# 1NC Columbia RD1 Edgemont AJ vs Lex TG

### 1NC – K

#### Settler colonialism structures the world in a settler-native-slave relationship, erasing indigenous peoples, causing constant ontological violence.

Tuck and Yang 12 [Eve Tuck is an award winning Unangax̂ scholar in the field of Indigenous studies and educational research. She is Associate Professor of Critical Race and Indigenous Studies at the Ontario Institute for Studies in Education (OISE), University of Toronto. Yang is a Ph.D. Social and Cultural Studies in Education, University of California, Berkeley] “Decolonization is not a metaphor”, Decolonization: Indigeneity, Education & Society //AA

Our intention in this descriptive exercise is not be exhaustive, or even inarguable; instead, we wish to emphasize that (a) decolonization will take a different shape in each of these contexts - though they can overlap - and that (b) neither external nor internal colonialism adequately describe the form of colonialism which operates in the United States or other nation-states in which the colonizer comes to stay. Settler colonialism operates through internal/external colonial modes simultaneously because there is no spatial separation between metropole and colony. For example, in the United States, many Indigenous peoples have been forcibly removed from their homelands onto reservations, indentured, and abducted into state custody, signaling the form of colonization as simultaneously internal (via boarding schools and other biopolitical modes of control) and external (via uranium mining on Indigenous land in the US Southwest and oil extraction on Indigenous land in Alaska) with a frontier (the US military still nicknames all enemy territory “Indian Country”). The horizons of the settler colonial nation-state are total and require a mode of total appropriation of Indigenous life and land, rather than the selective expropriation of profit-producing fragments. Settler colonialism is different from other forms of colonialism in that settlers come with the intention of making a new home on the land, a homemaking that insists on settler sovereignty over all things in their new domain. Thus, relying solely on postcolonial literatures or theories of coloniality that ignore settler colonialism will not help to envision the shape that decolonization must take in settler colonial contexts. Within settler colonialism, the most important concern is land/water/air/subterranean earth (land, for shorthand, in this article.) Land is what is most valuable, contested, required. This is both because the settlers make Indigenous land their new home and source of capital, and also because the disruption of Indigenous relationships to land represents a profound **epistemic, ontological, cosmological violence**. This violence is not temporally contained in the arrival of the settler but is reasserted each day of occupation. This is why Patrick Wolfe (1999) emphasizes that **settler colonialism is a structure and not an event.** In the process of settler colonialism, land is remade into property and human relationships to land are restricted to the relationship of the owner to his property. Epistemological, ontological, and cosmological relationships to land are interred, indeed made pre-modern and backward. Made savage. In order for **the settlers** to make a place their home, they must **destroy and disappear the Indigenous peoples that live there.** **Indigenous peoples are those who have creation stories, not colonization stories, about how we/they came to be in a particular place - indeed how we/they came to be a place**. Our/their relationships to land comprise our/their epistemologies, ontologies, and cosmologies. For **the settlers, Indigenous peoples are in the way and, in the destruction of Indigenous peoples, Indigenous communities, and over time and through law and policy, Indigenous peoples’ claims to land under settler regimes, land is recast as property and as a resource.** Indigenous peoples must be erased, must be made into ghosts (Tuck and Ree, forthcoming). At the same time, settler colonialism involves the subjugation and forced labor of chattel slaves, whose bodies and lives become the property, and who are kept landless. Slavery in settler colonial contexts is distinct from other forms of indenture whereby excess labor is extracted from persons. First, chattels are commodities of labor and therefore it is the slave’s person that is the excess. Second, unlike workers who may aspire to own land, the slave’s very presence on the land is already an excess that must be dis-located. Thus, the slave is a desirable commodity but the person underneath is imprisonable, punishable, and murderable. The violence of keeping/killing the chattel slave makes them deathlike monsters in the settler imagination; they are reconfigured/disfigured as the threat, the razor’s edge of safety and terror. The settler, if known by his actions and how he justifies them, sees himself as holding dominion over the earth and its flora and fauna, as the anthropocentric normal, and as more developed, more human, more deserving than other groups or species. **The settler is making a new "home" and that home is rooted in a homesteading worldview where the wild land and wild people were made for his benefit**. He can only make his identity as a settler by making the land produce, and produce excessively, because "civilization" is defined as production in excess of the "natural" world (i.e. in excess of the sustainable production already present in the Indigenous world). In order for excess production, he needs excess labor, which he cannot provide himself. The chattel slave serves as that excess labor, labor that can never be paid because payment would have to be in the form of property (land). The settler's wealth is land, or a fungible version of it, and so payment for labor is impossible.6 The settler positions himself as both superior and normal; the settler is natural, whereas the Indigenous inhabitant and the chattel slave are unnatural, even supernatural. **Settlers are not immigrants**. Immigrants are beholden to the Indigenous laws and epistemologies of the lands they migrate to. Settlers become the law, supplanting Indigenous laws and epistemologies. Therefore, settler nations are not immigrant nations (See also A.J. Barker, 2009). Not unique, the United States, as a settler colonial nation-state, also operates as an empire - utilizing external forms and internal forms of colonization simultaneous to the settler colonial project. This means, and this is perplexing to some, that dispossessed people are brought onto seized Indigenous land through other colonial projects. Other colonial projects include enslavement, as discussed, but also military recruitment, low-wage and high-wage labor recruitment (such as agricultural workers and overseas-trained engineers), and displacement/migration (such as the coerced immigration from nations torn by U.S. wars or devastated by U.S. economic policy). In this set of settler colonial relations, colonial subjects who are displaced by external colonialism, as well as racialized and minoritized by internal colonialism, still occupy and settle stolen Indigenous land. Settlers are diverse, not just of white **European descent, and include people of color, even from other colonial contexts**. This tightly wound set of conditions and racialized, globalized relations exponentially complicates what is meant by decolonization, and by solidarity, against settler colonial forces. Decolonization in exploitative colonial situations could involve the seizing of imperial wealth by the postcolonial subject. In settler colonial situations, seizing imperial wealth is inextricably tied to settlement and re-invasion. Likewise, the promise of integration and civil rights is predicated on securing a share of a settler-appropriated wealth (as well as expropriated ‘third-world’ wealth). Decolonization in a settler context is fraught because empire, settlement, and internal colony have no spatial separation. Each of these features of settler colonialism in the US context - empire, settlement, and internal colony - make it a site of contradictory decolonial desires7. Decolonization as metaphor allows people to equivocate these contradictory decolonial desires because it turns decolonization into an empty signifier to be filled by any track towards liberation. In reality, the tracks walk all over land/people in settler contexts. Though the details are not fixed or agreed upon, in our view, decolonization in the settler colonial context must involve the repatriation of land simultaneous to the recognition of how land and relations to land have always already been differently understood and enacted; that is, all of the land, and not just symbolically. This is precisely why decolonization is necessarily unsettling, especially across lines of solidarity. “Decolonization never takes place unnoticed” (Fanon, 1963, p. 36). Settler colonialism and its decolonization implicates and unsettles everyone.

#### The 1AC’s descriptions of Space aren’t neutral, but replicate the project of Western rationality and enlightenment that depend on the ongoing colonization of spacetime and disappearance of the Native as a backwards impediment to progress

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Settling time

As an empire of time rather than space … many significant American national theorists sought to escape the political paradoxes of space by conquering time. (Allen, 2008: 13)

Allen examines how U.S. empire depends upon three notions of time: a romanticized historical time recounting myths of the nation’s founding, the geological time of natural history, and the mechanized time of the clock and apparatuses of measurement. The organization and control over these three temporalities constitutes a colonial totality (Matson and Nunn, 2017) that works to settle time as much as space in the projection of settler futures.

The projection of settler futures depends on the ordering of time, constituted by ideologies of progress, of a mythologized past and present oriented toward the future. Scientific “progress” is positioned as a universal value key to constructing the future, while questioning the actions of Western science is positioned as irrational or reactionary. Concerning the TMT controversy, Casumbal-Salazar writes:

Relegated to the ‘dark ages’ of tradition, Native peoples appear as the agonistic menace of the modern scientific state. Delegitimized as irrational within the gendered hierarchies of Western science and philosophy … Hawaiians become suspect and subject to institutional anti-Native racism yet fetishized as an archeological remnant within multicultural society. (2017: 2)

In dominant discourses, Indigenous time is linked to the past, with the present constituted on assimilation and the future on complete erasure (Rifkin, 2017). The existence of contemporary Indigenous peoples poses a challenge to ongoing settler colonial hegemony. Goodyear-Ka‘ōpua explains how “settler state officials cast the kiaʻi [land protectors, caretakers] as impediments on the road to ‘progress’ (aka settler futurity) … (mis)representing us as fixed in place, pinned in a remote time” (2017: 191–192). Enlightenment notions of universality erase difference and thus Indigenous claims to prior rights or sovereignty. While these conceptions of time have long been critiqued, they continue to shape the central logics of contemporary Western science, including space science.

Linear conceptions of time are necessarily produced out of complex practices that organize and control relative and variable spatio-temporal formations. Rifkin posits a multiplicity of temporalities, writing:

temporalities need to be understood as having material existence and efficacy in ways that are not reducible to a single, ostensibly neutral vision of time as universal succession. The concept of frames of reference provides a way of breaking up this presumed timeline by challenging the possibility of definitively determining simultaneity … Within Einsteinian relativity, simultaneity depends on one’s perspective based on one’s frame of reference. (2017: 20)

Einstein’s theory of relativity demonstrates how time is relative, variable, and dependent on acceleration, which is a function of location within a gravitational field. It is a relationship between space, masses, and matter. As Valentine explains:

gravity is a consequence of the relational warping of spacetime by matter … That is, gravitational effects are literally universal but emerge locally through relativistic and constantly shifting specific relations among the mass of cosmic bodies and spacetime, producing variable observations from differently situated observers of one another (2017: 189–190).

The practices of Western astronomy are dependent on variable and relative relations among space and time. Whether it is earth-bound astronomers punching the clock on Martian time (Mirmalek, 2020) or the stretching of temporal experience in a gravity well, the location of bodies matters as it produces ‘differently situated observers,’ who experience time differently based on their frames of reference. Yet, time is held as a stable frame of reference from which the colonial scientist constitutes the metric for a purportedly universal observer situated in a neutral position of observation. Even Western science’s own understanding of time refuses to conform to Enlightenment notions of universality, demonstrating a contradiction between this ontology and the broader political and social ideologies with which it is entangled.

While notions of linear, progressive time are used to justify settler colonial projects, the relative and contingent relationships among space, time, and matter complicate claims to universality. Time, like space, is subject to practices of organization and control that produce subject–object relations key to the Western colonial project. For instance, geologic time, or what Allen refers to as “vertical time,” is the spatial-temporal imaginary of geologic strata. He describes that, while “history often depicted time advancing horizontally across space, the geological revolution made it possible to imagine time extending perpendicularly into the territory beneath the nation” (Allen, 2008: 165). The deep time of geology historicizes Western civilization as the top layer, the apex of natural history, and thus stands to justify colonialism and its civilizational projects. The exploration of cosmological time in the space sciences extends the colonial project further into the far expanses of the future and the totality of the universe.

The apparatus

Gazing out into the night sky or deep down into the structure of matter, with telescope or microscope in hand, Man [sic] reconfirms his ability to negotiate immense differences in scale in the blink of an eye. Designed specifically for our visual apparatus, telescopes and microscopes are the stuff of mirrors, reflecting what is out there … Man is an individual apart from all the rest. And it is this very distinction that bestows on him the inheritance of distance, a place from which to reflect-on the world, his fellow man, and himself. A distinct individual, the unit of all measure, finitude made flesh, his separateness is the key. (Barad, 2007: 134, emphasis added)

In Barad’s deconstructive reading of Enlightenment science, linear time and evacuated space are both the product of active material processes through which a purportedly universal “Man” continually enacts a separation between himself and the universe. It is this supposed separation from the rest of existence that constitutes “Man” as the subject of a masculinist science and the remainder of the universe as the object of his will. Practices of scientific observation and colonial occupation work in tandem to re-enact and reinforce this fundamental subject–object relationship. Critical scholars of science have long argued against the purported passivity of observation, from critiques of the Archimedean point (Yaqoob, 2014) to feminist theories of the embodied and situated nature of knowledge production (Haraway, 1988). Yet, beyond simply noting the ontological impossibility of Man’s separation from the universe, Barad theorizes an emergent and contingent form of separability – what she calls agential separability – that is (re)produced through the material practices of apparatuses. Barad explains that “apparatuses enact agential cuts that produce determinate boundaries and properties of entities within phenomena” (2007: 148). Apparatuses determine what comes to matter and how, thus producing differences between subject and object, which are not stable positions but rather enacted and contingent forms of relationality.

We employ the apparatus to explore how subject–object relations of Western colonial science are not universal and absolute, but rather enacted through material practices that selectively produce the privileged subject positions on which settler colonialism and space science both depend. Barad’s theory of spacetime mattering highlights the mutual constitution of space and time through the ongoing material re-configuring of the world. Apparatuses are

neither neutral probes of the natural world nor social structures that deterministically impose some particular outcome …  the notion of an apparatus is not premised on inherent divisions between the social and the scientific …  [they] are the practices through which these divisions are constituted. (Barad, 2007: 169)

Reconceiving subjectivity, objectivity, space, time, and matter in this way implies that questions of ethics are inseparable from apparatuses as practices that produce differences and iteratively construct the world. Apparatuses enact material changes through which some possibilities are realized while others are foreclosed.

Ontologically, apparatuses produce spatial, temporal, and material relations that constitute projects of Western colonial science. This approach helps elaborate arguments like those of Matson and Nunn that “even the most futuristic space telescopes have embedded within them a lineage of Euro-western cultural supremacy” (2017: n.p.). This is not to simply claim that telescopes are in some way symbolic of settler colonial relations, but to recognize how space science apparatuses actively orient relations of observation and materialize settler colonial relations.

Both TMT and HI-SEAS constitute apparatuses that extend spatially well beyond the infrastructural footprint on these mountains, to the island and surrounding ocean, into the atmosphere, to Moon, Mars, and cosmos. As part of these apparatuses, mountain environments of Hawaii become both a gateway to the cosmos and simulation of an alien landscape. Temporally, the apparatus stretches beyond contemporary scientific practices, drawing on longstanding histories of European imperialism, Western law, and settler colonial logics, and projecting these ideologies into offworld futures. Materially, these projects enroll technological, logistical, and physical systems, including roads, mirrors and lenses, sensors and surveillance devices, electromagnetic waves and domes, the geology of the Hawaiian landscape, and bodies of observer and observed.

#### This understanding of “space” replicates a Western theorization of place as neutral space relegates indigenous peoples to colonial authority by creating “cultural blanks” to be filled in by peaceful settlement

Barker and Pickerill 12 (Adam J Barker, and Jenny Pickerill, Department of Geography @ Univ of Leicester. “Radicalizing Relationships To and Through Shared Geographies: Why Anarchists Need to Understand Indigenous Connections to Lands and Place” Antipode.

Colonial Impacts on Perceptions of Place Indigenous understandings of place have generated criticism of many aspects of society in the northern bloc: Christian theology’s influence on political and economic colonial practice (Deloria 2003); the concept of “sovereignty” and the state system (Alfred 2006); constitutionalism as a method of governmental organization (Tully 1995; 2000); capitalism and relationships under a capitalist system (Adams 1989:17); language and culture (Basso 1996) and many other understandings of place, space, nature, and human relationships. Indigenous relationships to place fundamentally challenge colonial spatial concepts, from the ways that we move from place to place and through spaces (Pandya 1990) to how we move through time (Jojola 2004). Indeed Coulthard (2010:79) asserts that for Indigenous people place is central to understandings of life, whereas “most Western societies . . . derive meaning from the world in historical/developmental terms, thereby placing time as the narrative of central importance”. Historically, EuroAmerican cultures conceived of human relations to the environment in one of two ways, which John Rennie Short labels the “classical and romantic” (Short 1991:6): either “natural” places are improved through development and human spatial creation and use (with “wilderness” as a frightening, exterior “ other”), or despoiled through human contact and change (with the natural environment as a pristine and perfect spatial concept, and the suggestion that human identity must be bounded within it). Both conceptually marginalize or fully erase Indigenous presence in place. Contra this erasure, Indigenous peoples’ understandings of place have become important to the understanding of colonial geographies and the efforts of anti-colonial activists.2 Indigenous peoples have traditionally related to place through spatially stretched and dynamic networks of relationships (Cajete 2004; Johnson and Murton 2007). These networks bear some resemblance to Sarah Whatmore’s concept of hybrid geography, “which recognizes agency as a relational achievement, involving the creative presence of organic beings, technological devices and discursive codes, as well as people, in the fabrics of everyday living” (Whatmore 1999:26). Through these, Indigenous peoples have challenged the classical/romantic dichotomy that continues to haunt some aspects of anarchist spatial perceptions. For Indigenous peoples, place holistically encapsulates networks of relations between humans, features of the land, non-human animals, and living beings perceived as spirits or non-physical entities. All of these—humans included— are understood to have autonomy and will, but also obligation and responsibility to all of the other elements to which they are related and among whom they are situated. As such, we acknowledge that land and place are different to each other but seek to use the way they are interrelated throughout this article. Although land can be considered as material, its meaning is constantly interwoven into the relationality of place so that land is often taken to have multiple meanings beyond its simple materiality—as a resource, as identity and as relationship (Coulthard 2010). Indigenous peoples assaulted by settler colonization have and continue to face concerted attempts to break Indigenous connections to place. Religious conversion, for example, has had a massive impact on the ways that Indigenous peoples perceive the spaces occupied by spirit and otherwise metaphysical beings. Though no longer considered “tantamount to a complete transformation of cultural identity” (Axtell 1981:42), conversion to and participation in hierarchical-organized, spatially dislocated, and temporally defined Judeo-Christian religions (Deloria 2003:62–77) encouraged Indigenous peoples to see the spiritual as something above (literally) and beyond the direct contact of the human world. The general result is displacement and dislocation.

#### Mill’s Utilitarianism was historically used as a justification for colonization AND the theory fundamentally excludes indigenous struggles

Campbell 10 Craig Grant Campbell (2010) [Assistant Teaching Professor of Education (Lifelong Learning and Adult Education) His academic training includes a doctorate in Adult and Higher Education from Northern Illinois University and graduate work in Cross Cultural Studies with Indigenous Knowledge Systems emphasis from the University of Alaska Fairbanks.]‘Mill’s Liberal Project and Defence of Colonialism from a Post-Colonial Perspective’, South African Journal of Philosophy, 29:2, 63-73. DOI: 10.4314/sajpem.v29i2.57049 //AA

Colonial rule was thus not a moral concern for either of the Mill's in that both believed it was good and just because it advanced civilization and promoted the general welfare of the colonized population. John Stuart Mill constantly defended the role of the East India Company before Britain's Parliament and went to great lengths to describe the multitude of ways in which Indian society had benefitted from British rule, especially with regard to public services and the establishment of political and social institutions. In 1853, for example, he stated: ‘It must be said that the years which have since elapsed have been marked by a degree of activity in every description of public improvement, not only greater than that exhibited previously, but unsurpassed, it is believed, in any country in any age’ (Mill 1977b:93). The above highlights Mill's belief that the mission of the East India Company was to help provide Indian society with the stimulus necessary for development and progress, without which they would remain a backward and stagnant race. Mill's views on colonialism reflected the age in which he lived, when few Europeans questioned the notion that their cultures were far superior to other contemporary cultures, that Western European society was at the forefront of development and civilization, and thus that it was their moral duty to spread their ‘ways’ to all peoples of the world (Habibi 1999:125). Mill's admiration for European culture and justification for British paternalism, is highlighted by his claim that, ‘among the inhabitants of our earth, the European family of nations is the only one which has ever yet to show any capability of spontaneous improvement beyond a certain low-level’ (Mill 1977c:197). Mill's claim that ‘…despotism is a legitimate mode of dealing with barbarians, provided the end be their improvement…’ offers further support for his colonialism and his acknowledgement of the superiority of European cultures as the most progressive forces to stimulate growth and development within stagnant, non-progressive societies (Mill 1977a:224). Backward societies, according to Mill, had no right to non-interference as he did not believe that progression was a ‘natural, historical process’, but rather that ‘backward’ societies would remain in such a state unless there was paternalistic intervention by a more developed nation. Founded on his utilitarian justification, Mill claimed that in comparison to the chaos and despotism it replaced, British rule provided order, unification and a liberal challenge to the traditional repression which fuelled the stagnation of most ‘backward’ societies. This ‘vision’ is evident in the fact that Mill vehemently opposed a system of indirect rule where the ‘British propped up Indian princes as semi-autonomous allies and used them as bulwarks against possible threats from other princes or rebellious subjects’, and believed that such a system was detrimental to the ‘Imperial task’ (Zastoupil 1988:37). Indirect rule merely protected the atrocious behaviour of, what was considered by Mill, a ‘barbaric’ and ‘backward’ social system. Direct British rule, on the other hand, was the only appropriate method to fulfil the ‘civilising mission’ of colonial rule and therefore advocated the importance of good administration to bringing about social and political improvement.

#### The only ethical response is decolonization.

Tuck and Yang 12

(Eve Tuck, Unangax, State University of New York at New Paltz K. Wayne Yang University of California, San Diego, Decolonization is not a metaphor, Decolonization: Indigeneity, Education & Society Vol. 1, No. 1, 2012, pp. 1-40, JKS)

An ethic of incommensurability, which guides moves that unsettle innocence, stands in contrast to aims of reconciliation, which motivate settler moves to innocence. Reconciliation is about rescuing settler normalcy, about rescuing a settler future. Reconciliation is concerned with questions of what will decolonization look like? What will happen after abolition? What will be the consequences of decolonization for the settler? Incommensurability acknowledges that these questions need not, and perhaps cannot, be answered in order for decolonization to exist as a framework. We want to say, first, that decolonization is not obliged to answer those questions - decolonization is not accountable to settlers, or settler futurity. Decolonization is accountable to Indigenous sovereignty and futurity. Still, we acknowledge the questions of those wary participants in Occupy Oakland and other settlers who want to know what decolonization will require of them. The answers are not fully in view and can’t be as long as decolonization remains punctuated by metaphor. The answers will not emerge from friendly understanding, and indeed require a dangerous understanding of uncommonality that un-coalesces coalition politics - moves that may feel very unfriendly. But we will find out the answers as we get there, “in the exact measure that we can discern the movements which give [decolonization] historical form and content” (Fanon, 1963, p. 36). To fully enact an ethic of incommensurability means relinquishing settler futurity, abandoning the hope that settlers may one day be commensurable to Native peoples. It means removing the asterisks, periods, commas, apostrophes, the whereas’s, buts, and conditional clauses that punctuate decolonization and underwrite settler innocence. The Native futures, the lives to be lived once the settler nation is gone - these are the unwritten possibilities made possible by an ethic of incommensurability. *when you take away the punctuation he says of lines lifted from the documents about military-occupied land its acreage and location you take away its finality opening the possibility of other futures* -Craig Santos Perez, Chamoru scholar and poet (as quoted by Voeltz, 2012) Decolonization offers a different perspective to human and civil rights based approaches to justice, an unsettling one, rather than a complementary one. Decolonization is not an “and”. It is an elsewhere.

#### Asterisks DA – the permutation is a token gesture and settler move to innocence that moves indigenous nations to the margins and assimilates Native sovereignty

Tuck and Yang 12

(Eve Tuck, Unangax, State University of New York at New Paltz K. Wayne Yang University of California, San Diego, Decolonization is not a metaphor, Decolonization: Indigeneity, Education & Society Vol. 1, No. 1, 2012, pp. 1-40, JKS)

Moves to innocence V: A(s)t(e)risk peoples This settler move to innocence is concerned with the ways in which Indigenous peoples are counted, codified, represented, and included/disincluded by educational researchers and other social science researchers. Indigenous peoples are rendered visible in mainstream educational research in two main ways: as “at risk” peoples and as asterisk peoples. This comprises a settler move to innocence because it erases and then conceals the erasure of Indigenous peoples within the settler colonial nation-state and moves Indigenous nations as “populations” to the margins of public discourse. As “at risk” peoples, Indigenous students and families are described as on the verge of extinction, culturally and economically bereft, engaged or soon-to-be engaged in self-destructive behaviors which can interrupt their school careers and seamless absorption into the economy. Even though it is widely known and verified that Native youth gain access to personal and academic success when they also have access to/instruction in their home languages, most Native American and Alaskan Native youth are taught in English-only schools by temporary teachers who know little about their students’ communities (Lomawaima and McCarty, 2006; Lee, 2011). Even though Indigenous knowledge systems predate, expand, update, and complicate the curricula found in most public schools, schools attended by poor Indigenous students are among those most regimented in attempts to comply with federal mandates. Though these mandates intrude on the sovereignty of Indigenous peoples, the “services” promised at the inception of these mandates do little to make the schools attended by Indigenous youth better at providing them a compelling, relevant, inspiring and meaningful education. At the same time, Indigenous communities become the asterisk peoples, meaning they are represented by an asterisk in large and crucial data sets, many of which are conducted to inform public policy that impact our/their lives (Villegas, 2012). Education and health statistics are unavailable from Indigenous communities for a variety of reasons and, when they are made available, the size of the n, or the sample size, can appear to be negligible when compared to the sample size of other/race-based categories. Though Indigenous scholars such as Malia Villegas recognize that Indigenous peoples are distinct from each other but also from other racialized groups surveyed in these studies, they argue that difficulty of collecting basic education and health information about this small and heterogeneous category must be overcome in order to counter the disappearance of Indigenous particularities in public policy. In U.S. educational research in particular, Indigenous peoples are included only as asterisks, as footnotes into dominant paradigms of educational inequality in the U.S. This can be observed in the progressive literature on school discipline, on ‘underrepresented minorities’ in higher education, and in the literature of reparation, i.e., redressing ‘past’ wrongs against non- white Others. Under such paradigms, which do important work on alleviating the symptoms of colonialism (poverty, dispossession, criminality, premature death, cultural genocide), Indigeneity is simply an “and” or an illustration of oppression. ‘Urban education’, for example, is a code word for the schooling of black, brown, and ghettoized youth who form the numerical majority in divested public schools. Urban American Indians and Native Alaskans become an asterisk group, invisibilized, even though about two-thirds of Indigenous peoples in the U.S. live in urban areas, according to the 2010 census. Yet, urban Indians receive fewer federal funds for education, health, and employment than their counterparts on reservations (Berry, 2012). Similarly, Native Pasifika people become an asterisk in the Asian Pacific Islander category and their politics/epistemologies/experiences are often subsumed under a pan-ethnic Asian-American master narrative. From a settler viewpoint that concerns itself with numerical inequality, e.g. the achievement gap, underrepresentation, and the 99%’s short share of the wealth of the metropole, the asterisk is an outlier, an outnumber. It is a token gesture, an inclusion and an enclosure of Native people into the politics of equity. These acts of inclusion assimilate Indigenous sovereignty, ways of knowing, and ways of being by remaking a collective-comprised tribal identity into an individualized ethnic identity. From a decolonizing perspective, the asterisk is a body count that does not account for Indigenous politics, educational concerns, and epistemologies. Urban land (indeed all land) is Native land. The vast majority of Native youth in North America live in urban settings. Any decolonizing urban education endeavor must address the foundations of urban land pedagogy and Indigenous politics vis-a-vis the settler colonial state.

#### The role of the ballot is to center indigenous resistance-- Any ethical commitment requires that the debate places itself in the center of Native demands.

Carlson 16 (Elizabeth Carlson, PhD, is an Aamitigoozhi, Wemistigosi, and Wasicu (settler Canadian and American), whose Swedish, Saami, German, Scots-Irish, and English ancestors have settled on lands of the Anishinaabe and Omaha Nations which were unethically obtained by the US government. Elizabeth lives on Treaty 1 territory, the traditional lands of the Anishinaabe, Nehiyawak, Dakota, Nakota, and Red River Metis peoples currently occupied by the city of Winnipeg, the province of Manitoba, (2016): Anti-colonial methodologies and practices for settler colonial studies, Settler Colonial Studies, DOI: 10.1080/2201473X.2016.1241213, JKS)

Arlo Kempf says that ‘where anticolonialism is a tool used to invoke resistance for the colonized, it is a tool used to invoke accountability for the colonizer’.42 Relational accountability should be a cornerstone of settler colonial studies. I believe settler colonial studies and scholars should ethically and overtly place themselves in relationship to the centuries of Indigenous oral, and later academic scholarship that conceptualizes and resists settler colonialism without necessarily using the term: SCT may be revelatory to many settler scholars, but Indigenous people have been speaking for a long time about colonial continuities based on their lived experiences. Some SCTs have sought to connect with these discussions and to foreground Indigenous resistance, survival and agency. Others, however, seem to use SCT as a pathway to explain the colonial encounter without engaging with Indigenous people and experiences – either on the grounds that this structural analysis already conceptually explains Indigenous experience, or because Indigenous resistance is rendered invisible.43 Ethical settler colonial theory (SCT) would recognize the foundational role Indigenous scholarship has in critiques of settler colonialism. It would acknowledge the limitations of settler scholars in articulating settler colonialism without dialogue with Indigenous peoples, and take as its norm making this dialogue evident. In my view, it is critical that we not view settler colonial studies as a new or unique field being established, which would enact a discovery narrative and contribute to Indigenous erasure, but rather take a longer and broader view. Indigenous oral and academic scholars are indeed the originators of this work. This space is not empty. Of course, powerful forces of socialization and discipline impact scholars in the academy. There is much pressure to claim unique space, to establish a name for ourselves, and to make academic discoveries. I am suggesting that settler colonial studies and anti-colonial scholars resist these hegemonic pressures and maintain a higher anti-colonial ethic. As has been argued, ‘the theory itself places ethical demands on us as settlers, including the demand that we actively refuse its potential to re-empower our own academic voices and to marginalize Indigenous resistance’.44 As settler scholars, we can reposition our work relationally and contextually with humi- lity and accountability. We can centre Indigenous resistance, knowledges, and scholarship in our work, and contextualize our work in Indigenous sovereignty. We can view oral Indigenous scholarship as legitimate scholarly sources. We can acknowledge explicitly and often the Indigenous traditions of resistance and scholarship that have taught us and pro- vided the foundations for our work. If our work has no foundation of Indigenous scholarship and mentorship, I believe our contributions to settler colonial studies are even more deeply problematic.

### 1NC – DA

#### NASA is preserving resources by leveraging private partnerships

Miriam Kramer 21, author of Space, “NASA's plans for the future hinge on the success of private companies,” Axios, 12-7-2021, https://www.axios.com/nasa-private-spaceflight-plans-5a5710e6-5223-4da3-8c5d-5a712e1d862e.html

The private space players who will drive NASA's plans for the coming decade are declaring themselves and defining the stakes. Why it matters: NASA plans to focus on getting people to Mars and the Moon, and its deep space exploration ambitions hinge on the agency being able to successfully hand over major operations in low-Earth orbit to private companies. The space agency hopes companies will build private space stations that its astronauts can use and to continue to buy space on private rockets for launching its satellites and other payloads to orbit and beyond. NASA's "big experiment" right now is to test where these commercial partnerships work, the Planetary Society's Casey Dreier told Axios. What's happening: Last week, NASA announced it would award multimillion-dollar contracts to three teams of commercial space companies to start designing and building privately operated space stations.

#### Plan forces NASA trade-offs that crush effective Earth sciences --- risks catastrophic climate change

Haymet 7 (Tony, Director of the Scripps Institution of Oceanography – University of California, San Diego, Mark Abbott, Dean of the College of Oceanic and Atmospheric Science – Oregon State University, and Jim Luyten, Acting Director – Woods Hole Oceanographic Institution, “The Planet NASA Needs to Explore”, Washington Post, 5-10, [http://www.washingtonpost.com/wp-dyn/content/article/2007/05/09/AR2007050902451.html](http://www.lexis.com/research/retrieve))

Decades ago, a shift in NASA priorities sidelined progress in human space exploration. As momentum gathers to reinvigorate human space missions to the moon and Mars, we risk hurting ourselves, and Earth, in the long run. Our planet -- not the moon or Mars -- is under significant threat from the consequences of rapid climate change. Yet the changing NASA priorities will threaten exploration here at home. NASA not only launches shuttles and builds space stations, it also builds and operates our nation's satellites that observe and monitor the Earth. These satellites collect crucial global data on winds, ice and oceans. They help us forecast hurricanes, track the loss of Arctic sea ice and the rise of sea levels, and understand and prepare for climate changes. NASA's budget for science missions has declined 30 percent in the past six years, and that trend is expected to continue. As more dollars are reallocated to prepare for missions back to the moon and Mars, sophisticated new satellites to observe the Earth will be delayed, harming Earth sciences. The National Academy of Sciences has noted that the Landsat satellite system, which takes important measurements of global vegetation, is in its fourth decade of operation and could fail without a clear plan for continuation. The same is true for the QuikSCAT satellite, which provides critical wind data used in forecasting hurricanes and El Niño effects. In January, a partnership of university and NASA scientists demonstrated that climate change and higher ocean temperatures were reducing the growth of microscopic plants and animals at the heart of the marine food web. Their analysis was based on nearly a decade of NASA satellite measurements of ocean color, which unfortunately are at risk of being interrupted for several years. Sea levels are rising, and the Arctic Ocean may be ice-free in summer. The buildup of carbon dioxide in the oceans threatens to make them more acidic, which may in turn hinder the ability of some types of marine life, including corals, to build their shells and skeletons. We must learn as much as we can to assess these threats and develop solutions. Satellites provide coverage of vast, remote regions of our planet that would otherwise remain unseen, especially the oceans, which play an important role in climate change. Without accurate data on such fundamentals as sea surface height, temperatures and biomass, as well as glacier heights and snowpack thickness, we will not be able to understand the likelihood of dangers such as more severe hurricanes along the Gulf Coast or more frequent forest fires in the Pacific Northwest. Climate change is the most critical problem the Earth has ever faced. Government agencies and the private sector, as well as individual citizens, need to better grasp the risks and potential paths of global climate change. Mitigating these risks and preparing for the effects of warming will require scientific understanding of how our complex planet operates, how it is changing, and how that change will affect the environment and human society. John F. Kennedy's brilliant call to put a man on the moon by the end of the 1960s set an arbitrary deadline, but the deadline we face today is set by nature. NASA must continue to play a vital role in helping find ways to protect our planet for (and perhaps from) its intelligent life. Exploration of space is a noble quest. But we can't afford to be so starry-eyed that we overlook our own planet.

#### Warming causes extinction – any reduction should be prioritized above any other impact

Ramanathan et al. 17 [Veerabhadran Ramanathan is Victor Alderson Professor of Applied Ocean Sciences and director of the Center for Atmospheric Sciences at the Scripps Institution of Oceanography, University of California, San Diego, Dr. William Collins is an internationally recognized expert in climate modeling and climate change science. He is the Director of the Climate and Ecosystem Sciences Division (CESD) for the Earth and Environmental Sciences Area (EESA) at the Lawrence Berkeley National Laboratory (LBNL), Prof. Dr Mark Lawrence, Ph.D. is scientific director at the Institute for Advanced Sustainability Studies (IASS) in Potsdam, Örjan Gustafsson is a Professor in the Department of Environmental Science and Analytic Chemistry at Stockholm University, Shichang Kang is Professor, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences (CAS); CAS Center for Excellence in Tibetan Plateau Earth Sciences, and Molina, M.J., Zaelke, D., Borgford-Parnell, N., Xu, Y., Alex, K., Auffhammer, M., Bledsoe, P., Croes, B., Forman, F., Haines, A., Harnish, R., Jacobson, M.Z., Lawrence, M., Leloup, D., Lenton, T., Morehouse, T., Munk, W., Picolotti, R., Prather, K., Raga, G., Rignot, E., Shindell, D., Singh, A.K., Steiner, A., Thiemens, M., Titley, D.W., Tucker, M.E., Tripathi, S., & Victor, D., authors come from the following 9 countries - US, Switzerland, Sweden, UK, China, Germany, Australia, Mexico, India, “Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change,” Report of the Committee to Prevent Extreme Climate Change, September 2017, http://www.igsd.org/wp-content/uploads/2017/09/Well-Under-2-Degrees-Celsius-Report-2017.pdf] TDI

Climate change is becoming an existential threat with warming in excess of 2°C within the next three decades and 4°C to 6°C within the next several decades. Warming of such magnitudes will expose as many as 75% of the world’s population to deadly heat stress in addition to disrupting the climate and weather worldwide. Climate change is an urgent problem requiring urgent solutions. This paper lays out urgent and practical solutions that are ready for implementation now, will deliver benefits in the next few critical decades, and places the world on a path to achieving the longterm targets of the Paris Agreement and near-term sustainable development goals. The approach consists of four building blocks and 3 levers to implement ten scalable solutions described in this report by a team of climate scientists, policy makers, social and behavioral scientists, political scientists, legal experts, diplomats, and military experts from around the world. These solutions will enable society to decarbonize the global energy system by 2050 through efficiency and renewables, drastically reduce short-lived climate pollutants, and stabilize the climate well below 2°C both in the near term (before 2050) and in the long term (post 2050). It will also reduce premature mortalities by tens of millions by 2050. As an insurance against policy lapses, mitigation delays and faster than projected climate changes, the solutions include an Atmospheric Carbon Extraction lever to remove CO2 from the air. The amount of CO2 that must be removed ranges from negligible, if the emissions of CO2 from the energy system and SLCPs start to decrease by 2020 and carbon neutrality is achieved by 2050, to a staggering one trillion tons if the carbon lever is not pulled and emissions of climate pollutants continue to increase until 2030. There are numerous living laboratories including 53 cities, many universities around the world, the state of California, and the nation of Sweden, who have embarked on a carbon neutral pathway. These laboratories have already created 8 million jobs in the clean energy industry; they have also shown that emissions of greenhouse gases and air pollutants can be decoupled from economic growth. Another favorable sign is that growth rates of worldwide carbon emissions have reduced from 2.9% per year during the first decade of this century to 1.3% from 2011 to 2014 and near zero growth rates during the last few years. The carbon emission curve is bending, but we have a long way to go and very little time for achieving carbon neutrality. We need institutions and enterprises that can accelerate this bending by scaling-up the solutions that are being proven in the living laboratories. We have less than a decade to put these solutions in place around the world to preserve nature and our quality of life for generations to come. The time is now. The Paris Agreement is an historic achievement. For the first time, effectively all nations have committed to limiting their greenhouse gas emissions and taking other actions to limit global temperature change. Specifically, 197 nations agreed to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels,” and achieve carbon neutrality in the second half of this century. The climate has already warmed by 1°C. The problem is running ahead of us, and under current trends we will likely reach 1.5°C in the next fifteen years and surpass the 2°C guardrail by mid-century with a 50% probability of reaching 4°C by end of century. Warming in excess of 3°C is likely to be a global catastrophe for three major reasons: • Warming in the range of 3°C to 5°C is suggested as the threshold for several tipping points in the physical and geochemical systems; a warming of about 3°C has a probability of over 40% to cross over multiple tipping points, while a warming close to 5°C increases it to nearly 90%, compared with a baseline warming of less than 1.5°C, which has only just over a 10% probability of exceeding any tipping point. • Health effects of such warming are emerging as a major if not dominant source of concern. Warming of 4°C or more will expose more than 70% of the population, i.e. about 7 billion by the end of the century, to deadly heat stress and expose about 2.4 billion to vector borne diseases such as Dengue, Chikengunya, and Zika virus among others. Ecologists and paleontologists have proposed that warming in excess of 3°C, accompanied by increased acidity of the oceans by the buildup of CO2 , can become a major causal factor for exposing more than 50% of all species to extinction. 20% of species are in danger of extinction now due to population, habitat destruction, and climate change. The good news is that there may still be time to avert such catastrophic changes. The Paris Agreement and supporting climate policies must be strengthened substantially within the next five years to bend the emissions curve down faster, stabilize climate, and prevent catastrophic warming. To the extent those efforts fall short, societies and ecosystems will be forced to contend with substantial needs for adaptation—a burden that will fall disproportionately on the poorest three billion who are least responsible for causing the climate change problem. Here we propose a policy roadmap with a realistic and reasonable chance of limiting global temperature to safe levels and preventing unmanageable climate change—an outline of specific science-based policy pathways that serve as the building blocks for a three-lever strategy that could limit warming to well under 2°C. The projections and the emission pathways proposed in this summary are based on a combination of published recommendations and new model simulations conducted by the authors of this study (see Figure 2). We have framed the plan in terms of four building blocks and three levers, which are implemented through 10 solutions. The first building block would be fully implementing the nationally determined mitigation pledges under the Paris Agreement of the UN Framework Convention on Climate Change (UNFCCC). In addition, several sister agreements that provide targeted and efficient mitigation must be strengthened. Sister agreements include the Kigali Amendment to the Montreal Protocol to phase down HFCs, efforts to address aviation emissions through the International Civil Aviation Organization (ICAO), maritime black carbon emissions through the International Maritime Organization (IMO), and the commitment by the eight countries of the Arctic Council to reduce black carbon emissions by up to 33%. There are many other complementary processes that have drawn attention to specific actions on climate change, such as the Group of 20 (G20), which has emphasized reform of fossil fuel subsidies, and the Climate and Clean Air Coalition (CCAC). HFC measures, for example, can avoid as much as 0.5°C of warming by 2100 through the mandatory global phasedown of HFC refrigerants within the next few decades, and substantially more through parallel efforts to improve energy efficiency of air conditioners and other cooling equipment potentially doubling this climate benefit. For the second building block, numerous subnational and city scale climate action plans have to be scaled up. One prominent example is California’s Under 2 Coalition signed by over 177 jurisdictions from 37 countries in six continents covering a third of world economy. The goal of this Memorandum of Understanding is to catalyze efforts in many jurisdictions that are comparable with California’s target of 40% reductions in CO2 emissions by 2030 and 80% reductions by 2050—emission cuts that, if achieved globally, would be consistent with stopping warming at about 2°C above pre-industrial levels. Another prominent example is the climate action plans by over 52 cities and 65 businesses around the world aiming to cut emissions by 30% by 2030 and 80% to 100% by 2050. There are concerns that the carbon neutral goal will hinder economic progress; however, real world examples from California and Sweden since 2005 offer evidence that economic growth can be decoupled from carbon emissions and the data for CO2 emissions and GDP reveal that growth in fact prospers with a green economy. The third building block consists of two levers that we need to pull as hard as we can: one for drastically reducing emissions of short-lived climate pollutants (SLCPs) beginning now and completing by 2030, and the other for decarbonizing the global energy system by 2050 through efficiency and renewables. Pulling both levers simultaneously can keep global temperature rise below 2°C through the end of the century. If we bend the CO2 emissions curve through decarbonization of the energy system such that global emissions peak in 2020 and decrease steadily thereafter until reaching zero in 2050, there is less than a 20% probability of exceeding 2°C. This call for bending the CO2 curve by 2020 is one key way in which this report’s proposal differs from the Paris Agreement and it is perhaps the most difficult task of all those envisioned here. Many cities and jurisdictions are already on this pathway, thus demonstrating its scalability. Achieving carbon neutrality and reducing emissions of SLCPs would also drastically reduce air pollution globally, including all major cities, thus saving millions of lives and over 100 million tons of crops lost to air pollution each year. In addition, these steps would provide clean energy access to the world’s poorest three billion who are still forced to resort to 18th century technologies to meet basic needs such as cooking. For the fourth and the final building block, we are adding a third lever, ACE (Atmospheric Carbon Extraction, also known as Carbon Dioxide Removal, or “CDR”). This lever is added as an insurance against surprises (due to policy lapses, mitigation delays, or non-linear climate changes) and would require development of scalable measures for removing the CO2 already in the atmosphere. The amount of CO2 that must be removed will range from negligible, if the emissions of CO2 from the energy system and SLCPs start to decrease by 2020 and carbon neutrality is achieved by 2050, to a staggering one trillion tons, if CO2 emissions continue to increase until 2030, and the carbon lever is not pulled until after 2030. This issue is raised because the NDCs (Nationally Determined Contributions) accompanying the Paris Agreement would allow CO2 emissions to increase until 2030. We call on economists and experts in political and administrative systems to assess the feasibility and cost-effectiveness of reducing carbon and SLCPs emissions beginning in 2020 compared with delaying it by ten years and then being forced to pull the third lever to extract one trillion tons of CO2 The fast mitigation plan of requiring emissions reductions to begin by 2020, which means that many countries need to cut now, is urgently needed to limit the warming to well under 2°C. Climate change is not a linear problem. Instead, we are facing non-linear climate tipping points that can lead to self-reinforcing and cascading climate change impacts. Tipping points and selfreinforcing feedbacks are wild cards that are more likely with increased temperatures, and many of the potential abrupt climate shifts could happen as warming goes from 1.5°C in 15 years to 2°C by 2050, with the potential to push us well beyond the Paris Agreement goals. Where Do We Go from Here? A massive effort will be needed to stop warming at 2°C, and time is of the essence. With unchecked business-as-usual emissions, global warming has a 50% likelihood of exceeding 4ºC and a 5% probability of exceeding 6ºC in this century, raising existential questions for most, but especially the poorest three billion people. A 4ºC warming is likely to expose as many as 75% of the global population to deadly heat. Dangerous to catastrophic impacts on the health of people including generations yet to be born, on the health of ecosystems, and on species extinction have emerged as major justifications for mitigating climate change well below 2ºC, although we must recognize that the uncertainties intrinsic in climate and social systems make it hard to pin down exactly the level of warming that will trigger possibly catastrophic impacts. To avoid these consequences, we must act now, and we must act fast and effectively. This report sets out a specific plan for reducing climate change in both the near- and long-term. With aggressive urgent actions, we can protect ourselves. Acting quickly to prevent catastrophic climate change by decarbonization will save millions of lives, trillions of dollars in economic costs, and massive suffering and dislocation to people around the world. This is a global security imperative, as it can avoid the migration and destabilization of entire societies and countries and reduce the likelihood of environmentally driven civil wars and other conflicts. Staying well under 2°C will require a concerted global effort. We must address everything from our energy systems to our personal choices to reduce emissions to the greatest extent possible. We must redouble our efforts to invent, test, and perfect systems of governance so that the large measure of international cooperation needed to achieve these goals can be realized in practice. The health of people for generations to come and the health of ecosystems crucially depend on an energy revolution beginning now that will take us away from fossil fuels and toward the clean renewable energy sources of the future. It will be nearly impossible to obtain other critical social goals, including for example the UN agenda 2030 with the Sustainable Development Goals, if we do not make immediate and profound progress stabilizing climate, as we are outlining here. 1. The Building Blocks Approach The 2015 Paris Agreement, which went into effect November 2016, is a remarkable, historic achievement. For the frst time, essentially all nations have committed to limit their greenhouse gas emissions and take other actions to limit global temperature and adapt to unavoidable climate change. Nations agreed to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels” and “achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century” (UNFCCC, 2015). Nevertheless, the initial Paris Agreement has to be strengthened substantially within fve years if we are to prevent catastrophic warming; current pledges place the world on track for up to 3.4°C by 2100 (UNEP, 2016b). Until now, no specifc policy roadmap exists that provides a realistic and reasonable chance of limiting global temperatures to safe levels and preventing unmanageable climate change. This report is our attempt to provide such a plan— an outline of specifc solutions that serve as the building blocks for a comprehensive strategy for limiting the warming to well under 2°C and avoiding dangerous climate change (Figure 1). The frst building block is the full implementation of the nationally determined mitigation pledges under the Paris Agreement of the UN Framework Convention on Climate Change (UNFCCC) and strengthening global sister agreements, such as the Kigali Amendment to the Montreal Protocol to phase down HFCs, which can provide additional targeted, fast action mitigation at scale. For the second building block, numerous sub-national and city scale climate action plans have to be scaled up such as California’s Under 2 Coalition signed by 177 jurisdictions from 37 countries on six continents. The third building block is targeted measures to reduce emissions of shortlived climate pollutants (SLCPs), beginning now and fully implemented by 2030, along with major measures to fully decarbonize the global economy, causing the overall emissions growth rate to stop in 2020-2030 and reach carbon neutrality by 2050. Such a deep decarbonization would require an energy revolution similar to the Industrial Revolution that was based on fossil fuels. The fnal building block includes scalable and reversible carbon dioxide (CO2 ) removal measures, which can begin removing CO2 already emitted into the atmosphere. Such a plan is urgently needed. Climate change is not a linear problem. Instead, climate tipping points can lead to self-reinforcing, cascading climate change impacts (Lenton et al., 2008). Tipping points are more likely with increased temperatures, and many of the potential abrupt climate shifts could happen as warming goes from 1.5°C to 2°C, with the potential to push us well beyond the Paris Agreement goals (Drijfhout et al., 2015). In order to avoid dangerous climate change, we must address these concerns. We must act now, and we must act fast. Reduction of SLCPs will result in fast, near-term reductions in warming, while present-day reductions of CO2 will result in long-term climate benefts. This two-lever approach—aggressively cutting both SLCPs and CO2 –-will slow warming in the coming decades when it is most crucial to avoid impacts from climate change as well as maintain a safe climate many decades from now. To achieve the nearterm goals, we have outlined solutions to be implemented immediately. These solutions to bend down the rising emissions curve and thus bend the warming trajectory curve follow a 2015 assessment by the University of California under its Carbon Neutrality Initiative (Ramanathan et al., 2016). The solutions are clustered into categories of social transformation, governance improvement, market- and regulation-based solutions, technological innovation and transformation, and natural and ecosystem management. Additionally, we need to intensely investigate and pursue a third lever—ACE (Atmospheric Carbon Extraction). While many potential technologies exist, we do not know the extent to which they could be scaled up to remove the requisite amount of carbon from the atmosphere in order to achieve the Paris Agreement goals, and any delay in mitigation will demand increasing reliance on these technologies. Yet, there is still hope. Humanity can come together, as we have done in the past, to collaborate towards a common goal. We have no choice but to tackle the challenge of climate change. We only have the choice of when and how: either now, through the ambitious plan outlined here, or later, through radical adaptation and societal transformations in response to an ever-deteriorating climate system that will unleash devastating impacts—some of which may be beyond our capacity to fully adapt to or reverse for thousands of years. 2. Major Climate Disruptions: How Soon and How Fast? “Without adequate mitigation and adaptation, climate change poses unacceptable risks to global public health.” (WHO, 2016) The planet has already witnessed nearly 1°C of warming, and another 0.6°C of additional warming is currently stored in the ocean to be released over the next two to four decades, if climate warming emissions are not radically reduced during that time (IPCC, 2013). The impacts of this warming on extreme weather, droughts, and foods are being felt by society worldwide to the extent that many think of this no longer as climate change but as climate disruption. Consider the business as usual scenario: 15 years from now: In 15 years, planetary warming will reach 1.5°C above pre-industrial global mean temperature (Ramanathan and Xu, 2010; Shindell et al., 2012). This exceeds the 0.5°C to 1°C of warming during the Eemian period, 115,000– 130,000 years ago, when sea-levels reached 6-9 meters (20-30 feet) higher than today (Hansen et al., 2016b). The impacts of this warming will affect us all yet will disproportionately affect the Earth’s poorest three billion people, who are primarily subsistence farmers that still rely on 18th century technologies and have the least capacity to adapt (IPCC, 2014a; Dasgupta et al., 2015). They thus may be forced to resort to mass migration into city slums and push across international borders (U.S. DOD, 2015). The existential fate of lowlying small islands and coastal communities will also need to be addressed, as they are primarily vulnerable to sea-level rise, diminishing freshwater resources, and more intense storms. In addition, many depend on fsheries for protein, and these are likely to be affected by ocean acidifcation and climate change. Climate injustice could start causing visible regional and international conficts. All of this will be exacerbated as the risk of passing tipping points increases (Lenton et al., 2008). 30 years from now: By mid-century, warming is expected to exceed 2°C, which would be unprecedented with respect to historical records of at least the last one million years (IPCC, 2014c). Such a warming through this century could result in sea-level rise of as much as 2 meters by 2100, with greater sea-level rise to follow. A group of tipping points are clustered between 1.5°C and 2°C (Figure 2) (Drijfhout et al., 2015). The melting of most mountain glaciers, including those in the Tibetan-Himalayas, combined with mega-droughts, heat waves, storms, and foods, would adversely affect nearly everyone on the planet. 80 years from now: In 80 years, warming is expected to exceed 4°C, increasing the likelihood of irreversible and catastrophic change (World Bank, 2013b). 4ºC warming is likely to expose as much as 75% of the global population to deadly heat (Mora et al., 2017). The 2°C and 4°C values quoted above and in other reports, however, are merely the central values with a 50% probability of occurrence (Ramanathan and Feng, 2008). There is a 5% probability the warming could be as high as 6°C due to uncertainties in the magnitude of amplifying feedbacks (see Section 4). This in turn could lead to major disruptions to natural and social systems, threatening food security, water security, and national security and fundamentally affecting the great majority of the projected 11.2 billion inhabitants of the planet in 2100 (UN DESA, 2015). 3. What Are the Wild Cards for Climate Disruption? Increasing the concentrations of greenhouse gases in the atmosphere increases radiative forcing (the difference between the amount of energy entering the atmosphere and leaving) and thus increases the global temperature (IPCC, 2013). However, climate wild cards exist that can alter the linear connection with warming and anthropogenic emissions by triggering abrupt changes in the climate (Lenton et al., 2008). Some of these wild cards have not been thoroughly captured by the models that policymakers rely on the most. These abrupt shifts are irreversible on a human time scale (<100 years) and will create a notable disruption to the climate system, condemning the world to warming beyond that which we have previously projected. These climate disruptions would divert resources from needed mitigation and upset mitigation strategies that we have already put in place. 1. Unmasking Aerosol Cooling: The frst such wild card is the unmasking of an estimated 0.7°C (with an uncertainty range of 0.3°C to 1.2°C) of the warming in addition to mitigating other aerosol effects such as disrupting rainfall patterns, by reducing emissions of aerosols such as sulfates and nitrates as part of air pollution regulations (Wigley, 1991; Ramanathan and Feng, 2008). Aerosol air pollution is a major health hazard with massive costs to public health and society, including contributing to about 7 million deaths (from household and ambient exposure) each year (WHO, 2014). While some aerosols, such as black carbon and brown carbon, strongly absorb sunlight and warm the climate, others refect sunlight back into space, which cools the climate (Ramanathan and Carmichael, 2008). The net impact of all manmade aerosols is negative, meaning that about 30% of the warming from greenhouse gases is being masked by co-emitted air pollution particles (Ramanathan and Carmichael, 2008). As we reduce greenhouse gas emissions and implement policies to eliminate air pollution, we are also reducing the concentration of aerosols in the air. Aerosols last in the atmosphere for about a week, so if we eliminate air pollution without reducing emissions of the greenhouse gases, the unmasking alone would lead to an estimated 0.7°C of warming within a matter of decades (Ramanathan and Feng, 2008). We must eliminate all aerosol emissions due to their health effects, but we must simultaneously mitigate emissions of CO2 , other greenhouse gases, and black carbon and co-pollutants to avoid an abrupt and very large jump in the near-term warming beyond 2°C (Brasseur and Roeckner, 2005). 2. Tipping Points: It is likely that **as we cross the 1.5°C to 2°C thresholds we will trigger so called “tipping points” for abrupt and nonlinear changes in the climate system with catastrophic consequences** for humanity and the environment (Lenton, 2008; Drijfhout et al., 2015). Once the tipping points are passed, the resulting impacts will range in timescales from: disruption of monsoon systems (transition in a year), loss of sea ice (approximately a decade for transition), dieback of major forests (nearly half a century for transition), reorganization of ocean circulation (approximately a century for transition), to loss of ice sheets and subsequent sea-level rise (transition over hundreds of years) (Lenton et al., 2008). Regardless of timescale, once underway many of these changes would be irreversible (Lontzek et al., 2015). There is also a likelihood of crossing over multiple tipping points simultaneously. Warming of close to 3°C would subject the system to a 46% probability of crossing multiple tipping points, while warming of close to 5°C would increase the risk to 87% (Cai et al., 2016). Recent modeling work shows a “cluster” of these tipping points could be triggered between 1.5°C and 2°C warming (Figure 2), including melting of land and sea ice and changes in highlatitude ocean circulation (deep convection) (Drijfhout et al., 2015). This is consistent with existing observations and understanding that the polar regions are particularly sensitive to global warming and have several potentially imminent tipping points. The Arctic is warming nearly twice as quickly as the global average, which makes the abrupt changes in the Arctic more likely at a lower level of global warming (IPCC, 2013). Similarly, the Himalayas are warming at roughly the same rate as the Arctic and are thus also more susceptible to incremental changes in temperature (UNEP-WMO, 2011). This gives further justifcation for limiting warming to no more than 1.5°C. While all climate tipping points have the potential to rapidly destabilize climate, social, and economic systems, some are also self-amplifying feedbacks that once set in motion increase warming in such a way **that they perpetuate yet even more warming**. **Declining Arctic sea ice, thawing permafrost, and the poleward migration of cloud systems are all examples of self-amplifying feedback mechanisms, where initial warming feeds upon itself to cause still more warming acting as a force multiplier** (Schuur et al., 2015).

#### Warming independently triggers global war - extinction

Eric **Holthaus 15**, editor at rollingstone magazine citing James Hansen, former NASA climatologist, "The Point of No Return: Climate Change Nightmares Are Here," Rolling Stone, accessed 10-23-2016, http://www.rollingstone.com/politics/news/the-point-of-no-return-climate-change-nightmares-are-already-here-20150805

On July 20th, James Hansen, the former NASA climatologist who brought climate change to the public's attention in the summer of 1988, issued a bombshell: He and a team of climate scientists had identified a newly important feedback mechanism off the coast of Antarctica that suggests mean sea levels could rise 10 times faster than previously predicted: 10 feet by 2065. The authors included this chilling warning: If emissions aren't cut, "We conclude that multi-meter sea-level rise would become practically unavoidable. Social disruption and economic consequences of such large sea-level rise could be devastating. It is not difficult to imagine that conflicts arising from forced migrations and economic collapse might make the planet ungovernable, threatening the fabric of civilization."

## Case

### 1NC – AT: Debris

#### Alt cause – broad space privatization and existing debris.

Muelhapt et al 19 [(Theodore J., Center for Orbital and Reentry Debris Studies, Center for Space Policy and Strategy, The Aerospace Corporation, 30 year Space Systems Analyst and Operator, Marlon E. Sorge, Jamie Morin, Robert S. Wilson), “Space traffic management in the new space era,” Journal of Space Safety Engineering, 6/18/19, https://doi.org/10.1016/j.jsse.2019.05.007] TDI

The last decade has seen rapid growth and change in the space industry, and an explosion of commercial and private activity. Terms like NewSpace or democratized space are often used to describe this global trend to develop faster and cheaper access to space, distinct from more traditional government-driven activities focused on security, political, or scientific activities. The easier access to space has opened participation to many more participants than was historically possible. This new activity could profoundly worsen the space debris environment, particularly in low Earth orbit (LEO), but there are also signs of progress and the outlook is encouraging. Many NewSpace operators are actively working to mitigate their impact. Nevertheless, NewSpace represents a significant break with past experience and business as usual will not work in this changed environment. New standards, space policy, and licensing approaches are powerful levers that can shape the future of operations and the debris environment. 2. Characterizing NewSpace: a step change in the space environment In just the last few years, commercial companies have proposed, funded, and in a few cases begun deployment of very large constellations of small to medium-sized satellites. These constellations will add much more complexity to space operations. Table 1 shows some of the constellations that have been announced for launch in the next decade. Two dozen companies, when taken together, have proposed placing well over ~~20,000~~ [twenty thousand] satellites in orbit in the next ~~10~~ [10]years. For perspective, fewer than ~~8100~~[eight thousand one hundred] payloads have been placed in Earth orbit in the entire history of the space age, only 4800 [1] remain in orbit and approximately 1950 [2] of those are still active. And it isn't simply numbers – the mass in orbit will increase substantially, and long-term debris generation is strongly correlated with mass. [Table 1 Omitted] This table is in constant flux. It is based largely on U.S. filings with the Federal Communications Commission (FCC) and various press releases, but many of the companies here have already altered or abandoned their original plans, and new systems are no doubt in work. Although many of these large constellations may never be launched as listed, the traffic created if just half are successful would be more than double the number of payloads launched in the last 60 years and more than 6 times the number of currently active satellites. Current space safety, space surveillance, collision avoidance (COLA) and debris mitigation processes have been designed for and have evolved with the current population profile, launch rates and density of LEO space. By almost any metric used to measure activity in space, whether it is payloads in orbit, the size of constellations, the rate of launches, the economic stakes, the potential for debris creation, the number of conjunctions, NewSpace represents a fundamental change. 3. Compounding effects of better SSA, more satellites, and new operational concepts The changes in the space environment can be seen on this figurative map of low Earth orbit. Fig. 1 shows the LEO environment as a function of altitude. The number of objects found in each 10 km “bin” is plotted on the horizontal axis, while the altitude is plotted vertically. Objects in elliptical orbits are distributed between bins as partial objects proportional to the time spent in each bin. Some notable resident systems are indicated in blue text on the right to provide an altitude reference. The (dotted) red line shows the number of objects in the current catalog tracked by the U.S. Space Surveillance Network (SSN). All the COLA alerts and actions that must be taken by the residents are due to their neighbors in the nearby bins, so the currently visible risk is proportional to the red line.  The red line of the current catalog does not represent the complete risk; it indicates the risk we can track and perhaps avoid. A rule of thumb is that the current SSN LEO catalog contains objects about 10 cm or larger. It is generally accepted that an impact in LEO with an object 1 cm or larger will cause damage likely to be fatal to a satellite's mission. Therefore, there is a large latent risk from unobserved debris. While we cannot currently track and catalog much smaller than 10 cm, experiments have been performed to detect and sample much smaller objects and statistically model the population at this size [3]. The (solid) blue line represents the model of the 1 cm and larger debris that is likely mission-ending, usually called lethal but not trackable. If LEO operators avoid collisions with all the objects in the red line, they are nonetheless inherently accepting the risk from the blue line. This risk is already present. The (dashed) orange line is an estimate of the population at 5 cm and larger and is thus an estimate of what the catalog might conservatively be a few years after the Space Fence, a new radar system being built by the Air Force, comes on line (currently planned for 2019) [4]. Commercial companies offering space surveillance services, such as LeoLabs, ExoAnalytics, Analytic Graphics Inc., Lockheed, and Boeing, might also add to the number of objects currently tracked. Space Policy Directive 3 (SPD-3) [13] specifically seeks to expand the use of commercial SSA services. Existing operators can expect a sharp increase in the number of warnings and alerts they will receive because of the increase in the cataloged population. Almost all the increase will come from newly detected debris [5]. The pace of safety operations for each satellite on orbit will significantly change because of the increase in the catalog from the Space Fence. This effect is compounded because the NewSpace constellations described in Table 1 will drastically change the profile of satellites in LEO. The green bars in Fig. 1 represent the number of objects that will be added to the catalog (red or orange lines) from only the NewSpace large LEO constellations at their operational altitudes. This does not include the rocket stages that launch them, or satellites in the process of being phased into or removed from the operational orbits. Neighbors of one of these new constellations may face a radically different operations environment than their current practices were designed to address. Satellites in these large LEO constellations typically have planned operational lifetimes of 5–10 years. Some companies have proposed to dispose of their satellites using low thrust electric propulsion systems, which would spiral satellites down over a period of months or years from operating altitudes as high as 1500 km through lower orbits where the Hubble Space Telescope, the International Space Station, and other critical LEO satellites operate [6]. Similar propulsive techniques would raise replacement satellites from lower launch injection orbits to higher operational orbits. These disposal and replenishment activities will add thousands of satellites each year transiting through lower altitudes and posing a risk to all resident satellites in those lower orbits. More importantly, failures will occur both among transiting satellites and operational constellations, potentially leaving hundreds more stranded along the transit path.

#### No space war – disproves their satellites miscalc scenario

Pavur and Martinovic 19 [James Pavur, DPhil Researcher Cybersecurity Centre for Doctoral Training Oxford University, Ivan Martinovic, Professor of Computer Science Department of Computer Science Oxford University, “The Cyber-ASAT: On the Impact of Cyber Weapons in Outer Space,” 2019 11th International Conference on Cyber Conflict: Silent Battle, <https://ccdcoe.org/uploads/2019/06/Art_12_The-Cyber-ASAT.pdf>]

STABILITY IN SPACE Given the uncomfortable combination of high dependency and low survivability, one might expect to observe frequent attacks against critical military assets in orbit. However, **despite decades of** recurring **prophesies of** impending **space war, no such conflict has broken out** [14]–[18]. It is true that a handful of space security crises have occurred; most notably, the 2007 Chinese anti-satellite weapon (ASAT) test and the 2008 US ASAT demonstration in response [19]. Moreover, a recent Centre for Strategic and International Studies report suggests increasing interest in attacking US space assets, particularly among the Chinese, Russian, North Korean and Iranian militaries [20]. Overall, however, the space domain has remained puzzlingly peaceful. In this section, we outline three major contributors to this enduring stability: limited accessibility, attributable norms, and environmental interdependence. A. Limited Accessibility Space is difficult. Over 60 years have passed since the first Sputnik launch and only nine countries (ten including the EU) have orbital launch capabilities. Moreover, a launch programme alone does not guarantee the resources and precision required to operate a meaningful ASAT capability. Given this, one possible reason why space wars have not broken out is simply because only the US has ever had the ability to fight one [21, p. 402], [22, pp. 419–420]. Although launch technology may become cheaper and easier, it is unclear to what extent these advances will be distributed among presently non-spacefaring nations. Limited access to orbit necessarily reduces the scenarios which could plausibly escalate to ASAT usage. Only major conflicts between the handful of states with ‘space club’ membership could be considered possible flashpoints. Even then, the fragility of an attacker’s own space assets creates de-escalatory pressures due to the deterrent effect of retaliation. Since the earliest days of the space race, dominant powers have recognized this dynamic and demonstrated an inclination towards de-escalatory space strategies [23]. B. Attributable Norms There also exists a long-standing normative framework favouring the peaceful use of space. The effectiveness of this regime, centred around the Outer Space Treaty (OST), is highly contentious and many have pointed out its serious legal and political shortcomings [24]–[26]. Nevertheless, this **status quo framework has** somehow **supported over six decades of** relative **peace in orbit.** Over these six decades, norms have become deeply ingrained into the way states describe and perceive space weaponization. This de facto codification was dramatically demonstrated in 2005 when the US found itself on the short end of a 160-1 UN vote after opposing a non-binding resolution on space weaponization. Although **states** have **occasionally pushed** the **boundaries of** these **norms**, this has typically occurred **through incremental legal re-interpretation rather than** outright **opposition** [27]. Even the most notable incidents, such as the 2007-2008 US and Chinese ASAT demonstrations, were couched in rhetoric from both the norm violators and defenders, depicting space as a peaceful global commons [27, p. 56]. Altogether, this suggests that **states perceive real costs to breaking** this normative **tradition** and may even **moderate their behaviours accordingly.** One further factor supporting this norms regime is the high degree of attributability surrounding ASAT weapons. For kinetic **ASAT tech**nology, **plausible deniability and stealth** are essentially **impossible**. The literally explosive act of launching a rocket cannot evade detection and, if used offensively, retaliation. **This imposes high diplomatic costs on ASAT usage and testing**, particularly during peacetime. C. Environmental Interdependence A third stabilizing force relates to the orbital debris consequences of ASATs. China’s 2007 ASAT demonstration was the largest debris-generating event in history, as the targeted satellite dissipated into thousands of dangerous debris particles [28, p. 4]. Since debris particles are indiscriminate and unpredictable, they often threaten the attacker’s own space assets [22, p. 420]. This is compounded by Kessler syndrome, a phenomenon whereby orbital debris ‘breeds’ as large pieces of debris collide and disintegrate. As space debris remains in orbit for hundreds of years, the cascade effect of an ASAT attack can constrain the attacker’s long-term use of space [29, pp. 295– 296]. Any state with kinetic ASAT capabilities will likely also operate satellites of its own, and they are necessarily exposed to this collateral damage threat. **Space debris thus acts as a strong** strategic **deterrent to ASAT usage.**

#### No reason miscalc goes nuclear – satellites have been damaged before with no consequences

#### Alliances check miscalc – too costly

MacDonald 13 [(Bruce, teaches at the United States Institute of Peace on strategic posture and space/cyber security issues, leads a study on China and Crisis Stability in Space, and is adjunct professor at the Johns Hopkins School of Advanced International Studies) “Deterrence and Crisis Stability in Space and Cyberspace,” in Anti-satellite Weapons, Deterrence and Sino-American Space Relations, September 2013, https://apps.dtic.mil/dtic/tr/fulltext/u2/a587431.pdf] TDI

The US alliance structure can promote deterrence and crisis stability in space, as with nuclear deterrence. China has no such alliance system. If China were to engage in large-scale offensive counter-space operations, it would face not only the United States, but also NATO, Japan, South Korea and other highly aggrieved parties. Given Beijing’s major export dependence on these markets, and its dependence upon them for key raw material and high technology imports, China would be as devastated economically if it initiated strategic attacks in space. In contrast to America’s nuclear umbrella and extended deterrence, US allies make a tangible and concrete contribution to extended space deterrence through their multilateral participation in and dependence upon space assets. Attacks on these space assets would directly damage allied interests as well as those of the United States, further strengthening deterrent effects.

1. **Time frame – Kessler effect 200 years away**

**Stubbe 17** [(Peter, PhD in law @ Johann Wolfgang Goethe University Frankfurt) “State Accountability for Space Debris: A Legal Study of Responsibility for Polluting the Space Environment and Liability for Damage Caused by Space Debris,” Koninklijke Brill Publishing, ISBN 978-90-04-31407-8, p. 27-31] TDI

The prediction of possible scenarios of the future evolution of the debris p o p ulation involves many uncertainties. Long-term forecasting means the prediction of the evolution of the future debris environment in time periods of decades or even centuries. Predictions are based on models84 that work with certain assumptions, and altering these parameters significantly influences the outcomes of the predictions. Assumptions on the future space traffic and on the initial object environment are particularly critical to the results of modeling efforts.85 A well-known pattern for the evolution of the debris population is the so-called Kessler effect’, which assumes that there is a certain collision probability among space objects because many satellites operate in similar orbital regions. These collisions create fragments, and thus additional objects in the respective orbits, which in turn enhances the risk of further collisions. Consequently, the num ber of objects and collisions increases exponentially and eventually results in the formation of a self-sustaining debris belt aroundthe Earth. While it has long been assumed that such a process of collisional cascading is likely to occur only in a very long-term perspective (meaning a time 1 n of several hundred years),87 a consensus has evolved in recent years that an uncontrolled growth of the debris population in certain altitudes could become reality much sooner.88 In fact, a recent cooperative study undertaken by various space agencies in the scope of i a d c shows that the current l e o debris population is unstable, even if current mitigation measures are applied. The study concludes: Even with a 90% implementation of the commonly-adopted mitigation measures [...] the l e o debris population is expected to increase by an average of 30% in the next 200 years. The population growth is primarily driven by catastrophic collisions between 700 and 1000 km altitudes and such collisions are likely to occur every 5 to 9 years.89

#### No warming impact – their predictions are wrong and adaptation solves

Cass 17 (Oren Cass, He is the executive director of American Compass, whose mission is to restore an economic orthodoxy that emphasizes the importance of family, community, and industry to the nation’s liberty and prosperity. From 2015 to 2019, Cass was a senior fellow at the Manhattan Institute, where his work on strengthening the labor market addressed issues ranging from the social safety net and environmental regulation to trade and immigration to education and organized labor, Winter 2017, Accessed On 7-27-2021, National Affairs, "How to Worry about Climate Change", https://www.nationalaffairs.com/publications/detail/how-to-worry-about-climate-change, AP)

EXPECTATIONS IN PERSPECTIVE

Environmental activists have an immediate and predictable response: "because we know climate change is going to happen." But that conflates two very different conceptions of climate change: expected change and extreme change. The scientific consensus holds that the climate is warming and human activity plays a substantial role. But there is no consensus about how much warming human activity has caused or will cause. According to the Fifth Assessment Report of the United Nations' Intergovernmental Panel on Climate Change (IPCC) in 2013, the best estimates of warming for a given increase in the atmospheric concentration of carbon dioxide range by a factor of three, a range that has grown wider in recent years. A doubling of carbon dioxide could produce a temperature increase of 1.5 degrees Celsius, or 4.5 degrees Celsius, or more likely something in between. Expected climate change, averaging the widely varying projections and assuming no aggressive efforts to reduce greenhouse-gas emissions, entails warming of 3 to 4 degrees Celsius by 2100. Even focusing within that range, estimates for the expected environmental impacts of warming vary widely. The IPCC represents the gold standard for synthesizing scientific estimates, and, crucially, its best guesses bear little resemblance to the apocalyptic predictions often repeated by activists and politicians. For instance, the IPCC estimates that sea levels have risen by half a foot over the past century and will rise by another two feet over the current century. At the high end of the 3-to-4-degree range, it reports the impact on ecosystems will be no worse than that of the land-use changes to which human civilization already subjects the natural world. The responsibility for translating these and other disruptions into economic costs falls to Integrated Assessment Models (IAMs). To create its "Social Cost of Carbon," the Obama administration surveyed this economic literature and focused specifically on three models whose forecasts themselves vary widely, even starting from a common level of warming. For warming of 3 to 4 degrees Celsius by 2100, the middle of the three models estimates an annual cost of 1% to 3% of GDP. The low case estimates 0 to 1%. The high case estimates 2% to 4%. While 4% is a large dollar amount, arriving at that impact over nearly 100 years implies almost imperceptibly small changes in economic growth. The specifics of this high-case model are informative: The Dynamic Integrated model of Climate and the Economy (known as the DICE model) developed by William Nordhaus at Yale University estimates 3.8 degrees Celsius of warming by 2100 costing an associated 3.9% of GDP in that year. But over time, this cost is the equivalent of slowing economic growth by less than one-tenth of one percentage point annually. By 2100, regardless of climate change, the world is more than six times wealthier than in 2015 under this model; global GDP is $500 trillion. The effect of climate change is to reduce that gain from a multiple of 6.7 to a multiple of 6.5. The economy also continues to grow, so that the climate-change-afflicted world of 2105 is already much wealthier than a world of 2100 facing no climate change at all. Such estimates might seem counterintuitively low, especially given the rhetoric often employed. Part of the explanation lies in the almost incomprehensible economic progress that human civilization is capable of making over the course of a century. The annual cost identified by Nordhaus in 2100 is $20 trillion — massive by the standards of 2015, manageable by the standards of 2100. Further, that cost repeats every year even as the impacts are spread over many years. Thus, over the 2090 to 2110 time period, Nordhaus envisions the world spending a stunning $350 trillion to cope with climate change. One might despair over what else such resources might accomplish over that time period. But one must also recognize that the economy of 2100 will likely be able to allocate those resources toward climate change while also allocating to every other facet of society far more resources than are available today. Corroborating these models, the IPCC concludes that "for most economic sectors, the impacts of drivers such as changes in population, age structure, income, technology, relative prices, lifestyle, regulation, and governance are projected to be large relative to the impacts of climate change." In other words, other worrying problems have a far greater capacity to influence progress. None of this means the dislocations from climate change would be painless or the disruptions cheap. It is merely to observe that the impacts expected from climate change over the next hundred years look similar to those through which both civilization and our planet have successfully muddled over the past hundred and continue to struggle with today. Other worrying problems have their own anticipated but less-severe analogs, too. Whether a global pandemic strikes, epidemics will inevitably occur like the 2014 Ebola outbreak in West Africa that claimed more than 10,000 lives and cost the three countries at its center more than a tenth of their GDP. Whether artificial intelligence makes humans superfluous, self-driving vehicles could throw millions out of work in the years to come. Some countries will default on their debt; some business cycles will spawn deep global recessions. These challenges are not existential threats or even ones that require analysis outside the standard policy process — that is, they are not really worrying problems at all.

EXTREME CASES

If expected climate change represents the most likely outcome, extreme climate change represents the worst case: Models could be underestimating the warming that emissions will cause; feedback loops could send a 3-degree increase suddenly careening higher; or even at the expected level the climate could hit a tripwire that collapses global ecosystems or ocean currents or ice sheets or some other prerequisite of modern civilization. Any of these things may be true — as is the nature of genuinely forecasted challenges, they are mostly non-falsifiable. But while extreme climate change is a quintessentially worrying problem, it is also one that has no guarantee or even likelihood of occurring. Certainly, the "scientific consensus" or even the "scientific mainstream" on climate change does not extend to confidence in such scenarios. To compare extreme climate change with other worrying problems, it is helpful to consider the dimensions that make a problem "worrying": that it is forecasted, irreversible, and pervasive. On all three, climate change appears less worrying than most. Consider, first, the magnitude of the forecasted impact. Many worrying problems feature the credible prospect of killing a significant share of the human population or erasing modern civilization. Not extreme climate change. For instance, even considering higher temperature increases, the IPCC concludes that: Global climate change risks are high to very high with global mean temperature increase of 4°C or more above preindustrial levels in all reasons for concern, and include severe and widespread impacts on unique and threatened systems, substantial species extinction, large risks to global and regional food security, and the combination of high temperature and humidity compromising normal human activities, including growing food or working outdoors in some areas for parts of the year. Obviously, each of those effects would entail enormous economic costs, carry severe consequences for entire nations, and wreak havoc with the natural environment. But as a worst case, it nevertheless pales in comparison to catastrophes that might kill a significant share of the human population or erase the basic physical and economic infrastructure of modern civilization. Serious efforts to quantify existential threats concur. A 2016 report by the Global Priorities Project at Oxford offered as its example of a worst case that climate change could "render most of the tropics substantially less habitable than at present," as compared to hundreds of millions or billions of deaths associated with other challenges. Another Oxford study from 2008 asked conference participants to estimate the probability of various global catastrophes leading to human extinction in the coming century, and did not even see fit to include climate change as an option, while respondents gave molecular nanotechnology, super-intelligent artificial intelligence, and an engineered pandemic each at least a 2% chance of erasing humanity by 2100. Some analysts nonetheless place climate change among humanity's genuinely existential threats on the basis of its "fat tail," arguing that some unknowable but non-zero chance exists at the far-right end of the probability distribution for an outcome with essentially infinite cost. But this is true of all worrying problems — indeed, the characteristics of worrying problems might be viewed as those that generate such unknowable non-zero probabilities. Climate change cannot be distinguished from other worrying problems on that basis. Rather, the argument begs the question: What characteristics of climate change make its tail relatively fatter or thinner? The weight accorded to a worrying problem's forecasted effects depends greatly on the number of causal steps between the underlying phenomena and worst-case outcomes. Where fewer steps are necessary, or where steps are relatively more likely to occur, the probability of the worst case arising should increase. For instance, whether an engineered pandemic devastates humanity depends on development of the necessary technology (highly likely), its use by a malicious actor (indeterminate), and its spread defying efforts at containment (indeterminate). Generally speaking, technological threats will have the shortest chains while sociological threats will have the longest ones. Climate change would appear to sit somewhere in between. It has a very short chain to some impact — indeed, higher atmospheric concentrations of carbon dioxide are already having effects. But the connection from warmer temperatures to civilizational catastrophe is highly attenuated. The initial warming must cross thresholds that produce feedback loops. The ensuing warmth must produce environmental effects that cause unprecedented crises across societies. Those crises must in turn overwhelm the coping capacity of the entire global community, which must in turn produce wide-scale breakdowns in social order or trigger military conflict, which must in turn metastasize into...what? Certainly, one can invent a scenario. But the specifics quickly become hazy, and a worst case entirely outside of human experience difficult to articulate. The intent of this analysis is not to dismiss the severity of worst-case climate scenarios or to suggest that "wide-scale breakdowns in social order" are acceptable. But all worrying problems have worst-case forecasts that look this way, all with indeterminate probabilities of occurring, which leaves only a few options: We could become overwhelmed with despair, emphasize whichever problems are most politically useful, or seek out qualitative and quantitative bases for analysis. Too much discussion of climate change adopts the first or second approach. Efforts at the third approach will inevitably be imprecise and imperfect, but the burden of proof should lie on those declaring that climate change stands apart from other worrying problems to explain why that is so. The suggestion here is not that the forecasted threat of climate change does not belong alongside other worrying problems, only that the nature of its forecast cannot be what separates it as uniquely worrying.

WORRYING IN SLOW MOTION

In the other ways climate change is a worrying problem, meanwhile, it is less worrying than most. This is especially true with respect to irreversibility. While President Obama has lamented that climate change is a "comparatively slow-moving emergency," the one thing worse is a fast-moving one. Most worrying problems have worst-case scenarios that sweep the globe in a matter of months, days, or even minutes. For climate change, the damage unfolds over decades or centuries. This has several implications. First, while climate change is irreversible compared to the typical policy problem, it does allow for some potential interventions even once well underway. For instance, natural processes already exist for extracting carbon dioxide from the atmosphere, and new technologies could be developed that accelerate those processes or create artificial ones. Alternatively, humans could use so-called "geoengineering" to effect other changes in the climate system that might counteract an intensifying greenhouse effect. These approaches offer no guarantee or even likelihood of success; turning to geoengineering might be seen as a disaster in its own right. But they offer more cause for optimism than exists with many other worrying problems. Second, time permits adaptation. While the prospect of losing 50% of existing agricultural capacity is daunting, over a 50-year period only 1% of capacity needs to shift annually. By comparison, over the past 50 years, total agricultural output has tripled. Similarly, the need for hundreds of millions of people to migrate over a century amounts to little out of the ordinary on an annual basis. There are, for instance, more than 200 million migrant workers within China, as well as another 200 million international migrants and at least 60 million refugees around the world right now. The United Nations estimates 2.5 billion people will migrate to cities in just the next 35 years. Further migration, or perhaps the gradual abandonment of some cities or even entire regions, would obviously be extraordinarily costly and disruptive in human, economic, and environmental terms. But the reason such adaptations are rarely mentioned in the context of other worrying problems is not that they would be unnecessary, but rather that, in those other cases, they would be either impossible or else futile. Purveyors of creatively catastrophic climate cases also face a Catch-22: Developing ever-more extreme scenarios typically requires ever-longer timescales. Even higher temperatures and risks of further dominos falling are threatened — by 2300, or after "centuries." Confident forecasts of multi-meter sea-level rises are issued, to occur over multiple millennia. Harvard University's Martin Weitzman, the leading proponent of the case that climate change presents a uniquely "fat tail," falls into precisely this trap: The worst case he offers relies on continued temperature increases over multiple centuries. But if heightening the threat requires extending the timeframe further, it becomes diluted threefold: More time becomes available for adaptation, for economic progress and technological innovation that render the threat irrelevant, or for the model to fail. Any impact forecasted for 200, let alone 2,000, years into the future becomes almost inherently less cognizable than those already under study for 2100. Finally, consider the pervasiveness of extreme climate change. By influencing the literal atmosphere in which all other human activity takes place, climate change perhaps exceeds any other challenge in the breadth of its causal connections and potential effects. But this same dynamic also leaves its connections to ultimate damage more dependent on interaction with other contributing factors. As a result, more alternative approaches exist for mitigation. If one wants to prevent a financial collapse from sending the world into economic depression, one needs to prevent the collapse. By contrast, consider a favorite present-day causal chain used to illustrate the full specter of the climate threat: the asserted connection between climate change, drought in the Middle East, social upheaval in Syria, the country's gruesome civil war, the rise of ISIS, and the flood of refugees into Europe. Perhaps the catastrophe might have been averted or lessened had there been no drought. But better weather would seem an odd prescription for stability and prosperity in the Middle East — plainly neither necessary nor sufficient. Democratic governance, social progress, more effective Western intervention by either regional or global powers, or even just better water-usage practices are all superior approaches. Another country, bordering Syria, has suffered the same drought. But a report in Scientific American explains, "Water is driving the entire [Middle East] to desperate acts. Except Israel. Amazingly, Israel has more water than it needs." While Syria's oppressed society was crumbling, Israel launched a new era of desalination technology. The writer concludes: "The contrasts couldn't be starker. A few miles from [Israel], water disappeared and civilization crumbled. Here, a galvanized civilization created water from nothingness. As Bar-Zeev and I drink deep, and the climate sizzles, I wonder which of these stories will be the exception, and which the rule." This is compelling storytelling. At first glance it seems a cautionary tale of climate change. But read the concluding sentence again. Climate change is not the independent variable, it is the constant. The question is whether civilization will equip itself to thrive anyway. What separates a world of 2100 dominated by drought-plagued failed states and one filled with prospering democracies that export water from blooming desert plains is not climate change. It is the world's ability to supplant radical ideology with modernity. This same pattern repeats itself in equipping societies to withstand natural disasters, feed themselves, eradicate disease, or thrive in the face of any other challenge climate change might pose. Perhaps sociological challenges like declining fertility, workforce participation, or family stability seemed out of place in the initial list of worrying problems. Yet it is these, not genuinely existential threats to humanity, with which climate change has the most in common. They all impose real costs but rely on lengthy causal chains to reach from basic phenomenon to true catastrophe. They all unfold slowly and leave opportunity for intervention. Their pervasiveness in each case depends on interaction with other sociological conditions that all invite policy interventions themselves. These worrying problems deserve attention, but not out of proportion to the genuine nature of the threat they pose.

#### There is no credible nor uniform consensus that backs existential warming and if there was it won’t be until 11°

Beard et al. 21 (S.J. Beard, Lauren Holt, Asaf Tzachor, Luke Kemp, Shahar Avin, Phil Torres, and Haydn Belfield, S. J. Beard is an Academic Programme Manager and Senior Research Associate at the University of Cambridge’s Centre for the Study of Existential Risk (CSER), Asaf Tzachor is a researcher at CSER, and associate in CSaP, and the Global Food Security Center, in the University of Cambridge. Asaf's research interests span a variety of topics within sustainability sciences and global risks. His primary interest is in food systems' dependencies and asymmetries. His work aims to understand what shocks might threaten food security, what the consequences of disruptions may be, and how we can work to mitigate these risks; with a focus on the design, development and (ethical) deployment of emerging technologies, including future foods systems, intelligent agents, and autonomous machines, Luke Kemp is a Research Associate at the CSER and is an honourary lecturer in environmental policy at the Australian National University (ANU) and holds a PhD in international relations from the ANU and was previously a senior economist at Vivid Economics, Shahar Avin is a senior researcher associate at the CSER. Shahar worked at Google for a year as a mobile/web software engineer. His PhD was in philosophy of science, on the allocation of public funds to research projects. His undergrad was in physics and philosophy of science, which followed a mandatory service in the IDF, Phil Torres has a degree in Entomology and Biology from Cornell University and led conservation and education projects in the Amazon Rainforest for two years before starting his career in television. His scientific research and discoveries have been featured in Wired, BBC, Animal Planet, ABC News, National Geographic, The Wall Street Journal, MSNBC, and more, Haydn Belfield has a background in policy and politics, including as a Senior Parliamentary Researcher to a British Shadow Cabinet Minister, as a Policy Associate to the University of Oxford’s Global Priorities Project, and a degree in Philosophy, Politics and Economics from Oriel College at the University of Oxford, March 2021, Accessed On 7-27-2021, Science Direct Futures, Volume 127, "Assessing climate change’s contribution to global catastrophic risk", https://www.sciencedirect.com/science/article/pii/S0016328720301646, p. 2-3, AP)

Today, global catastrophic climate risk research mirrors the condition of nuclear risk research in the early 1980s. Many climate scientists, global catastrophic risk scholars, and environmental groups are seeking to raise awareness of the severe risk climate change poses to humanity. However, despite the well-developed consensus on the science of climate change and wide-ranging discussions about the threats it poses to individuals, communities, and nations, there remains no clear and credible mechanism for how a changing climate could cause global catastrophes. This paper aims to improve our understanding of climate risk by building an analytical framework to assess its contribution to global catastrophic risk. It begins by reviewing the current state of global catastrophic climate risk research and its limitations (Section [1](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#sec0005)) and then describes a new set of conceptual and evaluative tools developed for improved assessment of Global Catastrophic Risk (Section [2](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#sec0010)). Finally, it highlights some initial insights that can be gained from combining these tools and suggests questions for future research, most notably concerning the possibility of positive feedback loops between collapsing sociotechnological and ecological systems, which we refer to as ‘global systems death spirals,’ (Section [3](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#sec0030)) and the obstacles and opportunities to mitigating this risk (Section [4](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#sec0060)). 1. Existing assessments of climate change’s contribution to global catastrophic risk Global Catastrophic Risk (GCR) refers to risks with “the potential to inflict serious damage to human well-being on a global scale” up to and including human extinction ([Bostrom & Cirkovic, 2008](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#bib0085)). Such risks are characterized both by their direct impacts, e.g. taking the lives of a significant portion of the human population, and their indirect impacts, such as leaving survivors at heightened risk by undermining global resilience systems ([Avin et al., 2018](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#bib0030)).[2](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#fn0005) There are at least three overlapping scenarios that would constitute such a catastrophe. First, a large and sudden reduction in the global population ([Cotton-Barratt, Farquhar, Halstead, Schubert, & Snyder-Beattie, 2016](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#bib0105) use a 10 % threshold for this); second, a collapse of the global systems that facilitate social complexity and co-operation (henceforth “human civilization”); third, a permanent reduction in humanity’s potential for technological, scientific, moral, and cultural development. Given the significant amount of scientific attention that has been given to anthropogenic climate change and its effects, we know surprisingly little about its contribution to GCR. Recent studies have tended to be both vague in their assertions and inconsistent in their conclusions: Some, such as Wallace-Well’s (2019) book The Uninhabitable Earth, acknowledge this possibility but shy away from considering it since doing so involves too much speculation; while others, such as Jem Bendall’s widely read (2018) paper, “Deep Adaptation: A Map for Navigating Climate Tragedy”, go too far in the opposite direction, speculating wildly about disaster scenarios without credible evidence. These flaws are especially troubling given that commentators often conflate unfounded assertions about the catastrophic risk of climate change with the settled corpus of climate science. Some scholars have avoided this problem by confining themselves to what we know most about and focus on widely accepted limits to humanity’s ability to survive the direct effects of climate change, such as heat stress (e.g. [Halstead, 2018](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#bib0175)). These could become serious issues for certain regions after about 7 °C of global warming from pre-industrial levels, and for most of the world’s population after 11 °C ([Sherwood & Huber, 2010](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#bib0375)). Such scenarios are not impossible, as one recent assessment noted: “[o]n the highest emissions pathway ([Representative Concentration Pathway] 8.5), a rise of 7 °C is a very low probability at the end of this century, but appears to become more likely than not during the course of the 22nd century. A rise of more than 10 °C over the next few centuries cannot be ruled out." ([King, Schrag, Dadi, Ye, & Ghosh, 2015](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#bib0225)) However, this would require either that high levels of greenhouse gas (GHG) emissions continue far into the future or that natural feedback mechanisms are far stronger than expected. Other impacts of similar severity could be triggered by far smaller temperature increases. One notable study published in the Proceedings of the National Academies of Science suggests that a global temperature rise of more than 3 °C would be “catastrophic” while a rise of more than 5 °C, which is above anything seen during the past 20 million years, would “pose existential threats to a majority of the population” from deadly heat and sea-level rise. The authors’ models suggest that within the next eight decades, there is a 5% chance of exceeding 5 degrees of warming ([Xu & Ramanathan, 2017](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#bib0460)). Similarly, the 2015 book Climate Shock analyzes the uncertainty in standard climate models and finds a 3% chance of passing 6 °C under an ambitious “low-medium emissions pathway” and an 11 % chance of passing it under a more realistic “medium-high emissions pathway”. While stating that we cannot know the full implications of such a temperature rise, the authors describe it as an “indisputable global catastrophe” ([Wagner & Weitzman, 2015](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#bib0430)). Finally, a more alarmist, and non-peer-reviewed, report by the National Centre for Climate Restoration considered a range of future scenarios and argued that even global temperature increases of 3−4 °C “will drive increasingly severe humanitarian crises, forced migration, political instability and conflict” and “may result in ‘outright chaos’ and an end to human civilization as we know it”. Citing the findings of [Reilly et al. (2015)](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#bib0330), it estimates a 50 % chance of crossing this threshold, even if commitments under the Paris Agreement are met ([Dunlop & Spratt, 2017](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#bib0145)).[3](https://www-sciencedirect-com.proxy.lib.umich.edu/science/article/pii/S0016328720301646?via%3Dihub#fn0010) These studies differ in their assessments of both the likelihood and impact of different levels of warming, and they fail to address the questions of why or how this could produce a global catastrophe or how we should respond. This largely reflects the difficulty of these questions, which relate to complex interacting global systems. However, it also highlights some limitations of current climate risk analysis.