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#### International Relations is the royal science of empire – the aff engineers “sustainable warfare” through a mutating geopolitics of violence.

Grove ‘19

[Jarius, PoliSci at the University of Hawai’i. 2019. “Savage Ecology: War and Geopolitics in the Anthropocene.”] pat – ask me for the PDF!

Because I wanted this book to inspire curiosity beyond the boundaries of international relations (ir), I considered ignoring the field altogether, removing all mentions of ir or ir theory. However, upon closer reflection, I have decided to keep these references as I think they are relevant for those outside the discipline and for those who, like myself, often feel alienated within its disciplinary boundaries. In the former case, it is important to know that, unlike some more humble fields, ir has always held itself to be a kind of royal science. Scholarship in ir, particularly in the United States, is half research, and half biding time until you have the prince’s ear. The hallowed names in the mainstream of the field are still known because they somehow changed the behavior of their intended clients—those being states, militaries, and international organizations. Therefore, some attention to ir is necessary because it has an all-too-casual relationship with institutional power that directly impacts the lives of real people, and ir is all too often lethal theory. As an American discipline, the political economy of the field is impossible without Department of Defense money, and its semiotic economy would be equally dwarfed without contributory figures like Woodrow Wilson, Henry Kissinger, and Samuel Huntington. The ubiquity of Huntington’s “clash of civilizations” thesis and Kissinger’s particular brand of realpolitik are undeniable throughout the field, as well as the world. Each, in their own way, has saturated the watchwords and nomenclature of geopolitics from an American perspective so thoroughly that both political parties in the United States fight over who gets to claim the heritage of each. Although many other fields such as anthropology and even comparative literature have found themselves in the gravitational pull of geopolitics, international relations is meant to be scholarship as statecraft by other means. That is, ir was meant to improve the global order and ensure the place of its guarantor, the United States of America. Having spent the better part of a decade listening to national security analysts and diplomats from the United States, South Korea, Japan, Europe, China, Brazil, and Russia, as well as military strategists around the planet, I found their vocabulary and worldview strikingly homogeneous.

If this seems too general a claim, one should take a peek at John Mearsheimer’s essay “Benign Hegemony,” which defends the Americanness of the ir field. What is most telling in this essay is not a defense of the U.S. as a benign hegemonic power, which Mearsheimer has done at length elsewhere. Rather, it is his vigorous defense that as a field, ir theory has done well by the world in setting the intellectual agenda for global challenges, and for creating useful theoretical approaches to addressing those problems. For Mearsheimer, the proof that American scholarly hegemony has been benign is that there is nothing important that has been left out. A quick scan of the last ten or twenty International Studies Association conferences would suggest otherwise.

That issues like rape as a weapon of war, postcolonial violence, global racism, and climate change are not squarely in the main of ir demonstrates just how benign American scholarly hegemony is not. As one prominent anthropologist said to me at dinner after touring the isa conference in 2014, “it was surreal, like a tour through the Cold War. People were giving papers and arguing as if nothing had ever changed.” These same provincial scholars aspire and succeed at filling the advisory roles of each successive American presidency. One cannot help but see a connection between the history of the ir field, and the catastrophes of U.S. foreign policy during the twentieth and twenty-first centuries. One could repeat the words of the anthropologist I mentioned to describe the 2016 presidential campaign debates over the future of U.S. foreign policy: it is as if “nothing had ever changed.” And yet these old white men still strut around the halls of America’s “best” institutions as if they saved us from the Cold War, even as the planet crumbles under the weight of their failed imperial dreams.

If international relations was meant to be the science of making the world something other than what it would be if we were all left to our own worst devices, then it has failed monumentally. The United States is once again in fierce nuclear competition with Russia. We are no closer to any significant action on climate change. We have not met any of the Millennium Development Goals determined by the United Nations on eradicating poverty. War and security are the most significant financial, creative, social, cultural, technological, and political investments of almost every nation-state on Earth. The general intellect is a martial intellect.

Despite all this failure, pessimism does not exist in international relations, at least not on paper. The seething doom of our current predicament thrives at the conference bar and in hushed office conversations but not in our research. In public, the darkness disavowed possesses and inflames the petty cynicisms and hatreds that are often turned outward at tired and predictable scapegoats.

After the fury of three decades of critique, most ir scholars still camp out either on the hill of liberal internationalism or in the dark woods of political realism. Neither offers much that is new by way of answers or even explanations, and each dominant school has failed to account for our current apocalyptic condition. One is left wondering what it is exactly that they think they do. Despite the seeming opposition between the two, one idealistic about the future of international order (liberals) and the other self-satisfied with the tragedy of cycles of war and dominance (realists), both positions are optimists of the positivist variety.

For both warring parties, ir optimism is expressed through a romantic empiricism. For all those who toil away looking for the next theory of international politics, order is out there somewhere, and dutifully recording reality will find it—or at least bring us closer to its discovery. For liberal internationalism, this will bring the long-heralded maturity of Immanuel Kant’s perpetual peace. For second-order sociopaths known as offensive realists, crumbs of “useful strategic insight” and the endless details that amplify their epistemophilia for force projection and violence capability represent a potential “advantage,” that is, the possibility to move one step forward on the global political board game of snakes and ladders. Still, the cynicism of ir always creeps back in because the world never quite lives up to the empirical findings it is commanded to obey. Disappointment here is not without reason, but we cynically continue to make the same policy recommendations, catastrophe after catastrophe.

I have an idea about where ir’s recent malaise comes from. I think it is a moment, just before the awareness of the Anthropocene, after the Cold War and before September 11, when the end of everything was only a hypothetical problem for those of a certain coddled and privileged modern form of life. The catastrophe of the human predicament was that there was no catastrophe, no reason, no generation-defining challenge or war. Now the fate of this form of life is actually imperiled, and it is too much to bear. The weird denial of sexism, racism, climate change, the sixth extinction, and loose nukes, all by a field of scholars tasked with studying geopolitics, is more than irrationalism or ignorance. This animosity toward reality is a deep and corrosive nihilism, a denial of the world. Thus ir as a strategic field is demonstrative of a civilization with nothing left to do, nothing left to destroy. All that is left is to make meaning out of being incapable of undoing the world that Euro-American geopolitics created. Emo geopolitics is not pretty, but it is real. The letdown, the failure, the apocalypse-that-was-not finally arrived, and we are too late.

Still, the United States of America continues to follow the advice of “the best and the brightest,” testing the imperial waters, not quite ready to commit out loud to empire but completely unwilling to abandon it. Stuck in between, contemporary geopolitics—as curated by the United States—is in a permanent beta phase. Neuro-torture, algorithmic warfare, drone strikes, and cybernetic nation-building are not means or ends but rather are tests. Can a polis be engineered? Can the human operating system be reformatted? Can violence be modulated until legally invisible while all the more lethal? Each incursion, each new actor or actant, and new terrains from brains to transatlantic cables—all find themselves part of a grand experiment to see if a benign or at least sustainable empire is possible. There is no seeming regard for the fact that each experiment directly competes with Thomas Jefferson’s democratic experiment. One wonders if freedom can even exist anywhere other than temporarily on the fringe of some neglected order. Is this some metaphysical condition of freedom, or is the world so supersaturated with martial orders that the ragged edges between imperial orders are all that we have left? It feels like freedom’s remains persist only in the ruins of everything else. No space is left that can be truly indifferent to the law, security, or economy. Such is the new life of a human in debt. The social contract has been refinanced as what is owed and nothing more: politics without equity. Inequity without equality.

What about the impending collapse of the post–World War II order, the self-destruction of the United States, the rise of China and a new world order? If humanity lasts long enough for China to put its stamp on the human apocalypse, I will write a new introduction. Until then, we live in the death rattle of Pax Americana. While I think the totality of this claim is true, I do not want to rule out that many of us throughout the world still make lives otherwise. Many of us even thrive in spite of it all. And yet, no form of life can be made that escapes the fact that everything can come to a sudden and arbitrary end thanks to the whim of an American drone operator, nuclear catastrophe, or macroeconomic manipulation like sanctions. There are other ways to die and other organized forms of killing outside the control of the United States; however, no other single apparatus can make everyone or anyone die irrespective of citizenship or geographic location. For me, this is the most inescapable philosophical provocation of our moment in time.

The haphazard and seemingly limitless nature of U.S. violence means that even the core principles of the great political realist concepts like order and national interest are being displaced by subterranean violence entrepreneurs that populate transversal battlefields, security corridors, and border zones. Mercenaries, drug lords, chief executive officers, presidents, and sports commissioners are more alike than ever. Doomsayers like Paul Virilio, Lewis Mumford, and Martin Heidegger foretold a kind of terminal and self-annihilating velocity for geopolitics’ technological saturation, but even their lack of imagination appears optimistic. American geopolitics does not know totality or finality; it bleeds, mutates, and reforms. Furthermore, the peril of biopolitics seems now almost romantic. To make life live? Perchance to dream. The care and concern for life’s productivity is increasingly subsumed by plasticity—forming and reforming without regard to the telos of productivity, division, or normative order.

There are, of course, still orders in our geoplastic age, but they are almost unrecognizable as such. When so many citizens and states are directly invested in sabotaging publicly stated strategic ends, then concepts like national interest seem equally quaint. We are witnessing creative and horrifying experiments in the affirmative production of dying, which also deprive those targeted and in some cases whole populations from the relief of death. To follow Rucker, I want to try to see the world for what it is. We can only say that tragedy is no longer a genre of geopolitics. Tragedy redeems. The occluded character of contemporary geopolitics shoehorned into experience produces the feeling that there is no relief, no reason, no victory, no defeats, and no exit within the confines of national security’s constricted world. This is not tragedy: it is horror. We live in an age of horror that, like the victims of gore movies who never quite die so that they can be tortured more, furthers our practice of collective violence and goes on for decades as a kind of sustainable warfare.

#### The aff’s managerial concerns over space debris is techno-nationalism – liberal governance over space as a “commons” is the exclusive domain of space-faring nations

Stroikos ‘16

[Dimitrios, University of York. 2016. “China, India in Space and the Orbit of International Society: Power, Status, and Order on the High Frontier.”] Pat

Moreover, it is necessary to briefly say something about how techno-nationalism as a primary institution interacts with some of the other institutions of international space society. First, in many ways, techno-nationalism is complimentary to sovereign statehood because sovereignty in space is largely embedded in cosmopolitan and solidarist conceptions. This is partly why highly visible space projects define spacefaring hierarchies. Second, and consequently, techno-nationalism is also closely linked to great power status and great power management in the sense that different space capabilities also confer different levels of status and responsibilities in the management of international order in space. Likewise, in relation to diplomacy, highly visible techno-nationalist space feats can also offer a seat at the table of diplomatic initiatives and negotiations. Seen in this light, ‘high-visibility’ projects, such as space programmes are part of ‘recognition games’, which states play in order to acquire the status of a great power (Suzuki, 2008). As Cunningham (2009: 74) notes, ‘to be a superpower, one must be a “spacefaring” nation’. The Space Market Arguably, the economic factor has been one of the most neglected issues in the English School literature. Discussing some of the shortcomings of Bull’s work, Miller (1990: 74) pointed out in 1990, ‘a basic criticism of Bull’s account of international society’ is ‘that it does not include a strong economic component’ dealing with rules regarding trade, navigation, and investment and the common interests that permeate the sphere of economic activities. Since then, some important work has been done to bring together the economic sector and the English School, especially in the context of globalisation (Buzan, 2004; Buzan, 2005; Hurrell, 2007: 194-215). However, the question of how to consider the economic sector within the English School remains rather underdeveloped. According to Buzan, one response is to treat capitalism as a master institution, but he prefers the use of the market as a more neutral term, which has the additional merit of encompassing other practices, such as trade (Buzan, 2004: 193-4, Buzan, 2014a: 136). Consequently, given the growing globalisation and commercialisation of space activities (OECD, 2014: 9-10), there are good reasons for considering the space market as an emerging primary institution of international space society. Significantly, in some ways, since the advent of the Space Age, the space market has followed a parallel trajectory to the market as a distinctive institution at the global level. In particular, although the market was a key primary institution of the Western global international society during much of the Cold War, it has emerged as a sort of a global institution in the post-Cold War era (Buzan, 2014a: 138). Likewise, the space market was initially confined to American-led space activities, beginning as a US government initiative with the Communications Satellite Act in 1962, which led to the creation of the International Telecommunications Satellite Consortium (Intelsat) in 1964 (Moltz, 2014: 94). However, during the early Cold War, commercial activities were largely limited to the field of satellite communications and even commercial transatlantic cooperation in space was determined to a large extent by political and strategic factors and technology transfer considerations (Krige, 2013b). Equally, the idea of the commercialisation of space remained contested not the least because of the opposition of the Soviet Union and communist China to the market in general. This began to change only in the 1980s, when a number of space players emerged, including Europe and Japan, that challenged the US leadership in the fields of satellite manufacturing, launching capability, and other commercial space services. It was also during this period that the Soviet Union and China became less reluctant to get involved with commercial space activities (Krige, 2013a: 16-7). But it was after the end of the Cold War that the globalisation and commercialisation of space activities gradually led to the emergence of a global space market, which points to its inclusion as a primary institution of the international space society. According to a recent report by the Space Foundation (2015: 2), the global space economy grew up by 9 percent in 2014, totalling $330 billion, with commercial space activities accounting for the 76 percent of the global space economy and direct-to-home television services accounting for more than three-quarters of the commercial space sector. Even in the launch field, which has been traditionally reserved to the state largely due to national security and cost considerations, US small private companies have emerged like Space Exploration Technologies Corporation, known as SpaceX, and XCOR Aerospace. As Newlove-Eriksson and Eriksson (2013) argue, the globalisation of space activities has been underpinned by the growing importance of private authority and transnational Public-Private Partnerships (PPPs) and the blurred distinction between the military and civilian uses of space. Therefore, it makes sense to think of the space market as an institution of international space society. Yet, a number of points are worth noting here as they help to highlight the possibilities and limits of this move. First, despite all the attention paid to the privatisation of space travel promoted by space entrepreneurs of the likes of Elon Musk (SpaceX), Jeff Bezos (Blue Origin), and Richard Branson (Virgin Galactic), the privatisation of space should not be overstated. Not only does the degree of privatisation vary across space services and products (Moltz, 2014: 102-12), but governments also remain central actors in the space industry as key sources of initial investment and as customers for several space products and services (Brennan and Vecchi, 2011: 18, OECD, 2014: 17). Second, while it is clear that the argument over whether to have the market or not ended with the collapse of the Soviet Union, the tension between economic nationalism and economic liberalism is far from over, as there are not many states fully open to the forces of the global economy and many states support a form of capitalism that is embedded in economic nationalism. This points to the contested nature of the market as a primary institution in the sense that for many states the challenge of how to relate to the global market and make it more effective remains (Buzan, 2014a: 138). As far as international space society is concerned, it is necessary to note that the contested nature of the space market as an institution is reflected in the continuing dialectics between techno-nationalism and techno-globalism. It is commonplace among scholars to argue that Japan and China are two key examples of states that privilege a techno-nationalist approach to technology and innovation, including space technology. But even the United States has not been immune to techno-nationalist impulses. As Weiss (2014) shows, the enduring lead in high technology that the United States still enjoys is largely explained by the creation of not a liberal, but a hybrid political economy, whereby the national security state is interwoven with the commercial sector. NASA, of course, has been a key institution of the national security state since the beginning of the Space Age. But this has also been manifested in its recent efforts to catalyse the development of a commercial space industry through inviting competitive innovation (Weiss, 2014: 119-20, 27-8). This leads to the third point to make about how to understand the relationship between techno-nationalism and the space market. Because of the enduring influence of the former, it is tempting to see techno-nationalism as containing the space market (at least for the time being). Clearly, at one level, the space market can be understood as complementary to techno-nationalism in the ever-globalising international space society. Yet, at another level, the space market as a solidarist institution is staged as opposed to techno-nationalism. This tension is compounded by the fact that, in many ways, techno-nationalism occupies the crucial place of national sovereignty and territoriality in the sector of space considering that sovereignty in international space society is largely understood in cosmopolitan terms. Fourth, in discussing the market as a primary institution, Beeson and Breslin (2014) suggest that it makes more sense to treat the ‘developmental state’ and ‘regional production structures’ as primary institutions in East Asia rather than focusing on the market. This is an important consideration that serves to highlight how the global political economy is underpinned by significant regional derivations. Following from this, although it is apparent that the space market is a key feature of the social structure of international space society, it is possible to say that there are significant regional derivations. Perhaps the best expression of this is the Chinese and Indian variants of postcolonial techno-nationalism that still shape how the two rising Asian space powers relate to the space market. In light of the above, for now, it seems that there is some sort of hierarchy between techno-nationalism and the space market with the former subsuming the latter, especially with regards to space programmes in a postcolonial context. Certainly, the integration of China and India into the global space economy has accelerated over the last decades, but, as we shall see, techno-nationalism is still prominent in the ways in which the two Asian space powers approach space technology. Moreover, the space market remains contested as an emerging institution due to the ambiguity embedded in space law regarding space activities carried on by private actors. This process is further complicated by the inherent dual-use nature of space technology and the blurring of the distinction between the private and public realms (Newlove-Eriksson and Eriksson 2013). Environmental Stewardship There is now a burgeoning literature that deals with the relationship between international society and global environmentalism and assesses the extent to which environmental stewardship can be seen as a nascent institution of international society. Recent efforts to find ways to mitigate space debris as well as to create a normative framework for the sustainability of space are illustrative of how environmental stewardship is gradually becoming an institution in space. For example, in 2007, COPUOS adopted the ‘Space Debris Mitigation Guidelines’, which were wrought by the international Inter-Agency Debris Coordination Committee (IADC), consisting of experts from thirteen space agencies (United Nations Office for Outer Space Affairs, 2010). Moreover, as discussed earlier, in 2010, COPUOS formed the Working Group on the Long-term Sustainability of Outer Space Activities. Notably, the European Union proposal for a Code of Conduct for Outer Space also includes provisions on space debris control and mitigation (Council of the European Union, 2008: 9; Dickow, 2009: 159). Thus, there are grounds for considering environmental stewardship as an emerging institution of international space society. Indeed, the growing number of governments, private firms, and non-state actors that emphasise the importance of the sustainable utilisation of space suggests that space sustainability has emerged as a key norm. However, what should be noted is that these developments reflect a more pragmatic approach to maintain the space environment sustainable for the effective use of space rather than an expression of cosmopolitan values. Consequently, in the subsequent chapters, rather than examining in detail the engagement of China and India with environmental stewardship as a nascent institution in space, the focus will be on the emerging norm of space sustainability as a key great power responsibility in managing international space order and the implications of this development for China and India as aspiring great powers. Concluding Remarks Although it is clear that there are a number of ways of understanding the international politics of space, it may be worth going beyond standard theoretical approaches to understand how order is maintained in space. Drawing on key English School concepts, this chapter suggests that it is possible to conceptualise space not merely as a system, but also as an international society with a distinct social structure. This exercise of concept development is important both analytically and hermeneutically, given the notion of an exclusive club of space-faring countries. The chapter developed this argument further by highlighting how the nature of outer space as a distinctive sectoral interstate society is manifested in the ways in which its primary institutions are differentiated from such institutions at the global level (space war, space law, cosmopolitan sovereignty, space diplomacy, balance of power, great power management, techno-nationalism, space market, and environmental stewardship) in a historical and comparative context. In doing so, the chapter helps to highlight the constitutive impact of these institutions on the norms that shape the behaviour of the space-faring states.

#### Framing China as an irresponsible power in space is tied to fear of loss of control over the “new American way of war” and the frontier of outer space – that creates new instantiations that force conflict.

Hunter ‘18

(Cameron Hunter, PhD from the University of Bristol, MA in International Security and Terrorism Studies from University of Nottingham, and MA in Research Methods from the University of Bristol. “The Rise of China in Space: Technopolitical Threat Construction in American Public Policy Discourse” PHD Dissertation. <https://research-information.bris.ac.uk/files/183271194/Final_Copy_2018_09_25_Hunter_C_PhD.pdf> )//RJG

As we have seen in this chapter, proponents of the “Chinese space threat” have attempted to overturn what they see as a dangerous lack of attention for space matters relating to military and economic issues. To do this, American policy elites have built up two fairly distinct, yet mutually supporting narratives of specific Chinese “threats” to specific aspects of the American national Self. Together these narratives provide the linguistic elements that could be deployed in debates on the technological decisions the US faced in response to China’s “rise” in space. The most important aspect of the national Self which the “Chinese space threat” is positioned as jeopardising was the new, clean and ‘virtuous’ (Der Derian 2009) “American way of war.” American policy elites have built on existing, prevailing formulations of “the new American way of war” in order to highlight the crucial roles of space technology in enabling the desirable practices of American warfighting. At times, this is done in a way which explicitly compared the ‘virtuous’ “new American way of war” with the old, undesirable practices of warfare during World War II (Der Derian 2009: 136). In matters of conventional war, they warn that China could destroy satellites and transport American back to a time when casualties were unavoidably high. Advancing a specific vision of how America should fight its wars did not always require direct comparison, however. Military and political elites also warned that the US would not be able to project power wherever it wanted and needed. Their most catastrophic visions of all warned that Chinese space technology jeopardised the President’s ability to control the nuclear stockpile, and therefore by extension the stability of American nuclear deterrence and the existence of the American homeland. All of these claims involved complex, mutual relationships between identity and technical artefacts. The overall effect was the successful supplanting of the prior discursive representation of unchallenged American military space power, with constructions of an America reliant on space but with no defense against the new “Chinese space threat.” These struggles over the meaning of space technologies and national identities also played into debates on military technology procurement, explored in the next chapter. The second major component of the technopolitical identity politics of the “Chinese space threat” related to notions of American “exceptionalism.” This manifested under two main themes: national prestige, particularly around the legacy of the Moon landings, and utopian economic visions under the rubric of the American “frontier.” Although less dominant than the discourse positioning China as a “threat” to the “new American way of war,” the “Chinese space threat” to American “exceptionalism” was an important supporting component of narrative of a threatening “rise” of China in space. In matters of economics and prestige, the “threat” advocates had some moderate success. The conventional, prevailing understandings of Apollo as an unassailable national achievement was a powerful opponent for the “Chinese space threat” advocates to overturn with their countervailing visions of Chinese flags on the Moon. The greatest success, built not only on the discourse of the utopian vision of an endless American “frontier,” but also favourably positioned to draw on the strength of the military and prestige components of the wider “Chinese space threat,” was in the implementation of specific anti-Chinese trade regulations for space technology. Much as in the case of the military threat, the threat to “exceptionalism” was also significant because it played directly into debates about grand national technological programs such as the Space Shuttle, Constellation, and Orion. By simultaneously problematising the concepts of technology and culture, it is possible to recognise in these debates over identity that, at least on one level, those sounding the alarm on China are “correct.” The “new American way of war” does indeed require certain technical affordances in order to be realised, and China possesses the capability to destroy or disable those artefacts. What is missing from this argument is the recognition that this position also relies on technopolitical constructions of both China and America, and crucially that these constructions are socially contingent. Whether it was the military, prestige, or economic components of the American national Self which was supposedly threatened by China’s space program, analysis of the discourse reveals that these linguistic moves were attempts to contest or reproduce wider, powerful discourses constituting national identity. Collectively they portray a nation that is much more fragile than their imagined audiences realised. Proponents of the “Chinese space threat” are therefore involved in creating new technopolitical relationships between China, the US, and their space technologies. While we can see their attempts at supplanting older representations of the state and space technology as broadly successful, the question remains of how successful they are in translating this success in rhetoric into transformations of American technics themselves. It is this question of the power of the “Chinese space threat” discourse on the American ‘social battlefield of technology’ which must be addressed.

#### The construction of the asteroid threat promotes a culture of fear, making the idea of space militarization and war legitimate

Mellor ‘7(Dr Felicity, is a theoretical physicist and lecturer in Science in Context in the School of Interdisciplinary Sciences at the University of the West of England, Bristol “Colliding Worlds: Asteroid Research and the Legitimization of War in Space” JSTOR) BW

Even as the scientists themselves attempted to pull back from concrete proposals for weapons systems, their own discourse irresistibly drew them towards the militaristic intervention demanded by the narrative impera tive. **The identification of asteroids as a threat required a military response**. Astronomer Duncan Steel (2000b), writing about the impact threat in The Guardian newspaper, put it most clearly when he stated that 'we too need to declare war on the heavens'. Just as the overlap between science and science fiction was mutually supportive, so the overlap between impact science and defence helped legitimize both. The civilian scientists could draw on a repertoire of metaphors and concepts already articulated by the defence scientists to help make the case for the threat from space. They would no longer be a marginalized and underfunded group of astronomers, but would take on the ultimate role of defending the world. Similarly, in the context of the impact threat, the defence sci entists could further develop their weapons systems without being accused of threatening the delicate nuclear balance of mutually assured destruction or, in the period between the fall of the Soviet Union and the 9/11 attacks, of irresponsibly generating a climate of fear in the absence of an identifi able enemy. The civilian scientists attempted to still their consciences in their deal ings with the defence scientists by suggesting that, with the end of the Cold War and the demise of SDI, the latter had lost their traditional role. This argument was naive at best. In fact, as we have seen, the US defence sci entists had taken an interest in the impact threat since the early 1980s, from the time that SDI had greatest political support during the defence build-up of the Reagan era. Even at the time of the fractious Interception Workshop, George H.W. Bush was maintaining SDI funding at the same level as it had been during the second Reagan administration. If outwardly the Clinton administration was less supportive when it took office in 1993 and declared that SDI was over, many of those involved in the programme felt that it would actually go on much as before (FitzGerald, 2000: 491). SDI was renamed, and to some extent reconceived, but funding continued and was soon increased when the Republicans gained a majority in Congress.33 After George W. Bush took office in 2001, spending on missile defence research was greatly increased, including programmes to follow on from Brilliant Pebbles (Wall, 2001a; 2001b). Thus the defence scientists had shown an interest in the impact threat from the time of the very first meeting onwards, regardless of the state of funding for missile defence, which in any case continued throughout the period. This is not to suggest that the impact threat was not used by the defence scientists as a means of maintaining the weapons establishment. Indeed, the impact threat offered a possible means of circumventing or undermining arms treaties.34 But it does mean that the attempt to access new sources of funding, while being an important factor in the promotion of asteroids as a threat, did not fully explain either the weapons scientists' interests or the civilian scientists' repeated meetings with them. **The asteroid impact threat offered a scientifically validated enemy onto which could be projected the fears on which a militaristic culture depends.** Far from providing a replacement outlet for weapons technologies, the promotion of the asteroid impact threat helped make the idea of war in space more acceptable and helped justify the continued development of space based weaponry. Arguably, with the Clementine and Deep Impact mis sions, the asteroid impact threat even facilitated the testing of SDI-style systems. The asteroid impact threat legitimized a way of talking, and thinking, **that was founded on fear of the unknown** and the assumption that advanced technology could usher in a safer era. In so doing, it resonated with the politics of fear and the technologies of permanent war that are now at the centre of US defence policy.

#### Voting negative adopts failed IR for a healthy dose of pessimism – at the end of the world, all we can do is hope to be buried alive together.

Grove ‘19

[Jarius, PoliSci at the University of Hawai’i. 2019. “Savage Ecology: War and Geopolitics in the Anthropocene.”] pat – ask me for the PDF!

Failed ir affirms the power of this kind of negative thinking as an alternative to the endless rehearsing of moralizing insights and strategic foresight. The negative is not “against” or reacting to something. Rather, it is the affirmation of a freedom beyond the limits of life and death. That is, it is making a life by continuing to think about the world, even if that thinking is not recuperative, and even if nothing we think can save us. In the face of it all, one celebrates useless thinking, useless scholarship, and useless forms of life at the very moment we are told to throw them all under the bus in the name of survival at all costs. This is a logic referred to lately as hope and it is as cruel as it is anxiety inducing. Hope is a form of extortion. We are told that it is our obligation to bear the weight of making things better while being chided that the failure of our efforts is the result of not believing in the possibility of real change. In such an environment, pessimism is often treated as a form of treason, as if only neoliberals and moral degenerates give up—or so goes the op-ed’s insisting upon the renewed possibility of redemption.

In response to these exhortations, pessimism offers a historical atheism, both methodologically and morally. The universe does not bend toward justice. Sometimes the universe bends toward the indifference of gravity wells and black holes. Affirming negativity, inspired by Achille Mbembe, is grounds for freedom, even if that freedom or relief is only fleeting and always insecure. I am not arrogant enough to think a book can attain freedom of this sort, but this book is inspired by refusals of critique as redemption in favor of useless critique and critique for its own sake.

That the pursuit of knowledge without immediate application is so thoroughly useless, even profane, is a diagnosis of our current moment. The neoliberal assault on the university is evidence of this condition, as is the current pitch of American politics. Our indifference as intellectuals to maximizing value has not gone unnoticed. We are still dangerous, worthy of vilification, of attack, sabotage, and derision because we fail so decadently. We are parasites according to Scott Walker, Donald Trump, and the rest. So be it. We are and shall remain irascible irritants to a worldwide assault on thinking that is well underway and facing few obstacles in other jurisdictions.

What would failed scholarship do? Learn to die, learn to live, learn to listen, learn to be together, and learn to be generous. These virtues are useless in that they do not prevent or manage things. They do not translate into learning objectives or metrics. Virtues of this order are selfsame, nontransferable experiences. They are meaningful but not useful. These are luxurious virtues. Like grieving or joy, they are ends unto themselves. But how will these ideas seek extramural grants, contribute to an outcomes-based education system, or become a policy recommendation? They will not, and that is part of their virtue.

Even if there is no straight line to where we are and where we ought to be, I think we should get over the idea that somehow the U.S. project of liberal empire is conflicted, or “more right than it is wrong,” or pragmatically preferable to the alternatives. I hope this book can contribute to the urgent necessity to get out of the way by reveling in the catastrophic failure that should inspire humility but instead seems to embolden too many to seek global control yet again. Demolition may be an affirmative act if it means insurgents and others can be better heard. And yet this may fail too. If we can accomplish nothing at all, we can at least, as Ta-Nehisi Coates and other pessimists have said, refuse to suborn the lie of America any longer. Telling the truth, even if it cannot change the outcome of history, is a certain kind of solace. In Coates’s words, there is a kind of rapture “when you can no longer be lied to, when you have rejected the dream.” Saying the truth out loud brings with it the relief that we are not crazy. Things really are as bad as we think.

If there are those of us who want to break from this one-hundred-year-old race to be the next Henry Kissinger, then why do we continue to seek respect in the form of recognizable standards of excellence? I am not sure where the answer finally lies, but I do know that professionalization will not save us. To appear as normal and recognizably rigorous will not be enough to stave off the neoliberal drive to monetize scholarship, or to demand of us strategically useful insights. The least we can do in the face of such a battle is to find comfort in meaningful ideas and the friendships they build rather than try to perform for those we know are the problem. Some will ask, who is this “we” or is that “they”—where is your evidence? More will know exactly what I am talking about.

The virtues I seek are oriented toward an academy of refuge, a place we can still live, no matter how dire the conditions of the university and the classroom. It is not the think tank, boardroom, or command center. We are, those of us who wish to be included, the last of the philosophers, the last of the lovers of knowledge, the deviants who should revel in what Harney and Moten have called the undercommons.

In one of his final lectures, Bataille speaks of the remnants of a different human species, something not quite so doomed, something that wasted its newly discovered consciousness and tool-being on the art that still marks the walls of prehistoric caves. This lingering minor or vestigial heritage is philosophy’s beginning. Philosophy survives war, atrocity, famine, and crusades. Thinking matters in a very unusual way. Thinking is not power or emancipation. Thinking matters for a sense of belonging to the world, and for believing in the fecundity of the world despite evidence to the contrary.

How do you get all this from pessimism, from failure? Because willing failure is a temptation, a lure to think otherwise, to think dangerous thoughts. Pessimism is a threat to indifferentism and nihilism in the sense of the phenomenon of Donald Trump. Pessimism is a provocation and an enemy of skepticism, particularly of the metaphysical variety. It is not redemption from these afflictions, but in pessimism there is solace in the real. To put it another way, to study the world as it is means to care for it.

The exhortation that our care or interest should be contingent on how useful the world is and how much of it conforms to our designs is as much opposed to care as it is to empiricism. We can study airports, poetry, endurance races, borders, bombs, plastic, and warfare, and find them all in the world. To consider the depth of their existence can be an invitation to the world rather than a prelude to another policy report. One cannot make a successful political career out of such pursuits, but you might be able to make a life out of it, a life worth repeating even if nothing else happens.

At the end of Jack Halberstam’s The Queer Art of Failure, we are presented with the Fantastic Mr. Fox’s toast as an exemple of something meaningful in these dark times of ours.

They say all foxes are slightly allergic to linoleum, but it’s cool to the paw—try it. They say my tail needs to be dry cleaned twice a month, but now it’s fully detachable—see? They say our tree may never grow back, but one day, something will. Yes, these crackles are made of synthetic goose and these giblets come from artificial squab and even these apples look fake—but at least they’ve got stars on them. I guess my point is, we’ll eat tonight, and we’ll eat together. And even in this not particularly flattering light, you are without a doubt the five and a half most wonderful wild animals I’ve ever met in my life. So let’s raise our boxes—to our survival.

Halberstam says of this queer moment:

Not quite a credo, something short of a toast, a little less than a speech, but Mr. Fox gives here one of the best and most moving—both emotionally and in stop-motion terms—addresses in the history of cinema. Unlike Coraline, where survival is predicated upon a rejection of the theatrical, the queer, and the improvised, and like Where the Wild Things Are, where the disappointment of deliverance must be leavened with the pragmatism of possibility, Fantastic Mr. Fox is a queerly animated classic in that it teaches us, as Finding Nemo, Chicken Run, and so many other revolting animations before it, to believe in detachable tails, fake apples, eating together, adapting to the lighting, risk, sissy sons, and the sheer importance of survival for all those wild souls that the farmers, the teachers, the preachers, and the politicians would like to bury alive.

Although not as much fun as Halberstam’s monument to low theory, Savage Ecology is for all the other wild animals out there studying global politics. May we be buried alive together.

#### The Role of the Judge is to adopt martial empiricism.

Bousquet et al ‘20

[Antoine Bousquet, University of London, Jairus Grove, University of Hawai‘i at Manoa, and Nisha Shah University of Ottawa. 2020. “Becoming war: Towards a martial empiricism,” <https://journals.sagepub.com/doi/full/10.1177/0967010619895660>] pat

Haunting the formations and deformations of global life, war confronts us as an abyss in the face of which cherished interpretative frameworks perilously buckle and warp. Indeed, Tarak Barkawi and Shane Brighton (2011: 129) accurately identify a ‘conceptual black hole surrounding the notion of war’ that has insistently gnawed at the study of the phenomenon. Locating the source of this lacuna in the absence of an ‘ontology of war’, they propose to ground one in ‘fighting’ (Barkawi and Brighton, 2011: 136). Although we concur on the diagnosis, we take issue with the suggested remedy. War does not obey any neat philosophical division between epistemology and ontology. For us, the resolute elusiveness of any definitive understanding of war is inherent in that very object. Every attempt to conceptually shackle war is undone by the creative advance of its new modes, residences and intensities. This speaks against the value of ontology per se less than it calls for a strange, paradoxical and provisional ontology that is consonant with the confounding mutability of war. Such an ontology, suspended between infinity and totality, being and nothingness, the sheer fecundity and utter catastrophe of war, may not be too uncanny for its object. In fairness, Barkawi and Brighton (2011: 133) gesture towards this in acknowledging ‘war’s recalcitrance as an object of knowledge’ and allowing for war to unmake any truth. Yet they seem unwilling to embrace the full force of their own insight, which Marc von Boemcken (2016: 239) ultimately declares: ‘even the statement that “war is fighting” may well be eventually undone by war. In a very fundamental manner, war escapes human intelligibility.’

This special issue on ‘Becoming War’ grapples with war as obdurate mystery. In its recurring persistence yet constant reinvention, its paradoxical ordering of life for the generation of death, or its stubborn affront to the better world we all purport to want, war never ceases to perplex us. Our world is one shot through by war, manifest in the nation-states we inhabit, the ecologies of technics that bind us to one another, and the very thoughts ricocheting through our communities of sense. And yet we still do not know war.

Rather than endeavour yet again to ‘say something fundamental about what war is’ (Barkawi and Brighton, 2011: 134, emphasis in original), we choose to explore how war becomes. This is not to say that we deny any durability or regularities in the phenomenon of war over time. Simply that, as Alfred Whitehead (1978: 35) puts it, ‘there is a becoming of continuity, but no continuity of becoming’. Accordingly, we seek to trace the lines of becoming that congeal into what comes to count as war, even as it continually frays at the edges and insolently defies habituated frames of reference. We do not, therefore, offer a theory of continuity, a formula for what all lines of becoming war might have in common, but instead sketch a style of investigation that encompasses both the enduring cohesion and the radical dispersion of war. We call this endeavour ‘martial empiricism’ to renounce attempts to devise a definitive theory of war. Instead, we favour an open-ended conceptual arsenal for following the trail of war wherever it leads us, as opposed to camping in the places where we already expect to find it.

Although we do not aim to circumscribe the remit of its investigations, martial empiricism is nonetheless inherently situational, spurred by the impulse to grasp the present martial condition we inhabit in all its calamity and promise. We would be far from the first to point out the growing inadequacy of the conceptual frameworks of war inherited from the Westphalian historical interval. Yet we still collectively flounder in the face of a combined and uneven landscape of armed conflict populated by metastasizing war machines encompassing overseas contingency operations, fullspectrum hybrid theatres, ethno-supremacist militias, crowd-sourced paramilitaries, Incel shooters and narco-state assassins. The game is definitely up when a task force led by the former head of United States Central Command can write that ‘basic categories such as “battlefield,” “combatant” and “hostilities” no longer have clear or stable meaning’ (Abizaid and Brooks, 2014: 35). Confronted with this reality and the persistent bewilderment it induces, we contend that a certain epistemic humility is in order. Rather than professing to know where war begins and ends, martial empiricism starts in the middle, with only the barest tentative intuitions necessary to explore the logistics, operations and embodiments that engender armed conflict as an unremitting condition of global life.

## Case

### 1NC – Util

#### Utilitarian calculus doesn’t account for the geopolitical structure of aggregate conceptions of the good – that makes it incapable of grappling with the causes of apocalypse.

Grove ‘19

[Jarius, PoliSci at the University of Hawai’i. 2019. “Savage Ecology: War and Geopolitics in the Anthropocene.”] pat – ask me for the PDF!

Rather than see these two career trajectories as opposed, I think Crutzen’s thinking displays a continuous concern for the Northern Hemisphere and a particular cartography, rather than a geography, of human survival. Crutzen, as well as the concept of the Anthropocene itself, cannot escape preceding geopolitical conceptions of the Earth. Crutzen and others who rush so quickly to the necessity to transition efforts from climate abatement to climate modification are unsurprisingly not moved by claims that artificial cooling will likely cause droughts and famines in the tropics and subtropical zones of the global south; nor are they moved by how such plans may accelerate ocean acidification. The utilitarian risk calculus that favors the greatest good for the greatest number has no geographical or historical sensibility of how unequally aggregate conceptions of the good are distributed around the planet.

Global thinking, even in its scientific and seemingly universalist claims to an atmosphere that “we” all share, belies the geopolitics that enlivens scientific concern, as well as the global public policy agenda of geoengineering that seeks to act on behalf of it. Saving humanity as an aggregate, whether from nuclear war, Styrofoam, or climate turbulence, has never meant an egalitarian distribution of survivors and sacrifices. Instead, our new cosmopolitanism—the global environment—follows almost exactly the drawn lines, that is, the cartography or racialized and selective solidarities and zones of indifference that characterize economic development, the selective application of combat, and, before that, the zones of settlement and colonization. More than a result of contemporary white supremacy or lingering white privilege, the territorialization of who lives and who dies, who matters and who must be left behind for the sake of humanity, represents a five-hundred-year geopolitical tradition of conquest, colonization, extraction, and the martial forms of life that made them all possible through war and through more subtle and languid forms of organized killing.

I am not suggesting that Crutzen and others are part of a vast conspiracy; rather, I want to outline how climate change, species loss, slavery, the elimination of native peoples, and the globalization of extractive capitalism are all part of the same global ordering. That is, all of these crises are geopolitical. The particular geopolitical arrangement of what others have called the longue durée, and what I am calling the Eurocene, is geologically significant but is not universally part of “human activity” despite the false syllogism at the heart of popular ecological thinking that a global threat to humanity must be shared in cause and crisis by all of humanity.

Departing from Sloterdijk, I am hesitant to so easily locate modernity or explication as the root or cause of the global catastrophe. No single strategy, war, act of colonization, technological breakthrough, or worldview fully explains the apocalypse before us. However, there is something like what Gilles Deleuze and Félix Guattari call a refrain that holds the vast assemblage together, a geopolitical melody hummed along with the global expansion of a form of life characterized by homogenization rather than diversification. Accordingly, if we are to make some sense of such a vast world that is, even for Crutzen and Birks, “quite complex and difficult to model,” I think we must consider the particular refrain of geopolitics that is capable of, by scientific as well as more humbly embodied standards, destroying worlds along with the world. To eschew geopolitics simply because, as a refrain, it is too big, too grand, or too universal would ignore the conditions of possibility for nuclear weapons, power politics, and carbon-based globalization, and would greatly impoverish the explanatory capability of even the best climate models. So maybe it is not so strange that Crutzen and others’ attention to the nuclear threat of great powers has all but disappeared despite the fact that Russia and the United States still possess thousands of nuclear weapons, and as of late have been all too vocal about using them. Instead, the Anthropocene, as envisioned by Crutzen as a universal concern, requires with it a depoliticization of the causes of that concern.

### 1NC – Kessler

#### Risk is low – sat designs and cleanup checks.

O’Gorman 18 (John, MA thesis submitted to Rochester Institute of Technology, “The Cost of Clean Space- A Study of the Additional Fuel Costs of Launching Above Low Earth Orbit,” 5-18, <https://pdfs.semanticscholar.org/d703/101d657334d2e1575d08005e290578770cd1.pdf?_ga=2.70400848.1753078645.1567896134-909185996.1567896134>)

To conclude, orbital debris is a current issue and has the potential to be a serious problem in the coming decades and centuries if business as usual is conducted. Fortunately, steps are being taken now which can mitigate this disastrous scenario. The space community is still relatively small and better rocket and satellite design is helping to avoid the accidental creation of debris. Studies over the feasibility of pulling large objects from orbit have already been done and they show a large amount of promise for managing the future creation of debris very effectively. Although current international policies managing debris do not yet exist, the discussion over how space will be managed is already well underway. If sound debris policies can come out of these discussions, the utility of LEO can be preserved for future generations.

#### Kessler Syndrome false – less debris and existing guidelines solve

Lewis 15 (Hugh, Senior Lecturer in Aerospace Engineering at the University of Southampton, “Space debris, Kessler Syndrome, and the unreasonable expectation of certainty.” Room, <https://room.eu.com/article/Space_debris_Kessler_Syndrome_and_the_unreasonable_expectation_of_certainty>, Accessed 8/10/19, JMoore)

There is now widespread awareness of the space debris problem amongst policymakers, scientists, engineers and the public. Thanks to pivotal work by J.C. Liou and Nicholas Johnson in 2006 we now understand that the continued growth of the debris population is likely in the future even if all launch activity is halted. The reason for this sustained growth, and for the concern of many satellite operators who are forced to act to protect their assets, are collisions that are expected to occur between objects – satellites and rocket stages – already in orbit. In spite of several commentators warning that these collisions are just the start of a collision cascade that will render access to low Earth orbit all but impossible – a process commonly referred to as the ‘Kessler Syndrome’ after the debris scientist Donald Kessler – the reality is not likely to be on the scale of these predictions or the events depicted in the film Gravity. Indeed, results presented by the Inter-Agency Space Debris Coordination Committee (IADC) at the Sixth European Conference on Space Debris show an expected increase in the debris population of only 30% after 200 years with continued launch activity. Collisions are still predicted to occur, but this is far from the catastrophic scenario feared by some. Constraining the population increase to a modest level can be achieved, the IADC suggested, through widespread and good compliance with existing space debris mitigation guidelines, especially those relating to passivation (whereby all sources of stored energy on a satellite are depleted at the end of its mission) and post-mission disposal, such as de-orbiting the satellite or re-orbiting it to a graveyard orbit. Nevertheless, the anticipated growth of the debris population in spite of these robust efforts merits the investigation of additional measures to address the debris threat, according to the IADC.

#### No Kessler syndrome impact---rules, monitoring systems, and moving satellites solve

Mosher 9/3—journalist with more than a decade of experience reporting and writing stories about space, science, and technology, citing Jesse Gossner, an orbital-mechanics engineer who teaches at the US Air Force's Advanced Space Operations School [Dave, 9/3/2019, “Satellite collisions may trigger a space-junk disaster that could end human access to orbit. Here's how.”, Business Insider, <https://www.businessinsider.com/space-junk-kessler-syndrome-chain-reaction-prevention-2018-3>] AMarb

The Kessler syndrome plays center-stage in the movie "Gravity," in which an accidental space collision endangers a crew aboard a large space station. But Gossner said that type of a runaway space-junk catastrophe is unlikely. "Right now I don't think we're close to that," he said. "I'm not saying we couldn't get there, and I'm not saying we don't need to be smart and manage the problem. But I don't see it ever becoming, anytime soon, an unmanageable problem." There is no current system to remove old satellites or sweep up bits of debris in order to prevent a Kessler event. Instead, space debris is monitored from Earth, and new rules require satellites in low-Earth orbit be deorbited after 25 years so they don't wind up adding more space junk. "Our current plan is to manage the problem and not let it get that far," Gossner said. "I don't think that we're even close to needing to actively remove stuff. There's lots of research being done on that, and maybe some day that will happen, but I think that — at this point, and in my humble opinion — an unnecessary expense." A major part of the effort to prevent a Kessler event is the Space Surveillance Network (SSN). The project, led by the US military, uses 30 different systems around the world to identify, track, and share information about objects in space. Many objects are tracked day and night via a network of radar observatories around the globe. Optical telescopes on the ground also keep an eye out, but they aren't always run by the government. "The commercial sector is actually putting up lots and lots of telescopes," Gossner said. The government pays for their debris-tracking services. Gossner said one major debris-tracking company is called Exoanalytic. It uses about 150 small telescopes set up around the globe to detect, track

### 1NC – Space War

#### No miscalc or escalation

James Pavur 19, Professor of Computer Science Department of Computer Science at Oxford University and Ivan Martinovic, DPhil Researcher Cybersecurity Centre for Doctoral Training at Oxford University, “The Cyber-ASAT: On the Impact of Cyber Weapons in Outer Space”, 2019 11th International Conference on Cyber Conflict: Silent Battle T. Minárik, S. Alatalu, S. Biondi, M. Signoretti, I. Tolga, G. Visky (Eds.), <https://ccdcoe.org/uploads/2019/06/Art_12_The-Cyber-ASAT.pdf>

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 technology, 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 one’s going to war over a downed satellite

Bowen 18 [Bleddyn Bowen, Lecturer in International Relations at the University of Leicester. The Art of Space Deterrence. February 20, 2018. https://www.europeanleadershipnetwork.org/commentary/the-art-of-space-deterrence/]

Space is often an afterthought or a miscellaneous ancillary in the grand strategic views of top-level decision-makers. A president may not care that one satellite may be lost or go dark; it may cause panic and Twitter-based hysteria for the space community, of course. But the terrestrial context and consequences, as well as the political stakes and symbolism of any exchange of hostilities in space matters more. The political and media dimension can magnify or minimise the perceived consequences of losing specific satellites out of all proportion to their actual strategic effect.

#### Won’t go nuclear – seen as a normal conventional attack because of integration with ground forces

Firth 7/1/19 [News Editor at MIT Technology Review, was Chief News Editor at New Scientist. How to fight a war in space (and get away with it). July 1, 2019. MIT Technology Review]

Space is so intrinsic to how advanced militaries fight on the ground that an attack on a satellite need no longer signal the opening shot in a nuclear apocalypse. As a result, “deterrence in space is less certain than it was during the Cold War,” says Todd Harrison, who heads the Aerospace Security Project at CSIS, a think tank in Washington, DC. Non-state actors, as well as more minor powers like North Korea and Iran, are also gaining access to weapons that can bloody the noses of much larger nations in space.

### 1NC - Cyber

#### 1AC Falco is lies - it just says SpaceX gets hacked sometimes and has zero warrants for why hacking escalates beyond vague handwaving to “china wreaks havock” – this is our exact argument about the defenders of US hegemony securitizing China

#### They don’t solve it – their ev is not specific to constellations and concedes that ilaw is necessary to establish regulations

### 1NC - Asteroids

#### Tons of countermeasures prevent collisions

Rees 18—Fellow of Trinity College and Emeritus Professor of Cosmology and Astrophysics at the University of Cambridge, holds the honorary title of Astronomer Royal and also Visiting Professor at Imperial College London and at Leicester University [Martin, 2018, *On the Future Prospects for Humanity*, Chapter 1: Deep in the Anthropocene, Princeton University Press, Accessed through the Wake Forest Library] AMarb

You may guess that, being an astronomer, anxiety about asteroid collisions keeps me awake at night. Not so. Indeed, this is one of the few threats that we can quantify—and be confident is unlikely. Every ten million years or so, a body a few kilometres across will hit the Earth, causing global catastrophe—so there are a few chances in a million that such an impact occurs within a human lifetime. There are larger numbers of smaller asteroids that could cause regional or local devastation. The 1908 Tunguska event, which flattened hundreds of square kilometres of (fortunately unpopulated) forests in Siberia, released energy equivalent to several hundred Hiroshima bombs. Can we be forewarned of these crash landings? The answer is yes. Plans are afoot to create a data set of the one million potential Earth-crossing asteroids larger than 50 metres and track their orbits precisely enough to identify those that might come dangerously close. With the forewarning of an impact, the most vulnerable areas could be evacuated. Even better news is that we could feasibly develop spacecraft that could protect us. A ‘nudge’, imparted in space several years before the threatened impact, would only need to change an asteroid’s velocity by a few centimetres per second to deflect it from a collision course with the Earth.

#### No extinction---at worst 10% dies

Farquhar et al. 17 – \*director of the Global Priorities Project, M.A in Physics and Philosophy from the University of Oxford, \*\*Global Priorities Project, \*\*\*Research Associate in the FHI at the University of Oxford, Lecturer in Mathematics at St. Hugh’s College, \*\*\*\*PhD in philosophy, Researcher at the Centre for Effective Altruism, \*\*\*\*\*Academic Project Manager, Centre for the Study of Existential Risk, \*\*\*\*\*\*Director of Research at FHI [Sebastian Farquhar\*, John Halstead\*\*, Owen Cotton-Barratt\*\*\*, Stefan Schubert\*\*\*\*, Haydn Belfield\*\*\*\*\*, Andrew Snyder-Beattie\*\*\*\*\*\*, 2017, Global Priorities Project 2017, “Existential Risk Diplomacy and Governance”, <https://www.fhi.ox.ac.uk/wp-content/uploads/Existential-Risks-2017-01-23.pdf>] AMarb

According to the US National Academy of Sciences, as a rule of thumb, Near Earth Object (NEO) impacts with a diameter of 1.5km would likely kill 10% of the world population, and the damage ramps up to the entire population for those with a diameter of 10km.49 Due to the success of NEO tracking efforts, we can have relatively high confidence in the probability estimates of NEO strikes.50 On average, 5km NEOs are expected to strike once every 30 million years, and 10km NEOs once every 100 million years.51 We have discovered around 94% of nearby asteroids with a diameter of 1km or more and NASA believes all asteroids with a diameter of 10km or more have been detected,52 and continued detection of both asteroids and comets would give us time to prepare if a large NEO were on course to hit Earth. There is at present no known feasible way to deflect NEOs with a diameter of more than a few kilometres,53 though we might be able to develop such technology in the future.

#### All extinction-level asteroids are being tracked and won’t hit for 860 years

Taylor, 9-30-2018 (Chris Taylor, Senior Writer, "'Armageddon'-style asteroid will now not destroy human race, sorry," Mashable, https://mashable.com/article/armageddon-asteroid-threat/, 7-22-2019) AB

Some days are so damaging to your faith in humanity, you may find yourself idly wishing for the cleansing global firestorm that would follow an impact from the kind of asteroid that killed off the dinosaurs 65 million years ago. If that's the case, then astrophysicist and planetary scientist Michael Busch has some bad news. Over the last couple of decades, telescope-watchers like him have done such a good job of detecting and tracking the orbits of all possible extinction-level rocks out there that we can now say with confidence that none will hit us, at least not in the next 860 years. "We think we've discovered everything out there that's larger than 1 km across," Busch, who has been tracking asteroids since 2005, told me from his office in Mountain View, California. "Anything smaller than a kilometer would only cause regional destruction." For comparison, the dinosaur killer that landed in Mexico was a whopping 10 to 15 kilometers wide. C'mon, really, everything has been logged? Well, Busch concedes, "it's possible there may be one or two behind the sun" where we can't see them with current telescope technology. But the rocks would have to have been hiding there for the past decade, which is highly unlikely. And what do we get in 860 years' time? A puny rock called 1950 DA, which is a mere 1.1 kilometers across, and according to NASA models has at best a 0.3 percent chance of hitting the Earth in 2880. We don't know exactly where yet, because climate change is altering the Earth's rotation by tiny amounts — and on a timescale of 9 centuries, that change matters. The next frontier for scientists like Busch is finding all space rocks larger than 100 meters in diameter — the kind that "if it fell on a city, there's no more city," he says. But even if a potential city-buster lurks out there in the darkness, that still means we have to reset our cultural expectations of total planetary apocalypse — which have been stuck in the same place for the last 20 years, largely thanks to Hollywood. Old-school end of the world In 1998, two asteroid disaster movies collided on the screen at roughly the same time. First came Mimi Leder's Deep Impact, which we might best describe as blue-state America's vision of an impact event. It was the somber, serious version, starring an MSNBC reporter and lots of government officials, including President Morgan Freeman. And then there was Michael Bay's Armageddon — an asteroid movie for the red states. Ignoring science, Bay casually devastated New York and Paris with a meteor shower (take that, liberal elites!). The rest of the movie focused on Bruce Willis, Ben Affleck and a couple Space Shuttles' full of roughnecks, who blast off to kick some asteroid ass with an all-American H-bomb. This was so unrealistic that Bay had to add a disclaimer in the credits that though he had consulted with NASA, the space agency did not endorse his story. Many years later, scientists calculated that for the movie's plot to work — the H-bomb splitting the Earthbound asteroid in two with enough energy to completely change the course of the two chunks — it would have to be a billion times more powerful than the largest H-bomb ever built. Not surprisingly, it is the unserious Armageddon vision that persists in our cultural imagination. "Every time I give a public talk about asteroids, someone jokes about Bruce Willis," Busch laments. When it comes to deflecting those smaller city-busting asteroids, it turns out, an H-bomb can be a useful tool. But "blowing an asteroid in half is not how it's done," Busch says. "It's a poorly-controlled process" — you wouldn't be able to designate where the chunks of rock went. If you're going to make a fusion bomb do the work of predictable asteroid deflection, what you want to do is detonate it near one. Because it isn't about the explosion, it's about the waves of radiation that come in its wake. "What matters for an asteroid is the X-rays," Busch says. "They'd vaporize one whole side of the asteroid, just turn it into a cloud of gas" — and nudge the bulk of the rock off course. That's kind of a last resort option. Busch's preferred method for asteroid deflection is what he calls a "gravity tractor." If you simply park a spacecraft near an object like 1950 DA, then over a number of years the weak gravitational pull of the spacecraft itself would change an asteroid's course enough to save the Earth. But nobody's going to make a Hollywood thriller about the sensible method of bending asteroid orbits to our will, Busch laments: "A gravity tractor wouldn’t look that exciting, because you’re basically sitting there with the motor running for 10 years." Space rocks, the next generation The fact that Busch is involved in the anti-asteroid effort at all says a lot about how we got to this terribly safe juncture. Technically he works for the SETI Institute, the goal of which is to use telescope time to look for alien signals from the stars. But at a certain point, everyone's just looking for stuff from the sky. And there's been so much cross-pollination of asteroid science and research around the world in the last couple of decades, so much telescope-sharing, that it's hard to say exactly how many people are involved in the effort to log and track dangerous rocks. Back in the Armageddon years, there were "fewer people working on this full-time than work in the average McDonald's," Busch says. These days, "there's a large international effort that happens to be below the radar of the daily news." Some of it even recruited members of the public, as in the game-like project known as Asteroid Zoo. A big part of that effort, and a lot of the funding behind it, came in 2013. That was the year a meteorite hit Russia, landing near Chelyabinsk, 930 miles east of Moscow, and injuring 1,000 people. You probably remember the viral dash cam videos of the meteorite's path across the sky.

#### Current infrastructure and future generations solve – no threat for next 188 years despite tabloids

Mandelbaum, 7-24-2019 (Ryan F. Mandelbaum, Science Writer, "Who Protects Earth From Asteroids?," Gizmodo, https://gizmodo.com/who-protects-earth-from-asteroids-1836193730, 7-28-2019) AB

Of all the things that could end our world, an asteroid strike may be the doomsday we have the most control over. In fact, an asteroid strike is near the bottom of the list of feasible armageddons. After all, we inhabit a nuclear weapon-armed world where human activity is permanently altering habitats and changing the climate and where overuse of antibiotics is leading to deadly new strains of bacteria. But the effects of an asteroid strike—tsunamis, shock waves, and flattening winds, could be catastrophic. So, there are scientists who devote their time and research to preparing for this scenario. Though no known asteroid has a chance of bringing about large-scale destruction in our lifetimes, potentially hazardous asteroids make daily fodder for tabloids—and the U.S. government and scientists around the world take them seriously. Just this past spring, NASA, FEMA, and other space agencies teamed up to simulate an asteroid strike, playing out the decision-making required if telescopes do chance upon a new threat. “If you look at the consequences, they could be enormous. We’re talking about potential city killers, impacts that can wipe out an entire continent or even cause civilization to collapse. But the probability is extremely low. It’s the classic low-probability, high-consequence problem,” Mark Boslough, adjunct professor of Earth and planetary sciences at the University of New Mexico, told Gizmodo. “I don’t spend a lot of time worrying about it.” Where they’re coming from The solar system formed from a disk of matter surrounding the early Sun. Much but not all of that stuff coalesced into the planets. In the region between Mars and Jupiter, for example, Jupiter’s strong gravity halted planetary formation, and instead, lots of small rocky bodies crashed into one another and now live on as asteroids. Occasionally, gravitational forces from Jupiter can perturb these objects’ orbits closer to Earth. Other objects, like icy comets, will occasionally come close to Earth in their elliptical orbits. Together, these asteroids and comets make up the “Near-Earth Objects,” or NEOs. By definition, NEOs are any body within 1.3 astronomical units of the Sun, where 1 astronomical unit is approximately 93 million miles, the distance between Earth and the Sun, including comets with orbits around the Sun that take less than 200 years. Scientists have drafted a list of NEOs we should worry about, which are called potentially hazardous asteroids. These are bodies that cross Earth’s orbit and measure 140 meters across or larger, around the size of a football stadium, and come within .05 AU to Earth, or about 20 times the average distance to the Moon. Should something this size impact Earth, it would cause regional catastrophe, Boslough explained. And there are a lot of potential catastrophes that come with one meteorite strike, from high-speed winds to tsunamis to body-cooking heat to shockwaves. Asteroid strikes have long lived in the public concern. Paul Chodas, or as Boslough refers to him, “the Grand Master of Disaster,” engineered the 2019 Planetary Defense Conference tabletop exercise and made the decision to destroy New York City in the simulation. He explained that he was partially inspired by books he’d read as a kid, like The Conquest of Space by Willy Lee, and a painting of a burning, asteroid-struck New York City by Chesley Bonestell. When did scientists start worrying about asteroid impacts? As early as 1694, astronomer Edmond Halley (of Halley’s comet fame) suggested that comets might be able to impact Earth, and throughout the 18th and 19th centuries, others considered comet impacts a possibility—but there were too few observed comets for these scientists to really worry, according to a NASA release. Then, in 1908, the famous Tunguska event flattened a forest in Russia, and in the 1930s, scientists began discovering large asteroids like the asteroid Hermes that passed closely by Earth—perhaps the Tunguska event was an asteroid strike, and perhaps there were more asteroids to worry about. And in 1980, father-son team Luis and Walter Alvarez alongside scientists Frank Asaro and Helen Vaughn Michel discovered the rare element iridium in a layer of rock approximately 65 million years old, which they hypothesized was brought by a large asteroid. This discovery, and other research, is now the basis of the well-accepted theory that a large impact brought about the extinction of the dinosaurs. But that theory was controversial, and it took 30 years before it reached near-consensus status (some still contest how significant the impact was to the mass extinction). But perhaps the most important moment in modern asteroid-impact history didn’t occur on Earth. In 1993, scientists Carolyn and Eugene M. Shoemaker and David Levy discovered a comet orbiting Jupiter. Interest in comet Shoemaker-Levy 9, both public and scientific, skyrocketed as researchers realized that the comet would collide with Jupiter, which ultimately happened in July 1994, 25 years ago this month, leaving behind dark scars on the gas planet that were visible for months. Most of the scientists I spoke to mentioned the importance of Shoemaker-Levy 9 to their study of near-Earth asteroids. The comet marked the first visit to an observatory by Kelly Fast, NASA’s Near-Earth Object Observations Program manager. Boslough’s group created some predictions and models of the comet’s impact, while Chodas was involved in predicting the comet’s orbit. In other words, if something can smash into Jupiter, then something else could hit Earth. “It was obvious that the Earth had been impacted—there were other visible craters like the Meteor Crater in Arizona and you could see impact craters on the Moon,” Fast told Gizmodo. “But Shoemaker-Levy 9 showed us that impacts can happen today.” Thanks to the public awareness of Shoemaker-Levy 9 and increased acceptance of the Alvarez impact theory, Congress grew interested in protecting the Earth from strikes. Congress had already requested NASA to look into a program to survey asteroids in 1992, but In 1998, they ordered NASA to catalogue all near-Earth asteroids larger than a kilometer in size within 10 years, and that summer, NASA established the Near-Earth Object Observations Program headquartered at Jet Propulsion Laboratory in Pasadena, now called the Center for Near-Earth Object Studies, which compiles and computes orbits for near-Earth asteroids. In 2005, Congress expanded the goal to include 90 percent of near-Earth objects 140 meters in size or larger by 2020. Where we are Planetary defense is now a multi-pronged, international enterprise with a many-million-dollar budget. For the United States, NASA’s overarching Planetary Defense Coordination Office is in charge of projects that hunt for nearby asteroids, and for communications to the government, media, and the public about potentially hazardous objects. They also develop research techniques to prevent impacts, and coordinate with the government and agencies like FEMA on how to respond to a potential strike. Space agencies around the world like the European Space Agency, the Japanese Aerospace Exploration Agency, Roscosmos, and others all run various surveys and projects with respect to monitoring and researching NEOs. So, what are scientists doing? NASA runs the Wide-field Infrared Survey Explorer (WISE, now called NEOWISE) space telescope that surveys the sky for asteroids and the Infrared Telescope Facility (IRTF) in Hawaii, which characterizes recently discovered NEOs, while scientists run projects like the University of Arizona’s Catalina Sky Survey, the Pan-STARRS project in Hawaii, and others using general-purpose telescopes. Researchers must then follow up in order to document an asteroid’s properties and offer data for CNEOS scientists to calculate orbits and trajectories using systems first developed by Chodas. There are plenty of other surveys and NEO missions around the world. As for whether you should be concerned, for now, there are no known asteroids worth worrying about, regardless of what an incessant stream of tabloid headlines tell you. None of the asteroid orbits now listed in the CNEOS’ database are predicted to result in an impact in the next 188 years (though there is a chance that the small asteroid 2008 ST comes close in 2104). But if there should be any worry, it’s should be about the asteroids that we haven’t yet found. Despite the various surveys, scientists are only a third of the way to cataloguing the 25,000 estimated near-Earth objects—there just isn’t adequate infrastructure to find all of these space rocks. Some of the missions, like the WISE telescope, weren’t designed with asteroid surveying in mind. “It’s an old spacecraft. It’s way past its design life and has a number of aspects that make it not optimal for finding large numbers of near-Earth objects,” Amy Mainzer, principal investigator of NEOWISE, told Gizmodo. The National Academies released a report this year on the state of the asteroid survey, and according to their assessment, there just isn’t the specific infrastructure required to complete it. “Although Congress has charged NASA with NEO detection and threat characterization, it has failed to provide specific funding to enable NASA to adequately pursue this task.” The report suggested pursuing a dedicated successor to NEOWISE, called NEOCam. Then, of course, there are the smaller asteroids, which can cause local damage and strike with little-to-no warning. The 20-meter (66-foot) Chelyabinsk meteor exploded above Russia in 2013, shattering windows and injuring 1,491 people. This past December, a meteor exploded over the Bering Sea with 10 times the force of the Hiroshima bomb. These smaller impacts fall below the 140-meter limit set by Congress, but still have the potential to cause small-scale damage. “Another one of these Chelyabinsk-type events can easily happen in our lifetime. There have only been a handful of these events, whereas typhoons, hurricanes, and major flooding events happen every year somewhere on Earth.” When it comes to assessing the likelihood of an impact and the damage it will cause, scientists take into account the size of Earth, as well as how often asteroids of different sizes hit. Harmless, dust grain-sized meteors hit Earth almost constantly and burn up in the atmosphere; the odds of a 1-meter asteroid striking Earth amounts to around one impact per year and then become less likely with the size of the asteroid squared; the odds of a 100-meter rock striking are once per 10,000 years and a 1,000-meter asteroid once per million years, according to one Tufts University fact sheet. “Another one of these Chelyabinsk-type events can easily happen in our lifetime,” Boslough said. But as far as what to worry about, “There have only been a handful of these events, whereas typhoons, hurricanes, and major flooding events happen every year somewhere on Earth.” And as for larger events, they’re potentially preventable with enough lead time. For example, NASA’s OSIRIS-REx mission is studying the properties of asteroid Bennu, a potentially hazardous asteroid with the potential to threaten Earth in the next few centuries. Then there’s the Double Asteroid Redirection Test (DART) mission, a demonstration that will slam a spacecraft into the smaller asteroid in the (65803) Didymos binary at 3.7 miles per second, or 13,320 miles per hour. The ESA’s Hera mission will follow up and take observations of the collision’s effects. Scientists hope these missions will change the smaller asteroid’s orbit around the larger asteroid, and that in the future, NASA or other space agencies could use these “kinectic impactor” missions to change a future threatening asteroid’s orbit enough to miss Earth. There are other ideas for changing potentially hazardous asteroids’ orbits as well. Space agencies could just put a really heavy thing next to the asteroid to redirect it via the force of gravity, or remove matter from the asteroid’s surface. Of course, there’s always the last-minute option of nuking an asteroid that presents an imminent threat—but in this year’s Planetary Defense Conference tabletop exercise, scientists chose to nuke a large asteroid that would have leveled Denver, a decision that inadvertently destroyed New York City. Scientists now take this threat seriously. Despite the low probability of an asteroid impact, its dire consequences mean that this will continue to be an important area of research, one that requires probably about the amount of attention it presently receives—but maybe not any more or less. “Doom is pretty much out of the picture in our lifetimes and the lifetimes of our kids and grandkids,” Boslough said. “Once you get out to 100 years, future generations can keep looking, and if they find something they can do something about it.”

#### No asteroid threat for next millennia plus new tracking tech, deflection drills, international coop, and analysis of old impacts solve.

Strickland, 7-1-2019 (Ashley Strickland, "On International Asteroid Day, here's what to know about the threat to Earth," CNN, https://www.cnn.com/2019/06/30/world/international-asteroid-day-trnd-scn/index.html, 7-22-2019) AB

(CNN)For the first time, astronomers have shown that telescopes could provide enough warning to allow people to move away from an asteroid strike on Earth. Astronomers at the University of Hawaii used the ATLAS and Pan-STARRS survey telescopes to detect a small asteroid before it entered Earth's atmosphere on the morning of June 22. The asteroid, named 2019 MO, was 13 feet in diameter and 310,685 miles from Earth.. The ATLAS facility observed it four times over 30 minutes around midnight in Hawaii. Initially, the Scout impact analysis software at NASA's Jet Propulsion Laboratory deemed the potential impact as a 2. For reference, 0 is "unlikely" and 4 is "likely." Davide Farnocchia, navigation engineer at JPL, requested additional observations because he noticed a detection near Puerto Rico 12 hours later. The Pan-STARRS telescope was also operating and captured part of the sky where the asteroid could be seen. The additional images from the Pan-STARRS telescope helped researchers better determine the entry path for the asteroid, which bumped the Scout rating to 4. The calculation matched up, and weather radar in San Juan detected the asteroid as it burned up in our atmosphere. It entered the atmosphere over the ocean, 236 miles south of the city. ATLAS, which is two telescopes 100 miles apart on the Big Island and Maui, scans the entire sky every two nights for asteroids that could impact Earth. It can spot small asteroids half a day before they arrive at Earth and could point to larger asteroids days before. 2019 MO was small enough that it could burn up in the atmosphere. Although much of the knowledge of their capabilities and determinations about the asteroid was worked out after the fact, astronomers believe that ATLAS and Pan-STARRS could help predict more in the future. Asteroid missions Knowing the size and orbit of an asteroid is the main battle, as this enables prediction. In a few years, the Large Synoptic Survey Telescope will come online and enable the discovery of tens of thousands of asteroids in orbits that could bring them closer to Earth, said Ed Lu, executive director of the Asteroid Institute and a former NASA astronaut. "It's an exciting time for planetary defense because we are on the verge of an absolute flood of new observations that will allow us to track 10 times more asteroids than we've ever tracked before," Lu said. "In about two years, the LSST will turn on, and its discovery rate will be more than all the rest of the telescopes combined. In the first year, it will find tens of thousands of asteroids and be able to track them." Missions like NASA's OSIRIS-REx and Japan's Hayabusa2 are exploring asteroids in our solar system and aim to return samples to Earth in the coming years. The Near-Earth Object Camera, called NEOCam, is characterizing near-Earth objects. Other missions are planned. NASA's DART, which stands for Double Asteroid Redirection Test, is a planetary defense test to prevent an asteroid from hitting Earth. DART, which has a launch window opening in July 2021, will visit a binary asteroid system and aim to deflect a small asteroid. DART will crash into a moonlet of Didymos, a near-Earth asteroid, that is comparable in size to an asteroid that could pose a threat. The European Space Agency's complementary Hera mission will precisely measure how it changed the velocity of the larger asteroid and study DART's impact crater on the moonlet. Asteroid awareness Sunday is International Asteroid Day, commemorating the Earth's largest recorded asteroid impact while focusing on the real danger of asteroids that could collide with Earth. In 1908, a powerful asteroid struck the Podkamennaya Tunguska River area in a remote Siberian forest of Russia. The event leveled trees and destroyed forests across 770 square miles, an area nearly the size of three-quarters of the US state of Rhode Island. The impact threw people to the ground in a town 40 miles away. Shock waves rippled around the world, and "glowing clouds" were seen. NASA recently reexamined the "cold case" of the Tunguska strike. The impact happened in such a remote area that only a few dozen people even saw it. Media at the time speculated that it could have been a volcanic eruption or a mining accident. The idea of an asteroid strike seemed farfetched, NASA said in a release. Scientific research wasn't carried out around the impact area until the 1920s. But researchers couldn't find asteroid fragments or a crater. "Tunguska is the largest cosmic impact witnessed by modern humans," said David Morrison, a planetary science researcher at NASA's Ames Research Center, in a statement. "It also is characteristic of the sort of impact we are likely to have to protect against in the future." Six years ago, an asteroid entered Earth's atmosphere over Chelyabinsk, Russia. It exploded in the air, releasing 20 to 30 times more energy than that of the first atomic bombs and generating brightness greater than the sun. It damaged more than 7,000 buildings and injured more than 1,000 people. The shock wave broke windows 58 miles away. It had gone undetected because the asteroid came from the same direction and path as the sun. And it explains why astronomers and the Asteroid Day group want people to be aware. According to a Pew survey, 62% of adults in the United States think that one of NASA's top priorities should be monitoring asteroids or objects that could hit Earth. NASA and other space organizations around the world are focused on detecting the threat of near-Earth objects or NEOs, asteroids and comets whose orbits place them within 30 million miles of Earth. Tthere are no known NEOs that post a significant threat. NASA's NEO program funds and relies on detection and tracking efforts from observatories across the country and in space and collaborates with observatories around the world. Researchers modeled the Tunguska and Chelyabinsk events on computers to understand how damage can occur from asteroids entering our atmosphere, even when they break apart in the air. The analysis provided a promising discovery. Four computer models arrived at a similar picture of what happened at Tunguska. The asteroid was probably rocky, not icy, and between 164 and 262 feet across, and entered our atmosphere at 34,000 miles per hour. This created the energy equivalent to the Mount St. Helens volcanic eruption in 1980, between 6 and 9 miles above the ground. The researchers found that the interval between such devastating potential asteroid impacts on Earth is one of millenia, not centuries, based on the known asteroid population. "Because there are so few observed cases, a lot of uncertainty remains about how large asteroids break up in the atmosphere and how much damage they could cause on the ground," said Lorien Wheeler, NASA Ames researcher working on the agency's Asteroid Threat Assessment Project. "However, recent advancements in computational models, along with analyses of the Chelyabinsk and other meteor events, are helping to improve our understanding of these factors so that we can better evaluate potential asteroid threats in the future."