations." The Islamist government of Omar Hasan Ahmad al-Bashir is refusing to accept non-African states as members of the hybrid UN-African Union peacekeeping mission to Darfur that is due to replace the undermanned and demoralized African Union peacekeeping force whose mandate ends on December 31. Without its UN component of non-African states, the UN Security Council mandated force will be unable to operate effectively. Khartoum's veto led Jean-Marie Guehenno, the UN undersecretary for peacekeeping to warn last month that the entire peacekeeping mission may have to be aborted. And the Darfur region is not the only one at risk. Due to Khartoum's refusal to carry out the terms of its 2005 peace treaty with the Southern Sudanese that ended Khartoum's 20-year war and genocide against the region's Christian and animist population, the unsteady peace may be undone. Given Khartoum's apparent sprint to victory over the international community regarding Darfur, there is little reason to doubt that once victory is secured, it will renew its attacks in the south. The conflicts in the Horn of Africa have regional and global dimensions. Regionally, Egypt has played a central role in sponsoring and fomenting conflicts. Egypt's meddling advances its interest of preventing the African nations from mounting a unified challenge to Egypt's colonial legacy of extraordinary rights to the waters of the Nile River which flows through all countries of the region.

#### Great power war

Yeisley 11 [(USAF Lieutenant Colonel Mark O. Yeisley, assistant professor of international relations at the School of Advanced Air and Space Studies, Maxwell AFB, Alabama. MA Colorado State, PhD in international relations from Duke University) “Bipolarity, Proxy Wars, and the Rise of China,” Strategic Studies Quarterly, Winter 2011, <https://www.jstor.org/stable/26270538?seq=1#metadata_info_tab_contents>] TDI

Bipolarity, Nuclear Weapons, and Sino-US Proxy Conflict in Africa

It is likely China will achieve economic and then military parity with the United States in the next two decades. China currently possesses 240 nuclear warheads and 135 ballistic missiles capable of reaching the United States or its allies; that number of nuclear warheads is estimated to double by the mid 2020s.43 As during the Cold War, a bipolar system in which war between the United States and China is too costly will lead to policy decisions that seek conflict resolution elsewhere.44 But why would China’s rising necessarily lead to geostrategic competition with the United States, and where would this most likely occur? Unlike the Cold War, access to strategic resources rather than ideology would lie at the heart of future US-Sino competition, and the new “great game” will most likely be played in Africa.

Despite Communist Party control of its government, China is not interested in spreading its version of communism and is much more pragmatic in its objectives—securing resources to meet the needs of its citizens and improve their standard of living.45 Some estimates show that China will overtake the United States to become the world’s largest economy by 2015, and rising powers usually take the necessary steps to “ensure markets, materials, and transportation routes.”46 China is the leading global consumer of aluminum, copper, lead, nickel, zinc, tin, and iron ore, and its metal needs now represent more than 25 percent of the world’s total.47 In contrast, from 1970 to 1995, US consumption of all materials, including metals, accounted for one-third of the global total despite representing only 5 percent of the world’s population.48 China is the largest energy consumer, according to the International Energy Agency, surpassing the United States in consumption of oil, coal, and natural gas in 2009.49 As the two largest consumers of both global energy and materials, the United States and China must seek foreign policy prescriptions to fulfill future resource needs. While the United States can alleviate some of its energy needs via bio- or coal-based fuels, hydrogen, or natural gas alternatives, China currently lacks the technological know-how to do so and remains tied to a mainly nonrenewable energy resource base. Since the majority of these needs are nonrenewable, competition of necessity will be zero-sum and will be conducted via all instruments of power.50

Africa is home to a wealth of mineral and energy resources, much of which still remains largely unexploited. Seven African states possess huge endowments of oil, and four of these have equally substantial amounts of natural gas.51 Africa also enjoys large deposits of bauxite (used to make aluminum), copper, lead, nickel, zinc, and iron ore, all of which are imported and highly desired by China. Recent activity serves to prove that China seeks greater access to natural resources in Africa by avidly promoting Chinese development in a large number of African nations. South Africa, the continent’s largest economy, has recently allowed China to help develop its vast mineral wealth; it is China’s number one African source of manganese, iron, and copper.52 Chinese involvement in Africa is not wholly extractive; the continent provides a booming export market for China’s goods and a forum to augment its soft power in the region by offering alternatives to the political and economic baggage that accompanies US foreign aid.53

Of primary interest is open access to Africa’s significant deposits of oil and other energy resources. For example, China has 4,000 military personnel in Sudan to protect its interests in energy and mineral investments there; it also owns 40 percent of the Greater Nile Oil Production Company.54 Estimates indicate that within the next few decades China will obtain 40 percent of its oil and gas supplies from Africa.55 Trade and investment in Africa have also been on the rise; trade has grown more than 10 percent annually in the past decade. Between 2002 and 2004, African exports to China doubled, ranking it third behind the United States and France in trade with the continent. Chinese investment is also growing; more than 700 Chinese business operations across Africa total over $1 billion. Aid and direct economic assistance are increasing as well, and China has forgiven the debt of some 31 African nations.56

Africa is thus a vital foreign interest for the Chinese and must be for the United States; access to its mineral and petroleum wealth is crucial to the survival of each.57 Although the US and Chinese economies are tightly interconnected, the nonrenewable nature of these assets means competition will remain a zero-sum game. Nearly all African states have been independent entities for less than 50 years; consolidating robust domestic state institutions and stable governments remains problematic.58 Studies have shown that weak governments are often prime targets for civil conflicts that prove costly to control.59 Many African nations possess both strategic resources and weak regimes, making them vulnerable to internal conflict and thus valuable candidates for assistance from China or the United States to help settle their domestic grievances. With access to African resources of vital strategic interest to each side, competition could likely occur by proxy via diplomatic, economic, or military assistance to one (or both) of the parties involved.

Realist claims that focusing on third-world issues is misplaced are thus fallacious; war in a future US-China bipolar system remains as costly as it was during the Cold War. Because of the fragile nature of many African regimes, domestic grievances are more prone to result in conflict; US and Chinese strategic interests will dictate an intrusive foreign policy to be both prudent and vital. US-Sino proxy conflicts over control of African resources will likely become necessary if these great powers are to sustain their national security postures, especially in terms of strategic defense.60