# 1NC vs. Ava

## 1

**Interp: The affirmative must defend appropriation as a general principle, not specify a subset**

**Appropriation is a definite uncountable noun–that’s generic**

**WMWRC 18**. William and Mary Writing Resource Center, 2018, Using Articles, <https://www.wm.edu/as/wrc/newresources/handouts/using-articles.pdf> //SR

Use of the articles a, an, and the can depend on any of four paired noun qualities: countable vs. noncountable, definite vs. indefinite, first vs. subsequent mention, and general vs. specific: Countable vs. Non-countable A and an are used if the noun can be counted. I ran into a post. (How many posts did you run into? Just one. Therefore, use a.) I ate a piece of cake. I saw an eagle. The is used when the noun cannot be counted. I ran into the water. (How many waters did you run into? The question doesn't make any sense because water is non-countable. Therefore, use the.) I ate the rice. I saw the milk spill. Indefinite Articles: a and an A and an signal that the noun modified is indefinite, referring to any member of a group. These indefinite articles are used with singular nouns when the noun is general; the corresponding indefinite quantity word some is used for plural general nouns. The rule is: a + a singular noun beginning with a consonant: a boy an + a singular noun beginning with a vowel: an elephant some + a plural noun: some girls Note that in English, the indefinite articles are used to indicate membership in a profession, nationality, or religion. I am a teacher. Brian is an Irishman. Seiko is a practicing Buddhist. Definite Article: the The definite article is used before singular and plural nouns when the noun is particular or specific. The signals that the noun is definite; it refers to a particular member of a group. Compare the indefinite and definite articles in the following pairs: A dog (any dog). The dog (that specific dog) The is used with both singular and plural nouns: the book, the cat the books, the cats The is not used with non-countable nouns referring to something in a general sense: [no article] Coffee is a popular drink. [no article] Japanese was his native language. [no article] Intelligence is difficult to quantify. The is used with non-countable nouns that are made more specific by a modifying phrase or clause: The coffee in my cup is too hot to drink. The Japanese he speaks is often heard in the countryside. The intelligence of animals is variable but undeniable. The is also used when a noun refers to something unique: the White House; the theory of relativity; the 2016 federal budget Geographical Uses of the DO NOT use the before: names of countries, except the Netherlands, the US, the Philippines (Italy, Mexico, Bolivia) names of cities, towns, or states (Seoul, Manitoba, Miami) names of streets (Washington Blvd., Main St.) names of lakes and bays, except with a group of lakes like the Great Lakes (Lake Louise, Lake Erie) names of mountains, except with ranges of mountains like the Andes or the Rockies or unusual names like the Matterhorn (Mount Everest, Mount Fuji) names of continents (Asia, Europe) names of islands except with island chains like the Aleutians, the Hebrides, or the Canary Islands (Easter Island, Maui, Key West) DO use the before: names of rivers, oceans and seas (the Nile, the Pacific, the Sea of Japan) points on the globe (the Equator, the North Pole) geographical areas (the Middle East, the West) deserts, forests, gulfs, and peninsulas (the Sahara, the Persian Gulf, the Black Forest, the Iberian Peninsula) First vs. Subsequent Mention A or an is used to introduce a noun when it is mentioned for the first time in a piece of writing. The is used afterward each time you mention that same noun. An awards ceremony at the Kremlin would not normally have attracted so much attention. But when it was leaked that Soviet President Konstantin Chernenko would be presenting medals to three cosmonauts, interest in the ceremony intensified. (Time, Sept. 17, 1984). Note: There is and there are can be used to introduce an indefinite noun at the beginning of a paragraph or essay. General vs. Specific A, an, and the can all be used to indicate that a noun refers to the whole class to which individual countable nouns belong. This use of articles is called generic, from the Latin word meaning "class." A tiger is a dangerous animal. (any individual tiger) The tiger is a dangerous animal. (all tigers: tiger as a generic category) The omission of articles also expresses a generic (or general) meaning: no article with a plural noun: Tigers are dangerous animals. (all tigers) no article with a non-countable noun: Anger is a destructive emotion. (any kind of anger)

**1–Precision outweighs - anything outside the res is arbitrary and unpredictable because the topic determines prep, not being bound by it lets them jettison any word.**

**2–Limits and Ground - decimates clash by exploding limits to infinite forms appropriation with infinite possible interps of what constitutes it, each with different implications, political problems, and economic benefits which makes contesting the aff with unifying neg ground impossible and means they can always pick the most aff skewed slice of the res.**

**3–TVA – read your aff as an advantage under whole res – we still get your content education and sufficient aff ground by switching up aff advantages, frameworks, implementation, etc. But, 1ar theory checks pics and they incentivize more of them cuz nothing but cheaty generics link**

## 2

**Interp–Appropriation must be permanent and exclusive**

Timothy Justin **Trapp**, JD Candidate @ UIUC Law, **’13**, TAKING UP SPACE BY ANY OTHER MEANS: COMING TO TERMS WITH THE NONAPPROPRIATION ARTICLE OF THE OUTER SPACE TREATY UNIVERSITY OF ILLINOIS LAW REVIEW [Vol. 2013 No. 4]

The issues presented in relation to the nonappropriation article of the Outer Space Treaty should be clear.214 The ITU has, quite blatantly, created something akin to “property interests in outer space.”215 It allows nations to exclude others from their orbital slots, even when the nation is not currently using that slot.216 This is directly in line with at least one definition of outer-space appropriation.217 [\*\*Start Footnote 217\*\*Id. at 236 (“Appropriation of outer space, therefore, is ‘the exercise of exclusive control or exclusive use’ with a sense of permanence, which limits other nations’ access to it.”) (quoting Milton L. Smith, The Role of the ITU in the Development of Space Law, 17 ANNALS AIR & SPACE L. 157, 165 (1992)). \*\*End Footnote 217\*\*]The ITU even allows nations with unused slots to devise them to other entities, creating a market for the property rights set up by this regulation.218 In some aspects, this seems to effect exactly what those signatory nations of the Bogotá Declaration were trying to accomplish, albeit through different means.219

**Violation – Space Tourism is travel over a short duration – the events are neither permanent nor limit other uses by other actors of a particular region of space – even if they win singular examples of tourism that could be appropriation, they explicitly include travel that is temporary which makes the Aff Extra-Topical**

**Henderson and Tsui 19** Henderson, I. L., and W. H. K. Tsui. "The role of niche aviation operations as tourist attractions." Air transport: A tourism perspective (2019): 233-244. (Massey University School of Aviation, Palmerston North, New Zealand)//Elmer

17.5 Space Tourism Space tourism is another niche segment of the aviation industry that seeks to give tourists the ability to become astronauts and experience space travel for recreational, leisure, or business purposes. Since space tourism is extremely expensive, it is a case of a very small segment of consumers that are able and willing to purchase a space experience. There are several options for space tourists. For example, Crouch et al. (2009) investigate the choice behaviour between four types of space tourism: high altitude jet fighter flights, atmospheric zero-gravity flights, short-duration suborbital flights, and longer duration orbital trips into space. Reddy et al. (2012) find the following motivational factors behind space tourism (in order of importance): vision of earth from space, weightlessness, high speed experience, unusual experience, and scientific contribution. Currently, only high-altitude jet fighter flights and atmospheric zero-gravity flights are commercially available to tourists in the space tourism sector. Accordingly, this section provides an example of each, whilst the potential for suborbital and longer duration orbital trips into space are discussed later in this chapter. Case Study 17.3 Examples of Space Tourism MiG-29 Edge of Space Flight One current option for space tourists is to be taken up into the stratosphere in a supersonic fighter jet (see MiGFlug, 2017a). MiGFlug acts as a sales agent for this unique space tourism activity, which usually involves reaching an altitude of 20–22 km. At such an altitude, the curvature of the earth can be seen, the sky is dark, and it is possible to see into space. As part of this space travel experience, tourists are also given an opportunity to control the aircraft and there are a number of aerobatic manoeuvres that are performed by an experienced pilot. This operation is based out of Russia. The Mikoyan MiG-29 Fulcrum is a Russian military fighter jet that allows for rates of climb of 330 m/s and a top speed of Mach 2.25 (2390 km/h). MiGFlug sells three different services in this aircraft. For €12,500 a passenger can enjoy a 25-min flight featuring a number of aerobatic manoeuvres but without supersonic flight. For €14,500 a passenger can enjoy a 45-min flight that includes higher aerobatics and supersonic flight. The ‘Edge of Space’ flight includes aerobatics, supersonic flight, and the experience of being taken up into the stratosphere and is sold for €17,500.

**1AC Cooper is out of context–says that commercial exploitation violates the “spirit” but not that tourism is uniquely or technically exploitation–the word tourism is in a completely separate paragraph from appropriation**

**1–Limits – Expanding the Topic to include temporary actions explodes Topic Ground – Aff’s can affect temporary docking of private actors on the ISS, using lunar bases in a temporary manner for broader space exploration efforts, satellites that go up temporarily in orbit – this devastates predictable topic division.**

**2–Ground – Allowing affs to argue temporary actions means the Negative cannot argue private appropriation good since it assumes permanence which means we lose internal link magnitude since the plan only effects a small amount of time.**

**3–Extra-Topicality – Allowing Aff’s to affects other aspects of outer space gives them access to extra impacts and advantages that they can leverage proven by their ozone offense and we can’t turn it since it wasn’t grounded in the resolution.**

**Fairness and education are voters–debate’s a game with portable skills**

**DTD–T indicts the whole aff but severance kills 1nc strat construction**

**No rvi–you shouldn’t win for being T and incentivizes baiting T just to beat it back with infinite prep while chilling T since you’ll out frame us and auto-win on 2ar ethos every round.**

**Competing interps–reasonability is arbitrary and causes a race to the bottom–finding the best model of debate is key to preserve the most substantive norms in the long terms but no frivolous race to the top since limited words in the res mean limited interps**

**T before 1ar theory–NC abuse was reactive and only 2 months to discuss T whereas we can discuss 1ar theory whenever**

## 3

**Space tourism is coming now and creates space hotels that act as labs for physiological research**

**Caplan and Lindsay 17** Nick Caplan and Kirsty Lindsay 7-29-2017 "Space Tourism Could Help Boost Science and Health Research — Here's How"<https://www.space.com/37503-space-tourism-could-help-boost-science-health-research.html> (Nick graduated from the University of Birmingham with a PhD in Biomechanics)//Elmer

Perhaps one day we will see research teams launching groups of participants to spend a few weeks or months aboard a space hotel in order to study medical interventions that would slow the ageing process on Earth, and to help the human species colonise the Moon or even Mars. Research dating back to the early years of the space race has led to technologies that benefit us all. Many scientific discoveries have come since the arrival of inhabitable space stations that act as orbital laboratories. NASA’s first space station Skylab helped understand the effects on the human body of spending months in space and paved the way for the International Space Station. A huge number of research studies have been completed on the ISS since the year 2000 in the areas of human physiology, biology, biotechnology, physical science and earth and space science. These studies have led to discoveries such as enhanced protein crystal growth for drug development, efficient combustion of fuel droplets, and an understanding of the effects of long duration exposure to microgravity on the human body, revealing that spaceflight has effects similar to ageing on Earth. Despite much human physiological research being carried out in space, it has one major limitation – there are simply not enough humans currently going to space to act as research participants, leading to difficulties in research design. In fact, only 550 or so humans have ever been into space since Russian cosmonaut Yuri Gagarin first orbited the Earth in 1961. Human physiological experiments in space tend to have very small participant numbers (for example, the NASA twins study) or they have to take place over many years. Could the boom in commercial human spaceflight accelerate the speed of human physiological discoveries in space? We certainly think so. Commercial spaceflight companies such as SpaceX and Orbital are already launching rockets taking supplies and research equipment to the International Space Station. SpaceX is developing its habitable Dragon capsule to take space tourists around the moon, with ambitions to use its sibling, Red Dragon, to land astronauts on Mars. Others are developing sub-orbital spaceplanes, such as Virgin Galactic's SpaceShipTwo, which will enable passengers to experience microgravity for a number of minutes or travel 30 times faster between cities than passenger airlines. To safely send throngs of space tourists beyond the atmosphere, we need to understand the health implications of just getting these "non-professional" astronauts into space through new medical research, and developing spaceports will provide access to exciting new platforms to expand these frontiers of science. A range of unknown health risks await space tourists, who are expected to be a far more health-diverse group than current astronauts. We will need to determine the effects of high g-forces on people with medical conditions, as well as in adolescents who might want to go on the ultimate school holiday adventure past the Karman line – traditionally taken as the boundary of space. It will be vital that risks to passenger health are reduced through remote physiological monitoring, and new monitoring technologies will need to withstand the high g-forces involved in launching into space. The British government's commitment to become one of the most attractive places in the world for commercial spaceflight will allow space research to boldly go where only limited research has gone before.

**Key to manage new diseases**

**APS 20** 5-21-2020 "How Physiologists Are Helping Patients Recover from COVID-19"<https://ispyphysiology.com/2020/05/21/how-physiologists-are-helping-patients-recover-from-covid-19/> (American Physiology Society)//Elmer

Understanding Physiology Is Critical to Fighting COVID-19 For each of the new treatments and devices created to combat COVID-19, it is critical to make sure they are safe to use in people. This is where understanding of human physiology is very important. For instance, treatment with remdesivir can reduce the amount of the virus in your body and has helped people who are severely ill with COVID-19 recover faster. But the drug is known to damage the liver and the immune system, so it is very important to know how well a patient’s liver and immune system are functioning before using it as a treatment. Even as I write this, there are new findings that COVID-19 directly affects not only the lungs but also the brain, kidneys, blood vessels and blood cells. This makes treatment of COVID-19 very difficult. Scientists and bioengineers need to take into consideration how the different organs of the body coordinate to keep you alive and healthy—the knowledge of how all the organs, tissues and cell work together in health and disease is the basis of physiological study. The trouble with finding the best treatment for COVID-19 is that the symptoms are so different from one person to the next. Children seem to be less vulnerable to COVID-19, older people are more vulnerable and some young adults are dying from strokes caused by the coronavirus rather than respiratory issues. As we find out more about how COVID-19 affects the body, it is clear that there will be more than one best way to fight it. In my eyes, the COVID-19 pandemic has highlighted the value of scientific research, especially research that helps us understand human physiology. In a few short months, scientists have sequenced the genome of the virus, discovered how SARS-CoV-2 infects cells by attaching its “spikes” to a protein on cells and developed new potential treatments. It will be the research physiologist’s job to study and understand how to best use these medicines and devices to treat COVID-19 patients.

## 4

**JCPOA passes now, but it’s close and diplomacy is key**

Joseph **Ataman et. al.**, Camille Knight, Adam Pourahmadi and Tamara Qiblawi, Cnn, **2-16**-2022, "Decision on Iran nuclear deal 'days away,' says French foreign minister ," CNN, <https://www.cnn.com/2022/02/16/middleeast/iran-nuclear-agreement-conclusion-intl/index.html> //SR

Paris, France (CNN)Negotiations over the revival of a 2015 deal that would see Iran curb uranium enrichment in exchange for sanctions relief will conclude in days, French Foreign Minister Jean-Yves Le Drian told the country's lawmakers on Wednesday. "We are coming ... to the hour of truth," Le Drian said of ongoing negotiations in Vienna to salvage the landmark deal -- which former President Donald Trump abandoned in 2018, and Tehran began to withdraw from a year later. "It's not a matter of weeks, it's a matter of days," he said. Later on Wednesday, Iran's chief negotiator Ali Bagheri Kani struck an unusually optimistic note, saying that parties to the deal were "closer than ever to an agreement." But Kani warned that negotiations could still fall through. "Nothing is agreed until everything is agreed," he said in a tweet. "Our negotiating partners need to be realistic, avoid intransigence and heed lessons of past 4yrs." "Time for their serious decisions," Kani added. Iran and the United States are engaged in a final round of indirect talks -- mediated by China, Russia and European parties to the agreement -- over a return to the 2015 nuclear agreement, known as the Joint Comprehensive Plan of Action (JCPOA). Analysts believe that failure to reach an agreement could lead violence in the crisis-ridden region to spiral out of control, with Iran fast approaching the nuclear threshold that would enable it to develop a nuclear weapon. Tensions in the Middle East have escalated in recent weeks, with Iran-backed Houthi militants launching unprecedented missile and drone attacks on the United Arab Emirates, considered a haven of security in the volatile region. Saudi-led coalition forces fighting the militant group retaliated with the deadliest offensive on Houthi-held parts of northern Yemen in years, killing scores of people and knocking out the country's internet. In his comments Wednesday, Le Drian warned that a breakdown in the Vienna talks would trigger a "serious crisis." "Either [the Iranians] trigger a serious crisis in the days to come -- we could do without that -- or else they accept the agreement which respects the interests of all parties and particularly the interests of Iran," he said. Le Drian said the two and half months of negotiations in Vienna was "exhausting diplomatic work." Iran returned to indirect negotiations with the US shortly after President Joe Biden -- who promised to return to the deal as a presidential nominee -- took office. Iran had rejected repeated overtures by the Trump administration to return to the negotiations after the former president withdrew from the deal.

**Space diplomacy directly trades off with nonproliferation agreements – finite manpower, money, and political will**

**Johnson-Freeze 16** [(Joan, Professor and former Chair of National Security Affairs at the US Naval War College, Newport, Rhode Island) “Space Warfare in the 21st Century: Arming the Heavens,” Cass Military Studies, 11/8/2016] JL

\*The plan is legislated in the AVC (same bureau of the State Department that’s concerned with the JCPOA)

Proactive policymaking takes commitment, manpower, and money. A quick look at the money and manpower devoted to diplomacy in the US State and Defense departments compared to the resources available for the hardwareproducing military–industrial complex efforts described in Chapter 5 is enlightening. The Assistant Secretary of State for Arms Control, Verification, and Compliance (AVC) leads space-related diplomacy in the State Department. The AVC Bureau is responsible for “all matters related to the implementation of certain international arms control, nonproliferation, and disarmament agreements and commitments; this includes staffing and managing treaty implementation commissions.”34 The AVC arms control portfolio includes nuclear, biological, and chemical weapons and all related issues. The AVC section charged with space issues is the Office of Emerging Security Challenges; this office also handles missile defense issues and the promotion of transparency, cooperation, and building confidence regarding cybersecurity. As of financial year 2013, AVC had a budget of $31.2 million and 141 employees35 to be active participants and leaders in all of these issues. By way of comparison, the Space Security and Defense Program, a joint program of the DoD and the Office of the Director of National Intelligence (ODNI) was programmed for a similar budget amount in financial year 2015: $32.3 million. That program is described as a “center of excellence for options and strategies (materiel, non-materiel, cross-Title, cross-domain) leading to a more resilient and enduring National Security Space (NSS) Enterprise.”36 A majority of SSDP funding is allocated to the development of offensive space control strategies. So basically, the same budget is allocated for all US global space diplomacy efforts as for an in-house Pentagon think tank to devise counterspace strategies. Within the Pentagon, the Deputy Assistant Secretary of Defense for Space Policy is charged with all issues related to space policy, including diplomacy. The responsibilities of the Space Policy office are to: • Develop policy and strategy for a domain that is increasingly congested, competitive, and contested • Implement across DoD — plans, programs, doctrine, operations — and with the IC and other agencies • Engage with allies and other space-faring countries in establishing norms and augmenting our capabilities.37 The breadth of those responsibilities, which includes reviewing space acquisitions, means that there may be only a handful of individuals actually engaged in multilateral diplomatic efforts, acting, for example, as advisors to diplomatic discussions such as those through the United Nations. Additionally, the expanse of the Pentagon results in a chain of command that makes organizational competition for attention to subject matter challenging at best. The Deputy Assistant Secretary of Defense for Space Policy reports to the Assistant Secretary of Defense for Homeland Defense, who then reports to the Principle Deputy Secretary of Defense for Homeland Defense and Global Security, who then reports to the Under Secretary of Defense for Defense Policy. There are also a multitude of space players in other governmental organizations to coordinate and contend with, particularly within the Air Force and intelligence communities. Personnel are spread thin. US government-wide space diplomacy needs a mandate, manpower, and a supporting budget. Diplomacy, especially multilateral diplomacy, can be timeconsuming, manpower-intensive, and frustrating; and patience is not a strong American virtue. The recent experience in the UN LTS Working Group is emblematic of everything that causes the United States to shun multilateralism. Under the auspices of this group, countries had worked in good faith over the past five years to develop technical guidelines as reciprocal constraints, as insisted upon by the developing countries when they rejected the ICOC. Yet group success appeared thwarted at the February 2016 meeting of the LTS Working Group by one country, Russia.

**Iranian prolif spurs Middle Eastern prolif and goes nuclear**

**Chilton and Hoshovsky 20** – [(Kevin, led U.S. Strategic Command and has participated in the Jewish Institute for National Security of America’s Generals and Admirals Program; Harry, policy analyst at JINSA’s Gemunder Center for Defense and Strategy) "Avoiding a nuclear arms race in the Middle East," Defense News, 2-13-2020,<https://www.defensenews.com/opinion/commentary/2020/02/13/avoiding-a-nuclear-arms-race-in-the-middle-east/>] TDI

This raises two immediate concerns. First, should Iran race for the bomb, it is almost inevitable that the United States and/or Israel will take preventative military action to stop it from crossing that fateful threshold. This could easily spiral into a regional war as Iran activates its various proxy forces against the United States and its allies. Second, an Iranian nuclear breakout attempt could spur a proliferation cascade throughout the Middle East, beginning with Saudi Arabia. Mohammed bin Salman, the Saudi crown prince, openly stated in 2018 that if Iran developed nuclear weapons, Riyadh would quickly “follow suit.” One suggested approach would see Saudi Arabia purchase a nuclear power reactor from a major supplier like South Korea and then build a reprocessing plant that would yield enough weapons-grade plutonium in five years. A half-decade delay isn’t optimal, however, when the goal is achieving nuclear deterrence quickly. Thus, there is the so-called Islamabad option. This refers to Riyadh’s role in financing Pakistan’s nuclear weapons program and an alleged commitment from Islamabad that it would repay the favor. While Pakistani and Saudi officials have denied any such understanding, there is the possibility that the two could work out an arrangement where Islamabad could deploy some of its nuclear arsenal on Saudi soil following a successful Iranian breakout. Although this maneuver would draw sharp, international criticism, in theory, it would allow Riyadh to remain in good standing vis-a-vis the nuclear nonproliferation treaty. Nevertheless, Pakistan might not be willing to play spoiler against a nuclearized Iran. If it is, Middle Eastern geopolitics would become extremely unstable. If Saudi Arabia acquires nuclear weapons, many believe Turkey would follow suit. Last September, Turkish President Recep Tayyip Erdogan declared that he “cannot accept” the argument from Western nations that Turkey should not be allowed to attain nuclear weapons. In 1958, Charles de Gaulle proclaimed that a nation without nuclear weapons “does not command its own destiny”; two years later, France tested its first bomb. Erdogan’s comments echo those earlier remarks and raise the possibility that Ankara could become the second NATO member to leave the alliance’s nuclear umbrella in favor of its own independent arsenal.

**Extinction**

**Krepinevich 13** – [(Dr. Andrew F, the President of the Center for Strategic and Budgetary Assessments) “Critical Mass: Nuclear Proliferation in the Middle East,” 2013,<https://csbaonline.org/uploads/documents/Nuclear-Proliferation-in-the-Middle-East.pdf>] TDI

As more countries over time develop nuclear capabilities and build up their nuclear arsenals, the competition will evolve from an Israeli-Iranian affair to a multi-state rivalry. For illustrative purposes we will assume that in the 2025-2030 timeframe, Iran, Saudi Arabia, Turkey, and perhaps Egypt and/or Iraq have nuclear arsenals in the low double-digit range (i.e., ten to forty weapons). What form might a nuclear competition among these powers and Israel assume? The remainder of this chapter attempts to shed some light on this issue, and its potential implications, with emphasis on those affecting regional stability. The challenge of preserving stability when confronted with military competition among five nuclear-armed states within the Middle East and with other powers external to the region engaged in a Great Game for influence is formidable. At first blush, one thing seems apparent: many Cold War-era metrics for assessing the competition and gauging where it might be headed appear to be of little utility; in fact, they may actually prove misleading and dangerous. The same can be said of those looking to apply Cold War-era arms control metrics as a way of keeping the peace in general and avoiding nuclear use in particular. During the Cold War, many nuclear strategists came to view nuclear parity (the possession of roughly equivalent arsenals capable of inflicting roughly equivalent levels of destruction) between the United States and the Soviet Union as stabilizing. The perception of these strategists is that the rough equivalence contributed to the tradition of non-use of nuclear weapons, and was thus desirable. Parity enabled both sides to avoid the perception of being inferior to their rival, and perceptions are critical to deterrence and to preserving the confidence of one’s allies and security partners. If accepted by both sides, parity could enable them to avoid the cost and instability associated with “racing” toward ever-larger arsenals. Accordingly, maintaining parity was a major objective of U.S.-Soviet (and later U.S.-Russian) arms control negotiations. Yet irrespective of its merits, parity is not an option for states engaged in an n-player competition. Each competitor cannot have a nuclear force equivalent to all the others. Even if the competition should solidify into two coalitions so as to mimic the two-player Cold War competition, questions would almost certainly arise regarding the willingness of a coalition partner that has not been attacked to risk its own destruction by using its nuclear weapons in response to an attack on its ally. Indeed, these concerns were raised during the Cold War, and formed a major justification for France pursuing its own force de frappe. 93 In a Middle Eastern “n-player” competition, all nuclear powers would be challenged to establish an “assured destruction” capability against all the other regional nuclear powers, another Cold War desideratum, given their relatively modest economies. An “assured destruction” capability in an n-state competition would require that each state have weapons sufficient to survive an initial attack by all potential rivals and still be able to devastate the countries of all attackers. It would also require that the source of the attack be reliably identified. As noted earlier, this may prove difficult given likely limitations on these states’ ability to field advanced early warning systems. For example, would Israel be able to determine with confidence the owner of a ballistic missile launched from a location along the Iranian-Turkish border? The origin of any cruise missile launched from a sea-based platform? Even assuming a state could identify the source (or sources) of an attack, could its command and control systems survive the attack sufficiently intact to execute a retaliatory strike? A decapitation strike could preclude an “assured destruction” retaliatory strike even if sufficient weapons survive to execute one. This, in turn, raises the possibility of a “catalytic” war—one that is initiated between two states by a third party. Given a proliferated Middle East as described above, the chances that a regime would incorrectly attribute the source of an attack cannot be easily dismissed. To the extent cyber weapons can introduce false information into a state’s decision-making process, the risks of catalytic war only increase. Further complicating matters, the early warning requirement following a proliferation cascade could be multidirectional, and at some point perhaps 360 degrees, especially if nuclear rivals begin deploying a portion of their nuclear forces at sea. Early warning requirements would be stressed even further (and the costs of such a system increase correspondingly) if a neighboring state (e.g., Iran in the case of Turkey or Iraq; Turkey in the case of Israel; etc.) were to acquire nuclear weapons. In this case warning times would be even more compressed than in an Israeli-Iranian competition. Owing to its proximity to Iran, Saudi Arabia, for example, could have less than five minutes to react to an Iranian ballistic missile attack no matter how advanced its early warning and command and control systems are. As noted earlier in this assessment, regardless of what assumptions are made regarding a regional nuclear power’s early warning system, given the short ballistic missile flight times it seems likely that preserving command and control of the state’s nuclear forces while under attack will prove challenging. States might be tempted to adopt a launch-on-warning posture, but this requires both early warning and a highly responsive command and control system. Should a state determine that it will not be able to launch-on-warning and instead attempt to “ride-out” a nuclear first strike and retaliate, it would still need its command and control system to function effectively in the wake of the nuclear attack. Absent a highly resilient command and control system, a state’s ability to launch a retaliatory nuclear strike may require nuclear release authority to be diffused to lower-level commanders. But again, absent an effective early warning system it may not be possible to determine the attack source with confidence in a region with multiple nuclear powers.

## 5

**CP: Statesought to call a global constitutional convention and establish a constitution reflecting intergenerational concern with exclusive authority to ban appropriation of outer space by private entities for private space tourism and bind participating bodies to its result**

**Gardiner 1** [Stephen M. Gardiner, Professor of Philosophy and Ben Rabinowitz Endowed Professor of Human Dimensions of the Environment at the University of Washington, Seattle, “A Call for a Global Constitutional Convention Focused on Future Generations,” 2014, *Ethics & International Affairs*, Vol. 28, Issue 3, pp. 299-315, https://doi.org/10.1017/S0892679414000379, EA]

A Constitutional Convention In my view, the above line of reasoning leads naturally to a more specific proposal: that we—concerned individuals, interested community groups, national governments, and transnational organizations—should initiate a call for a global constitutional convention focused on future generations. This proposal has two components. The first component is procedural. The proposal takes the form of a “call to action.” It is explicitly an attempt to engage a range of actors, based on a claim that they have or should take on a set of responsibilities, and a view about how to go about discharging those responsibilities. The second component is substantive. The main focus for action is a push for the creation of a constitutional convention at the global level, whose role is to pave the way for an overall constitutional system that appropriately embodies intergenerational concern. The substantive idea rests on several key ideas. Still, for the purposes of a basic proposal, I suggest that these be understood in a relatively open way that, as far as is practicable, does not prejudge the outcome of the convention, and especially its main recommendations. First, the convention itself should be understood as “a representative body called together for some occasional or temporary purpose” and “constituted by statute to represent the people in their primary relations.”14 Second, a constitutional system should be thought of in a minimalist sense as “a set of norms (rules, principles or values) creating, structuring, and possibly defining the limits of government power or authority.”15 Third, the “instigating” role of the convention should be to discuss, develop, make recommendations toward, and set in motion a process for the establishment of a constitution. Fourth, its primary subject matter should be the need to adequately reflect and embody intergenerational concern, where this would include at least the protection of future generations, the promotion of their interests (where “interests” is to be broadly conceived so as to include rights, claims, welfare, and so on), and the discharging of duties with respect to them. It may also (and in my view should) include some way of reflecting concern for past generations, including responsiveness to at least certain of their interests and views. However, I will leave that issue aside in what follows. The proposal to initiate a call for a global constitutional convention has at least two attractive features. First, it is based in a deep political reality, and does not underplay the challenge. It acknowledges the problem as it is, both specific and general, and calls attention to the heart of that problem, including to the failures of the current system, the need for an alternative, and the background issue of responsibility. Moreover, though the proposal is dramatic and rhetorically eye-catching, it is so in a way that is appropriately responsive to the seriousness of the issue at hand, the persistent political inertia surrounding more modest initiatives, and the fact that (grave though concerns about it are) climate change is only one instance of the tyranny of the contemporary (and the wider perfect moral storm), and we should expect others to arise over the coming decades and centuries. The second attractive feature of the proposal is that, though ambitious, it is not alienating. While it does not succumb to despair in the face of the challenge, neither does it needlessly polarize and divide from the outset (for example, by leaping to specific recommendations about how to fill the institutional gap). Instead, it acknowledges that there are fundamental difficulties and anxieties, but uses them to start the right kind of debate, rather than to foreclose it. As a result, the proposal is a promising candidate to serve as the subject of a wide and overlapping political consensus, at least among those who share intergenerational concern. Selective Mirroring To quell some initial anxieties, it is perhaps worth clarifying the open-ended and non-alienating character of the proposal. One temptation would be to view the call for a global constitutional convention as a fairly naked plea for world government, a prospect that would be deeply alienating—indeed anathema—to many. However, that is not my intention. Though it is possible that a global constitutional convention would lead in this direction, it is by no means certain. At a minimum, no such body could plausibly recommend any form of “world government” without simultaneously advancing detailed suggestions about how to avoid the standard threats such an institution might pose. Moreover, it seems perfectly conceivable, even likely under current ways of thinking, that a global constitutional convention would pursue what we might call a selective mirroring strategy. Specifically, a convention would seek to develop a broader system of institutions and practices that reflected the desirable features of a powerful and highly centralized global authority but neutralized the standing threats posed by it (for example, it might employ familiar strategies such as the separation of powers). In all likelihood, one feature of a selective mirroring approach would be the significant preservation of existing institutions to serve as a bulwark against the excesses of any newly created ones. Whether and how such a strategy might be made effective against the perfect moral storm, and whether something closer to a “world government” would do better, would be a central issue for discussion by the convention.

**Spills over to foster broader intergenerational representation, but independence is key**

**Gardiner 2** [Stephen M. Gardiner, Professor of Philosophy and Ben Rabinowitz Endowed Professor of Human Dimensions of the Environment at the University of Washington, Seattle, “A Call for a Global Constitutional Convention Focused on Future Generations,” 2014, *Ethics & International Affairs*, Vol. 28, Issue 3, pp. 299-315, https://doi.org/10.1017/S0892679414000379, EA]

One set of guidelines concerns how the global constitutional convention relates to other institutions. The first guideline concerns relative independence: (1) Autonomy: Any global constitutional convention should have considerable autonomy from other institutions, and especially from those dominated by factors that generate or facilitate the tyranny of the contemporary (and the perfect moral storm, more generally). Thus, for example, attempts should be made to insulate the global constitutional convention from too much influence from short-term and narrowly economic forces. The second guideline concerns limits to that independence: (2) Mutual Accountability: Any global constitutional convention should be to some extent accountable to other major institutions, and they should be accountable to it. Thus, for example, though the global constitutional convention should not be able to decide unilaterally that national institutions should be radically supplanted, nevertheless such institutions should not have a simple veto on the recommendations of the convention, including those that would result in sharp limits to their powers. A third guideline concerns adequacy: (3) Functional Adequacy: The global constitutional convention should be constructed in such a way that it is highly likely to produce recommendations that are functionally adequate to the task. Thus, for example, the tasks of the global constitutional convention should not be assigned to any currently existing body whose design and authority is clearly unsuitable. In my view, this guideline rules out proposals such as the Royal Society’s suggestion that governance of geoengineering should be taken up by the United Nations’ Commission on Sustainable Development,20 or the Secretary-General’s recommendation of a new United Nations’ High Commissioner for Future Generations.21 Though such proposals may have merit for some purposes (for example, as pragmatic, incremental suggestions to highlight the importance of intergenerational issues), they are too modest, in my opinion, to reflect the gravity of the threats posed by climate change in particular, and the perfect moral storm more generally. Aims A second set of guidelines concerns the aims of the global constitutional convention. Here, the perfect moral storm analysis would suggest: (4) Comprehensiveness: The convention should be under a mandate to consider a very broad range of global, intergenerational issues, to focus on such issues at a foundational level, and to recommend institutional reform accordingly. (5) Standing Authority: Though the convention may recommend the establishment of some temporary and issue-specific bodies, its focus should be on the establishment of institutions with standing authority over the long term. These guidelines are significant in that they stand against existing issue-specific approaches to global and intergenerational problems, and encourage not only a less ad hoc but also a more proactive approach. In particular, the global constitutional convention might be expected to recommend institutions that would be charged with identifying, monitoring, and taking charge of intergenerational issues as such. For example, such institutions should address not only specific policy issues (such as climate change, large asteroid detection, and long-term nuclear waste) but also the need to identify similar threats before they arise.

**Proactive measures mitigate a laundry list of emerging catastrophic risks – extinction**

**Beckstead et al. 14** [Nick Beckstead, Nick Bostrom, Niel Bowerman, Owen Cotton-Barratt, William MacAskill, Seán Ó hÉigeartaigh, Toby Ord, \* Future of Humanity Institute, University of Oxford, \*\* Director, Future of Humanity Institute, University of Oxford, \*\*\* Global Priorities Project, Centre for Effective Altruism; Department of Physics, University of Oxford, \*\*\*\* Global Priorities Project, Centre for Effective Altruism; Future of Humanity Institute, University of Oxford, \*\*\*\*\* Uehiro Centre for Practical Ethics, University of Oxford, \*\*\*\*\*\* Cambridge Centre for the Study of Existential Risk; Future of Humanity Institute, University of Oxford, \*\*\*\*\*\*\* Programme on the Impacts of Future Technology, Oxford Martin School, University of Oxford, “Policy Brief: Unprecedented Technological Risks,” 2014, *The Global Priorities Project, The Future of Humanity Institute, The Oxford Martin Programme on the Impacts of Future Technology, and The Centre for the Study of Existential Risk*, https://www.fhi.ox.ac.uk/wp-content/uploads/Unprecedented-Technological-Risks.pdf, Accessed: 03/13/21, EA]

In the near future, major technological developments will give rise to new unprecedented risks. In particular, like nuclear technology, developments in synthetic biology, geoengineering, distributed manufacturing and artificial intelligence create risks of catastrophe on a global scale. These new technologies will have very large benefits to humankind. But, without proper regulation, they risk the creation of new weapons of mass destruction, the start of a new arms race, or catastrophe through accidental misuse. Some experts have suggested that these technologies are even more worrying than nuclear weapons, because they are more difficult to control. Whereas nuclear weapons require the rare and controllable resources of uranium-235 or plutonium-239, once these new technologies are developed, they will be very difficult to regulate and easily accessible to small countries or even terrorist groups. Moreover, these risks are currently underregulated, for a number of reasons. Protection against such risks is a global public good and thus undersupplied by the market. Implementation often requires cooperation among many governments, which adds political complexity. Due to the unprecedented nature of the risks, there is little or no previous experience from which to draw lessons and form policy. And the beneficiaries of preventative policy include people who have no sway over current political processes — our children and grandchildren. Given the unpredictable nature of technological progress, development of these technologies may be unexpectedly rapid. A political reaction to these technologies only when they are already on the brink of development may therefore be too late. We need to implement prudent and proactive policy measures in the near future, even if no such breakthroughs currently appear imminent.

**Maintaining sustainable use of outer space is key to future generations**

**Islam 18** [Mohammad Saiful Islam, Mohammad works for the Institute of Advanced Judicial Studies and the Beijing Institute of Technology. 4-27-2018, "The Sustainable Use of Outer Space: Complications and Legal Challenges to the Peaceful Uses and Benefit of Humankind," Beijing Law Review,<https://www.scirp.org/journal/paperinformation.aspx?paperid=85201> accessed 12/12/21] Adam

4.2. Ensure the Rights of Future Generations in Outer Space Sustainable development is the establishing principle for achieving present human needs without damaging the demands of future generations maintaining integrity and constancy of the natural systems. The modern idea of sustainable development is derived from the Brundtland Report in 1987. Generally considered in modern application and exploration of outer space, fundamental elements are the area must be dedicated to peaceful purposes; and the area must be preserved for future generations [(Heim, 1990)](https://www.scirp.org/journal/paperinformation.aspx?paperid=85201#ref17) . It is an indispensable and inordinate challenge to confirm uphold the healthy environment and make sure development without destroying the rights of future generations in space. Article IX of The Outer Space Treaty provided, in the exploration and use of outer space, States should pursue studies and conduct exploration of outer space so as to avoid harmful contamination and also adverse changes in the environment of the Earth [(Outer Space Treaty, 1967)](https://www.scirp.org/journal/paperinformation.aspx?paperid=85201#ref35) . The issues of what constitutes harmful contamination in Earth’s environment have yet to be interpreted. The legal definition of “adverse” and “harmful” will also modification as Earth, indigenous sciences progress, separately or in concert, with the planetary exploration space sciences [(Robinson, 2005)](https://www.scirp.org/journal/paperinformation.aspx?paperid=85201#ref38) . As a result of multifaceted political, economic, scientific, technological, educational, and other global problems, there has been practicing exclusively only international cooperation for sustainable space development among the developed countries [(Noichim, 2005)](https://www.scirp.org/journal/paperinformation.aspx?paperid=85201#ref34) . The space faring nations should promote a supportive environment for peaceful and sustainable use of space, decrease environmental effects on Earth and protect the terrestrial environment. We should escape a regime that will ultimately reflect the over-exploitation of resources and environmental havoc [(Fountain, 2002)](https://www.scirp.org/journal/paperinformation.aspx?paperid=85201#ref9) .

**COPUOS is normal means**

**Halstead 10**—(B.S., Psychology, The University of Alabama; J.D., The University of Alabama School of Law; LL.M., Institute of Air and Space Law, McGill University; Lieutenant Colonel, U.S. Air Force Judge Advocate General's Corps). C. Brandon Halstead. 2010. "Prometheus Unbound - Proposal for a New Legal Paradigm for Air Law and Space Law: Orbit Law," Journal of Space Law 36, no. 1, 143-206

The debate on how to distinguish airspace from outer space is as old as the space age itself. The problems emerging from space exploration first entered the agenda of the United Nations in 1957, and were later placed on the agenda before the General Assembly through the establishment of an Ad Hoc Committee on the Peaceful Uses of Outer Space (COPUOS) in 1958.' Although this Committee initially focused on the debate of disarmament, its status was later made permanent in 1961 while its charter was expanded to include examination of all issues relating to the field of exploration and use of outer space by governmental and non-governmental organizations.16 In 1962 the Scientific and Technical Sub-Committee and Legal Sub-Committee began their true substantive work and became the main center of international cooperation and coordination for exploration of peaceful uses of outer space." Successive sessions focused on general and specific issues of space law, including the establishment of a frontier between outer space and atmospheric space18.

## 6

**CP: States ought to ban the appropriation of outer space by private entities for private space tourism with the exception of space elevators.**

**Elevators are part of tourism–risk of competition on such a vague term**

BáRbara **Ferreira**, 3-5-**2012**, "Geosciences Column: Promise and challenges of space elevators for tourism," GeoLog, <https://blogs.egu.eu/geolog/2012/03/05/geosciences-column-promise-and-challenges-of-space-elevators-for-tourism/> //SR

Tokyo-based Obayashi Corp. proposes to carry space tourists to a station a tenth of the distance to the moon, or roughly 36,000km above Earth’s surface, using a solar powered space elevator attached to a carbon nanotube pulley. The device would also allow researchers to continue yet further into space, likely as far as the counterweight at the end of the cable, located a whopping 96,000km from Earth. Such altitudes are considered very high, even in the context of the most ambitious space projects. For example, the International Space Station orbits at 330km above Earth, whereas the forthcoming Virgin Galactic shuttle will briefly fly customers at an altitude of 110km. In comparison, the average passenger jet cruises at a height of 10km. But Obayashi is no stranger to ambitious construction projects. They are the main contractor on Tokyo Sky Tree, the world’s tallest self-supporting tower (635m), and its international portfolio includes the Dubai Metro system and Stadium Australia, used for the Sydney Olympics. “Not simply a dream” Renewed enthusiasm for the space elevator project hinges on a number of crucial technological developments and methodological insights, including the carbon nanotube technology used to construct the cable. Invented in the 1990s, it is many times stronger and more flexible than steel. The elevator car, or climber, would travel on the cable using magnetic linear motors, which would use an alternating magnetic field to cause the coil to move. As for the station, it would have to be strategically placed in geosynchronous orbit, that is, circling in sync with the spinning of the Earth, and thereby always remaining in the same spot relative to its base on the ground. Little is known about many of the project’s finer practical details, including the potential cost, likely sponsors, and where to build it. “At this moment, we cannot estimate the cost for the project,” an Obayashi official said to Wired. “However, we’ll try to make steady progress so that it won’t end up as simply a dream.” Space tourism has recently been heavily featured in the news, with Virgin Galactic expecting to test its first spacecraft beyond Earth’s atmosphere this year and promising commercial suborbital passenger services as soon as by 2014. However, unlike Virgin Galactic, which will only carry six passengers at a time, its designers claim the elevator could carry up to 30 people and travel at a maximum speed of 200km/h. For comparison, the traditional Space Shuttle travelled at 28,000km/h.

**Private Companies are pursuing Space Elevators**

**Alfano 15** Andrea Alfano 8-18-2015 “All Of These Companies Are Working On A Space Elevator”<https://www.techtimes.com/articles/77612/20150818/companies-working-space-elevator.htm> (Writer at the Tech Times)//Elmer

Space elevators are solid proof that any mundane object sounds way cooler if you stick the word "space" in front of it. But there's much more than coolness at stake when building a space elevator – this technology has the potential to revolutionize space transportation, and the Canadian private space company Thoth Technology that was recently awarded a patent for its space elevator design isn't the only company in the game. One of the other major players is a U.S.-based company called LiftPort Group, founded by space entrepreneur Michael Laine in 2003. Its plan for a space elevator is vastly different from the one for which Thoth received a patent, however. Whereas Thoth's plans entail tethering a 12-mile-high inflatable space elevator to the Earth, LiftPort is shooting for the moon. Originally, LiftPort had planned to build an Earth elevator, too, but it abandoned the idea in 2007 in favor of building a lunar elevator. The basic design for a lunar elevator is an anchor in the moon that is attached to a cable that extends to a space station situated at a very special point. Known as a Lagrange Point, this is the gravitational tipping point between the Earth and the moon, where their gravitational pulls essentially cancel one another out. A robot could then travel up and down the tether, ferrying cargo between the moon and the station. Out farther in space, a counterweight would balance out the system. Both types of space elevator are intended to increase space access, but in very different ways. Thoth's Earth elevator aims to make launches easier by starting off 12 miles above the Earth's surface. LiftPort's space elevator aims to increase access to the moon in particular, because it is much easier to launch a rocket to the Lagrange Point and dock it at a space station than it is to get to the moon directly. There's a third major company based in Japan called Obayashi Corp. whose plans look like a hybrid of Thoth's and LiftPort's. Obayashi is not a space company, however – it's actually a construction company. Like Thoth, Obayashi plans to build an Earth elevator. But its Earth elevator would consist of a cable tethered to the blue planet, a robotic cargo-carrier, a space station, and a counterweight. It essentially looks like LiftPort's plans, but stuck to the Earth instead of to the moon.

**Yes Space Elevators – NASA confirms.**

**Snowden 18** Scott Snowden 10-2-2018 "A colossal elevator to space could be going up sooner than you ever imagined"<https://www.nbcnews.com/mach/science/colossal-elevator-space-could-be-going-sooner-you-ever-imagined-ncna915421> (Scott has written about science and technology for 20 years for publications around the world. He covers environmental technology for Forbes.)//Elmer

For more than half a century, rockets have been the only way to go to space. But in the not-too-distant future, we may have another option for sending up people and payloads: a colossal elevator extending from Earth’s surface up to an altitude of 22,000 miles, where geosynchronous satellites orbit. NASA says the basic concept of a space elevator is sound, and researchers around the world are optimistic that one can be built. The Obayashi Corp., a global construction firm based in Tokyo, has said it will build one by 2050, and China wants to build one as soon as 2045. Now an experiment to be conducted soon aboard the International Space Station will help determine the real-world feasibility of a space elevator. “The space elevator is the Holy Grail of space exploration,” says Michio Kaku, a professor of physics at City College of New York and a noted futurist. “Imagine pushing the ‘up’ button of an elevator and taking a ride into the heavens. It could open up space to the average person.”

**Regardless of completion, Elevators spur investment in Nanotechnology**

Liam **O’Brien 16**. University of Wollongong. 07/2016. “Nanotechnology in Space.” Young Scientists Journal; Canterbury, no. 19, p. 22.

Nanotechnology is at the forefront of scientific development, continuing to astound and innovate. Likewise, the space industry is rapidly increasing in sophistication and competition, with companies such as SpaceX, Blue Origin and Virgin Galactic becoming increasingly prevalent in what could become a new commercial space race. The various space programs over the past 60 years have led to a multitude of beneficial impacts for everyday society. Nanotechnology, through research and development in space has the potential to do the same. Potential applications of nanotechnology in space are numerous, many of them have the potential to capture and inspire generations to come. One of these applications is the space elevator. By using carbon nanotubes, a super light yet strong material, this concept would be an actual physical structure from the surface of the Earth to an altitude of approximately 36 000 km. The tallest building in the world would fit into this elevator over 42 000 times. The counterweight, used to keep the elevator taught, is proposed to be an asteroid. This would need to be at a distance of 100 000 km, a quarter of the distance to the moon. The benefits of such a structure would be enormous. 95% of a space shuttle's weight at take-off is fuel, costing US$ 20 000 per kilogram to send something into space. However, with a space elevator the cost per kilogram can be reduced to as little as US$ 200. Exploration to other planets can begin at the tower, and travel to and from the moon could become as simple as a morning commute to work. Solar sails provide the means to travel large distances and incredible speeds. Much like sails on a boat use wind, the solar sail uses light as a source of propulsion. Ideally these sails would be kilometres in length and only a few micrometres in thickness. This provides us with the ability to travel at speeds previously unheard of. Using carbon nanotubes once again, a solar sail has the capability to travel at 39 756 km/s which is 13% of the speed of light! This sail could reach Pluto in an astonishing 1.7 days, and Alpha Centauri in just 32 years. Space travel to other planets, other stars, could be possible with solar sails. The Planetary Society is funding for a space sail of itself, and has successfully launched one into orbit. NASA has also sent a sail into orbit, allowing it to burn up in the atmosphere after 240 days. Investing time and resources into nanotechnology for space exploration has benefits for society today. Materials such as graphene are being used in modern manufacturing at an increasing rate as the applications become utilised. Carbon nanotubes will change the way we think about materials and their strength. These nanotubes have a tensile strength one hundred times that of steel, yet are only a sixth of the weight. Imagine light weight vehicles using less petrol and energy as well as being just as strong as regular vehicles. With potentials to revolutionize the way we think about space travel, nanotechnology has a bright future. As a new field of science, it has the capability to push the human race to the outer reaches of our galaxy and hopefully one day to other stars. It will inspire generations of explorers and dreamers to challenge themselves and advance the human race into the next era. As Richard Feynman said in his 1959 talk 'There's Plenty of Room at the Bottom' "A field in which little has been done, but in which an enormous amount can be done. There is still plenty more to achieve.

**Nano tech solves warming**

Bhavya **Khullar**. September 4, 20**17**. Nanomaterials Could Combat Climate Change and Reduce Pollution. https://www.scientificamerican.com/article/nanomaterials-could-combat-climate-change-and-reduce-pollution/

The list of environmental problems that the world faces may be huge, but some strategies for solving them are remarkably small. First explored for applications in microscopy and computing, nanomaterials—materials made up of units that are each thousands of times smaller than the thickness of a human hair—are emerging as useful for tackling threats to our planet’s well-being. Scientists across the globe are developing nanomaterials that can efficiently use carbon dioxide from the air, capture toxic pollutants from water and degrade solid waste into useful products. “Nanomaterials could help us mitigate pollution. They are efficient catalysts and mostly recyclable. Now, they have to become economical for commercialization and better to replace present-day technologies completely,” says [Arun Chattopadhyay](http://www.iitg.ac.in/arun/), a member of the chemistry faculty at the Center for Nanotechnology, Indian Institute of Technology Guwahati. To help slow the climate-changing rise in atmospheric CO2levels, researchers have developed nanoCO2 harvesters that can suck atmospheric carbon dioxide and deploy it for industrial purposes. “Nanomaterials can convert carbon dioxide into useful products like alcohol. The materials could be simple chemical catalysts or photochemical in nature that work in the presence of sunlight,” says Chattopadhyay, who has been working with nanomaterials to tackle environmental pollutants for more than a decade. Many research groups are working to address a problem that, if solved, could be a holy grail in combating climate change: how to pull CO2 out of the atmosphere and convert it into useful products. Chattopadhyay isn’t alone. Many research groups are working to address a problem that, if solved, could be a holy grail in combating climate change: how to pull CO2 out of the atmosphere and convert it into useful products. Nanoparticles offer a promising approach to this because they have a large surface-area-to-volume ratio for interacting with CO2 and properties that allow them to facilitate the conversion of CO2into other things. The challenge is to make them economically viable. Researchers have tried everything from metallic to carbon-based nanoparticles to reduce the cost, but so far they haven’t become efficient enough for industrial-scale application. One of the most recent points of progress in this area is work by scientists at the CSIR-Indian Institute of Petroleum and the Lille University of Science and Technology in France. The researchers developed a nanoCO2 harvester that uses water and sunlight to convert atmospheric CO2 into methanol, which can be employed as an engine fuel, a solvent, an antifreeze agent and a diluent of ethanol. Made by wrapping a layer of modified graphene oxide around spheres of copper zinc oxide and magnetite, the material looks like a miniature golf ball, captures CO2 more efficiently than conventional catalysts and can be readily reused, according to Suman Jain, senior scientist of the Indian Institute of Petroleum, Dehradun in India, who developed the nanoCO2harvester. Jain says that the nanoCO2 harvester has a large molecular surface area and captures more CO2 than a conventional catalyst with similar surface area would, which makes the conversion more efficient. But due to their small size, the nanoparticles have a tendency to clump up, making them inactive with prolonged use. Jain adds that synthesizing useful nanoparticle-based materials is also challenging because it’s hard to make the particles a consistent size. Chattopadhyay says the efficiency of such materials can be improved further, providing hope for useful application in the future. CLEANSING WATER Most toxic dyes used in textile and leather industries can be captured with nanoparticles. “Water pollutants such as dyes from human-created waste like those from tanneries could get to natural sources of water like deep tube wells or groundwater if wastewater from these industries is left untreated,” says Chattopadhyay. “This problem is rather difficult to solve.” An international group of researchers led by professor Elzbieta Megiel of the University of Warsaw in Poland reports that nanomaterials have been widely studied for removing heavy metals and dyes from wastewater. According to the research team, adsorption processes using materials containing magnetic nanoparticles are highly effective and can be easily performed because such nanoparticles have a large number of sites on their surface that can capture pollutants and don’t readily degrade in water. Chattopadhyay adds that appropriately designed magnetic nanomaterials can be used to separate pollutants such as arsenic, lead, chromium and mercury from water. However, the nanotech-based approach has to be more efficient than conventional water purification technology to make it worthwhile. In addition to removing dyes and metals, nanomaterials can also be used to clean up oil spills. Researchers led by Pulickel Ajayan at Rice University in Houston, Texas, have developed a reusable nanosponge that can remove oil from contaminated seawater.

**Warming causes extinction**

**Schultz 16** (Robert Schultz [Retired Professor and Chair of Computer Information Systems at Woodbury University] “Modern Technology and Human Extinction,” <http://proceedings.informingscience.org/InSITE2016/InSITE16p131-145Schultz2307.pdf>) RW

There is consensus that there is a relatively short window to reduce carbon emissions before drastic effects occur. Recent credible projections of the result of lack of rapid drastic action is an average temperature increase of about 10o F by 2050. This change alone will be incredibly disruptive to all life, but will also cause great weather and climate change. For comparison purposes, a 10 degree (Fahrenheit) decrease was enough to cause an ice layer 4000 feet thick over Wisconsin (Co2gether, 2012). Recently relevant information has surfaced about a massive previous extinction. This is the Permian extinction, which happened 252 million years ago, during which 95% of all species on earth, both terrestrial and aquatic, vanished. The ocean temperature after almost all life had disappeared was 15 degrees (Fahrenheit) above current ocean temperatures. Recent information about the Permian extinction indicates it was caused by a rapid increase in land and ocean temperatures, caused by the sudden appearance of stupendous amounts of carbon in the form of greenhouse gases (Kolbert, 2014, pp. 102-144). The origin of the carbon in these enormous quantities is not yet known, but one possibility is the sudden release of methane gases stored in permafrost. This is also a possibility in our current situation. If so, extinction would be a natural side effect of human processes. There is also a real but smaller possibility of what is called “runaway greenhouse,” in which the earth’s temperature becomes like Venus’ surface temperature of 800o The threat of extinction here is not entirely sudden. The threat is, if anything, worse. Changes in the atmosphere--mainly increases in the concentration of greenhouse gases in the atmosphere-- can start processes that can’t be reversed but which take long periods of time to manifest. “Runaway greenhouse” may be the worst. Once again, suggestions of technological solutions to this situation should be treated with some skepticism. These proposals are often made by technophiles ignoring all the evidence that technology is very much subject to unanticipated side effects and unanticipated failures. What has happened concerning the depletion of the ozone layer should be a clear warning against the facile uses of technology through geoengineering to alter the makeup of the entire planet and its atmosphere. The complicating factor in assessing extinction likelihood from climate change is corporations, especially American fossil fuel corporations such as Exxon-Mobil and Shell. Through their contributions, they have been able to delay legislation ameliorating global warming and climate change. As mentioned before, recently released papers from Exxon-Mobil show that the corporation did accept the scientific findings about global warming and climate change. But they concluded that maintaining their profits was more important than acting to ameliorate climate change. Since it is not a matter of getting corporations to appreciate scientific facts, the chances of extinction from climate change are good. To ameliorate climate change, it is important to leave a high percentage of fossil fuel reserves in the ground. But this is exactly what a profit-seeking fossil fuel corporation cannot do. One can still hope that because fossil fuel corporations are made up of individuals, increasingly bad consequences of global warming and climate change will change their minds about profits. But because of the lag in effects, this mind change will probably be too late. So I conclude we will probably see something like the effects of the Permian extinction perhaps some time around 2050. (The Permian extinction was 95% extinction of all species.) This assumes the release of methane from the arctic will take place around then.

## 7

**Commercial tourism solves aerospace competitiveness.**

Olena **Suschenko 18.** (Candidate of Economic Sciences, Associate Professor Faculty of International Economic Relations, Department of Tourism Simon Kuznets Kharkiv National University of Economics "ECONOMICS OF AEROSPACE TOURISM: PECULIARITIES AND PROSPECTS OF MARKETING FOR POTENTIAL SPACE TOURISM COMPANIES." http://www.visnyk-econom.uzhnu.uz.ua/archive/20\_3\_2018ua/19.pdf/

Introduction and formulation of the study’s problema tic. Spaceflight is expensive, especially given that the cost of building rockets and spacecraft are high due to the engineering and materials involved. It is clear here that there is a need of democratisation of the spaceflight, the relationship between the cost reduction of the access to space and a rise of interests of more potential customers is an actual trend. A relationship that is being redefined by the rapidly advancing fields of commercial spaceflight and space tourism. A greater attention to space tourism and commercial spaceflights is required in order to develop a coherent, long-term conceptualization of the implications of modern mobility for sustainability. With the rise of the tourism in the aerospace industry, new technological approaches have been explored to reduce considerably the costs of access to space and may lead to the improvement of spaceflight technology. To understand this fact, in section 1 we will see how the space tourism can bring some improvements in the standards of the aerospace industry, afterwards in section 2 we will see which kind of economic models and marketing approaches can be put in place in order to have a better management of assets and an increase in the interest of the public in this new branch of tourism. Analysis of recent research and publications The economy of the aeronautics and space industry is based on the traditional trading model of selling products at a price above its costs. The final customer buys a good, which the supplier produces and delivers. Manufacturers of aircraft purchase engines and equipment and sell a directly assembled product to armies, airlines, and rental companies. They do not sell to passengers, who buy the service from the airlines. This classical model knows certain specificities here. This industry has a mastery of technologies that are directly exploitable by the military. As a result, States are heavily involved in its research and development work and many of its projects are under the cover of “Secret-Defence”. It requires heavy investment in the production tool. That is why it is financed in part by state military programs and purchasing options for its clients. The aeronautics and space sector is driven by different demands. These of the States, which wish to dispose of the armaments furnished by this industry. These of people who travel by plane for business or leisure. These of companies that ship goods through the air. And finally, these of organizations of all types that work to conquer space. History has demonstrated that as technology has evolved and states have increasingly recognized the potential of outer space, the range of activities planned for outer space has proliferated. In addition, the commercial prospects offered by outer space have led to significant participation by private enterprises. If its state anchor refers to the concept of “industry of sovereignty”, it has progressively internationalized to rest on markets and processes today globalized. If companies are granted access in space, this will create opportunities for diversification, which will ease the tension between companies, and pressure on companies to encourage wasteful practices like persuading the consumer to consume more than what is necessary. The development of space tourism will benefit people socially. This will help to break down the tension that many people feel about the future due to projections of the limited resources of the earth. The cost of outer space travel is steep and wasteful from an economic point of view. But space tourism will also make a potentially critical contribution in overcoming the pressures of deflation in the world that is caused by the oversupply in traditional industries and the slow development of new industries. The fundamental misconception by economists about the future role of commercial space travel is essential because of the relation to the present condition of the global economy in order to further understand this; it is required to first understand the basic pattern of business development all around the world. As the name implies, space tourism is travelling to space as a destination for recreational, leisure or business purposes. Faced with the environmental challenge, companies operating in this sector will have to renew themselves and respond to the new challenges in terms of technical innovation imposed by the establishment of assets promoting the emergence of space tourism. The space tourism market is a niche market with a limited number of vendors. The market is still in its development stage where companies are trying to enhance their spaceflight technology. Growing competition, rapid advances in technology, frequent changes in government policies, public consequence, and environmental regulations are currently the major factors that challenge the growth of the players in this global market. Space enthusiasts are delighted at this flurry of renewed interest, and the fact that China has succeeded in sending a person into orbit merely heightens the stakes and intensifies the competition. In recent years, some private enterprises have been approaching Space flight with a relatively low-cost philosophy, in great contrast with the one followed by government agencies in past years. In fact, some examples of small reusable airplane-like vehicles have been developed to perform sub-orbital missions, which could represent a first step towards a safer, more comfortable and less expensive access to Space in the near future. The main idea is to merge part of technological solutions developed for aeronautical and atmospheric re-entry purposes in order to design such vehicles. But to see in these initiatives the dawn of a space tourism age would be making a leap of faith. True, space’s return to the top of the international policy agenda has to be welcomed, not least for its commercial potential. The recent growth of activities towards developing passenger space travel services is very promising; however, there is a widespread but mistaken idea that space tourism will remain a small-scale activity of the very wealthy. The truth is that having been delayed for over three decades by government space agencies’ failure to develop more than a small fraction of the commercial potential of space, the start of space travel services is long overdue, and so they are capable of growing rapidly into a major new industry. That is, the technical and business know-how exists to enable space tourism to grow to a turnover of 100 billion Euros/year within a few decades if it receives the public support of even 10% of space agencies budgets. This development would sharply reduce the cost of accessing the resources of space, which could prevent the spread of the “resource wars” which have begun so ominously. No activity, therefore, offers greater economic benefits than the rapid development of low-cost space tourism services. A range of government policies should be revised to reflect this.

**Aerospace decline causes global nuclear war**

**Pfaltzgraff 10** – Robert L, Shelby Cullom Davis Professor of International Security Studies at. The Fletcher School of Law and Diplomacy and President of the Institute for Foreign Policy Analysis, et al., Final Report of the IFPA-Fletcher Conference on National Security Strategy and Policy, “Air, Space, & Cyberspace Power in the 21st-Century”, p. xiii-9

Deterrence Strategy In stark contrast to the bipolar Cold War nuclear setting, today’s security environment includes multiple, independent nuclear actors. Some of these independent nuclear weapons states are potential adversaries, some are rivals, and some are friends, but the initial decision for action by any one of them may lie beyond U.S. control. The United States may need to influence, signal, and restrain enemies, and it may need to continue to provide security guarantees to non-nuclear friends and allies. America may also face catalytic warfare, where, for example, a U.S. ally such as Israel or a third party such as China could initiate action that might escalate to a nuclear exchange. Although the United States would not be a party to the nuclear escalation decision process, it could be drawn into the conflict. Compared to a bipolar world, very little is known about strategic nuclear interaction and escalation in a multipolar world. The U.S. nuclear deterrent must restrain a wider variety of actors today than during the Cold War. This requires a range of capabilities and the capacity to address specific challenges. The deterrent must provide security guarantees and assurance sufficient to prevent the initiation of catalytic warfare by an ally, while deterring an adversary from resorting to nuclear escalation. America may also need simultaneously to deter more than one other nuclear state. Deterrence requirements include four critical elements: early warning, C2, delivery systems, and weapons. The Air Force plays an indispensable role in furnishing the U.S. early warning system in its entirety through satellites and radar networks. In command and control, infrastructure is provided by the Air Force, including Milstar satellites and, in the future, advanced extremely high frequency (AEHF) satellites. In the area of delivery systems and weapons, two-thirds of the strategic triad – intercontinental ballistic missiles (ICBMs) and bombers – is furnished by the Air Force and its Global Strike Command. U.S. Overseas Basing and the Anti-Access/Area-Denial Threat The increased availability of anti-access/area-denial assets coupled with growing threats to the sea, air, space, and cyberspace commons are challenging the power projection capabilities of the United States. These threats, in the form of aircraft and long-range missiles carrying conventional or nuclear munitions, present problems for our overseas bases. States such as North Korea, China, and Iran jeopardize the notion that forward-deployed U.S. forces and bases will be safe from enemy attack. Consequently, the United States must create a more flexible basing structure encompassing a passive and active defense posture that includes these features: dispersal, hardening, increased warning time of attack, and air defenses. Simultaneously, the United States must continue to develop long-range, offensive systems such as low-observable manned and remotely piloted strike aircraft, precision missiles, and intelligence, surveillance, and reconnaissance (ISR) platforms to penetrate heavily defended A2/AD environments. This approach will increase the survivability of U.S. forward-deployed assets and power projection capabilities and thus bolster deterrence and U.S. guarantees to America’s allies and friends. Asymmetric Challenges The increasing number of actors gaining access to advanced and dual-use technologies augments the potential for asymmetric attacks against the United States and its allies by those who are unable to match U.S. military capabilities. Those actors pose increasing challenges to the ability of the United States to project power through the global commons. Such attacks could target specific U.S. vulnerabilities, ranging from space assets to the financial, transportation, communications, and/or energy infrastructures, and to the food and water supply, to mention only the most obvious. Asymmetric attacks denying access to critical networks and capabilities may be the most cost-effective approach to circumventing traditional U.S. force advantages. The USAF and DoD must develop systems and technologies that can offset and defend against asymmetric capabilities. This will require a robust R&D program and enhanced USAF cooperation with its sister services and international partners and allies. Space Dominance Space is increasingly a contested domain where U.S. dominance is no longer assured given the growing number of actors in space and the potential for kinetic and non-kinetic attacks, including ASAT weapons, EMP, and jamming. As a result, the United States must protect vital space-based platforms and networks by reducing their vulnerability to attack or disruption and increasing the country’s resilience if an attack does occur. Required steps include hardening and incorporating stealth into next generation space systems and developing rapid replenishment capacity (including micro-satellite technologies and systems and new launch capabilities). At the same time, America must reduce its dependence on space capabilities with air-based substitutes such as high altitude, long endurance, and penetrating ISR platforms. Increased cooperation among the services and with U.S. allies to develop such capabilities will also be paramount. Cyber Security Cyber operations are vital to conducting USAF and joint land, sea, air, and space missions. Given the significance of the cyber threat (private, public, and DoD cyber and information networks are routinely under attack), the United States is attempting to construct a layered and robust capability to detect and mitigate cyber intrusions and attacks. The USAF’s cyber operations must be capable of operating in a contested cyber domain to support vital land, sea, air, and space missions. USAF cyberspace priorities include developing capabilities to protect essential military cyber systems and to speed their recovery if an attack does occur; enhancing the Air Force’s capacity to provide USAF personnel with the resolution of technical questions; and training/recruitment of personnel with cyber skills. In addition, the USAF and DoD need to develop technologies that quickly and precisely attribute attacks in cyberspace. Cyber attacks can spread quickly among networks, making it extremely difficult to attribute their perpetrator, and therefore to develop a deterrence strategy based on retaliation. In addition, some cyber issues are in the legal arena, including questions about civil liberties. It is likely that the trend of increased military support to civil authorities (for example, in disaster relief operations) will develop in the cyber arena as well. These efforts will entail greater service, interagency, international, and private-sector collaboration. Organizational Change and Joint Force Operations To address growing national security challenges and increasing fiscal constraints, and to become more effective, the joint force needs to adapt its organizations and processes to the exigencies of the information age and the security setting of the second decade of the twenty-first century. This entails developing a strategy that places increased emphasis on joint operations in which each service acts in greater concert with the others, leverages capacities across the services (two land services, three naval services, and five air services) without duplicating efforts, and encourages interoperability. This would provide combatant commanders (CCDRs) with a greater range of capabilities, allowing heightened flexibility to use force. A good example of this approach is the Air-Sea Battle concept being developed jointly by the Air Force and Navy, which envisions heightened cooperation between the two services and potentially with allies and coalition partners. Intelligence, Surveillance, and Reconnaissance Capabilities There is an increasing demand for ISR capabilities able to access and persist in contested airspace in order to track a range of high-value mobile and hard-to-find targets, such as missile launchers and underground bunkers. This increases the need for stealthy, survivable systems and the development of next-generation unmanned platforms. The USAF must continue to emphasize precision targeting, both for strike and close-air-support missions. High-fidelity target identification and discrimination enabled by advanced radars and directed-energy systems, including the ability to find, track, and target individuals within a crowd, will provide battlefield commanders with improved options and new opportunities for leveraging joint assets. Engagement and International Security Cooperation Allies and coalition partners bring important capabilities from which the USAF and other services have long benefited. For example, allies and coalition partners can provide enhanced situational awareness and early warning of impending crises as well as assist in understanding the interests, motivations, traditions, and cultures of potential adversaries and prospective coalition partners. Moreover, foreign partner engagement and outreach are an avenue to influence partner and adversary perspectives, thus shaping the environment in ways favorable to U.S. national security interests. Engagement also may be a key to realizing another Air Force and joint priority: to sustain or gain access to forward operating bases and logistical infrastructure. This is particularly important given the growing availability of A2/AD assets and their ability to impede U.S. power projection capabilities. Procurement Choices and Affordability The USAF needs to field capabilities to support current operations and pressing missions while at the same time pursuing promising technologies to build the force of the future. Affordability, effectiveness, time urgency, and industrial base issues inevitably shape procurement choices and reform. The Air Force must maintain today’s critical assets while also allocating resources to meet future needs. Given the long lifespan anticipated for many weapon systems, planners need to make the most reliable cost estimates and identify problems at the outset of a weapons system’s development phase so that they can be corrected as early and cost-effectively as possible. Support to Civil Authorities As evidenced in the aftermath of the 2010 earthquakes in Haiti and Chile (the Chile earthquake hit after this conference), the USAF has a vital role to play in the U.S. response to international relief operations and support to civil authorities. In Haiti, the USAF reopened the airport and deployed contingency response elements, while also providing ISR support for the joint forces in the theater. In Chile, USAF satellite communication capabilities were critical to the recovery and relief efforts. USAF civil support roles are likely to grow to include greater use of the Reserve Components. Consequently, USAF planners should reassess the active and reserve component mix of forces and capabilities to identify potential mobilization and requirement shortfalls. CLOSING CONFERENCE THOUGHTS A recurring conference theme was the need for the USAF to continue to examine specific issues of opportunity and vulnerability more closely. For example, a future initiative could include focused working groups that would examine such questions and issues as: • How can air, space, and cyberspace capabilities best support deterrence, preserve U.S. freedom of action, and support national objectives? • How should the USAF leadership reconceptualize its vision, institutional identity, and force posture to align as closely as possible with the future national security setting? • What is the appropriate balance between high-end and low-end air and space capabilities that will maximize military options for national decision makers, given emerging threats and fiscal constraints? • What are the opportunities, options, and tradeoffs for investment and divestment in science and technology, infrastructure, and programmed capabilities? • What are additional interdependent concepts, similar to Air-Sea Battle, that leverage cross-service investments to identify and foster the development of new joint capabilities? • What are alternative approaches to officer accessions and development to support shifting and emerging Air Force missions, operations, and force structure, including cyber warfare? • How can the USAF best interact with Congress to help preserve or refocus the defense-industrial base as well as to minimize mandates and restrictions that weigh on future Air Force investments? Finally, the USAF must continue to be an organization that views debate, as the Chief of Staff of the Air Force put it in his opening conference address, “…as the whetstone upon which we sharpen our strategic thinking.” This debate must also be used in pursuit of political support and to ensure that the USAF maintains and develops critical capabilities to support U.S. national security priorities. The 38th IFPA-Fletcher Conference on National Security Strategy and Policy was conceived as a contribution to that debate. Almost a century has passed since the advent of airpower and Billy Mitchell’s demonstration of its operational potential with the sinking of the Ostfriesland on July 21, 1921. For most of that time, the United States has benefitted from the rapid development of air and space power projection capabilities, and, as a result, it has prevailed in successive conflicts, contributed to war deterrence and crisis management, and provided essential humanitarian relief to allies and friends around the world. As we move into the second decade of the twenty-first century, the U.S. Air Force (USAF), like its service counterparts, is re-assessing strategies, operational concepts, and force structure. Across the conflict spectrum, security challenges are evolving, and potential adversaries–state and non-state actors–are developing anti-access and other asymmetric capabilities, and irregular warfare challenges are becoming more prevalent. The potential exists for “hybrid” warfare in which state adversaries and/or non-state actors use a mix of conventional and unconventional capabilities against the United States, a possibility made more feasible by the diffusion of such capabilities to a larger number of actors. Furthermore, twenty-first-century security challenges and threats may emanate from highly adaptive adversaries who ignore the Geneva Conventions of war and use military and/or civilian technologies to offset our military superiority. As it develops strategy and force structure in this global setting, the Air Force confronts constraints that will have important implications for budget and procurement programs, basic research and development (R&D), and the maintenance of critical skills, as well as recruitment, education, training, and retention. Given the dynamic nature of the security setting and looming defense budget constraints, questions of where to assume risk will demand bold, innovative, and decisive leadership. The imperative for joint operations and U.S. military-civilian partnerships is clear, underscoring the need for a whole-of-government and whole-of-society approach that encompasses international and non-governmental organizations (NGOs). THE UNITED STATES AS AN AEROSPACE NATION: CHALLENGES AND OPPORTUNITIES In his address opening the conference, General Norton A. Schwartz, Chief of Staff of the Air Force (CSAF), pointed out how, with its inherent characteristics of speed, range, and flexibility, airpower has forever changed warfare. Its advent rendered land and maritime forces vulnerable from the air, thus adding an important new dimension to warfare. Control of the air has become indispensable to national security because it allows the United States and friendly forces to maneuver and operate free from enemy air attack. With control of the air the United States can leverage the advantages of air and space as well as cyberspace. In these interdependent domains the Air Force possesses unique capabilities for ensuring global mobility, long-range strike, and intelligence, surveillance, and reconnaissance (ISR). The benefits of airpower extend beyond the air domain, and operations among the air, land, maritime, space, and cyber domains are increasingly interdependent. General Schwartz stated that the Air Force’s challenge is to succeed in a protracted struggle against elements of violent extremism and irreconcilable actors while confronting peer and near-peer rivals. The Air Force must be able to operate with great precision and lethality across a broad spectrum of conflict that has high and low ends but that defies an orderly taxonomy. Warfare in the twenty-first century takes on a hybrid complexity, with regular and irregular elements using myriad tools and tactics. Technology can be an enabler but can also create weaknesses: adversaries with increased access to space and cyberspace can use emerging technologies against the United States and/or its allies. In addition, the United States faces the prospect of the proliferation of precision weapons, including ballistic and cruise missiles as well as increasingly accurate mortars, rockets, and artillery, which will put U.S. and allied/coalition forces at risk. In response to mounting irregular warfare challenges American leaders have to adopt innovative and creative strategies. For its part, the USAF must develop airmen who have the creativity to anticipate and plan for this challenging environment. Leadership, intellectual creativity, capacity, and ingenuity, together with innovative technology, will be crucial to addressing these challenges in a constrained fiscal environment. System Versatility In meeting the broad range of contingencies – high, low, regular, irregular, and hybrid – the Air Force must maintain and develop systems that are versatile, both functionally (including strike or ISR) and in terms of various employment modes, such as manned versus remotely piloted, and penetrating versus stand-off systems. General Schwartz emphasized the need to be able to operate in conflict settings where there will be demands for persistent ISR systems able to gain access to, and then loiter in, contested or denied airspace. The targets to be identified and tracked may be mobile or deeply buried, of high value, and difficult to locate without penetrating systems. General Schwartz also called attention to the need for what he described as a “family of systems” that could be deployed in multiple ways with maximum versatility depending on requirements. Few systems will remain inherently single purpose. Indeed, he emphasized that the Air Force must purposefully design versatility into its new systems, with the majority of future systems being able to operate in various threat environments. As part of this effort further joint integration and inter-service cooperation to achieve greater air-land and air-sea interoperability will continue to be a strategic necessity. Space Access and Control Space access, control, and situational awareness remain essential to U.S. national security. As potential rivals develop their own space programs, the United States faces challenges to its unrestricted access to space. Ensuring continuing access to the four global commons – maritime, air, space, and cyberspace – will be a major challenge in which the USAF has a key role. The Air Force has long recognized the importance of space and is endeavoring to make certain that U.S. requirements in and for space are met and anticipated. Space situational awareness is vital to America’s ability to help evaluate and attribute attacks. Attribution, of course, is essential to deterrence. The USAF is exploring options to reduce U.S. dependence on the Global Positioning System (GPS), which could become vulnerable to jamming. Promising new technologies, such as “cold atoms,” pseudolites, and imaging inertial navigation systems that use laser radar are being investigated as means to reduce our vulnerability. Cyber Capabilities The USAF continues to develop cyber capabilities to address opportunities and challenges. Cyber threats present challenges to homeland security and other national security interests. Key civilian and military networks are vulnerable to cyber attacks. Preparing for cyber warfare and refining critical infrastructure protection and consequence management will require new capabilities, focused training, and greater interagency, international, and private sector collaboration. Challenges for the Air Force General Schwartz set forth a series of challenges for the Air Force, which he urged conference participants to address. They included: • How can the Air Force better address the growing demand for real-time ISR from remotely piloted systems, which are providing unprecedented and unmatched situational awareness? • How can the USAF better guarantee the credibility and viability of the nation’s nuclear forces for the complex and uncertain security environment of this century? • What is the way ahead for the next generation of long-range strike and ISR platforms? What trade-offs, especially between manned and unmanned platforms, should the USAF consider? How can the USAF improve acquisition of such systems? How can the USAF better exploit the advantage of low-observables? • How can the Air Force better prepare itself to operate in an opposed network environment in which communications and data links will be challenged, including how to assure command and control (C2) in bandwidth-constrained environments? • In counter-land operations, how can the USAF achieve improved target discrimination in high collateral damage situations? • How should the USAF posture its overseas forces to ensure access? What basing structure, logistical considerations, andprotection measures are required to mitigate emerging anti-access threats? • How can the Air Force reduce its reliance on GPS to ensure operations in a GPS-denied environment? • How can the USAF lessen its vulnerability to petroleum shortages, rising energy prices, and resulting logistical and operational challenges? • How can the Air Force enhance partnerships with its sister services and the interagency community? How can it better collaborate with allies and coalition partners to improve support of national security interests? These issues were addressed in subsequent conference sessions. The opening session focused on the multidimensional and dynamic security setting in which the Air Force will operate in the years ahead. The session included a discussion of the need to prioritize necessary capabilities and to gauge “acceptable risks.” Previous Quadrennial Defense Reviews (QDRs) rested on the basic assumption that the United States would be able to support operations simultaneously or nearly simultaneously in two major regional contingencies, with the additional capacity to respond to smaller disaster-relief and/or stability operations missions. However, while the 2010 QDR1 maintains the need for U.S. forces to operate in two nearly simultaneous major wars, it places far greater emphasis on the need to address irregular warfare challenges. Its focus is maintaining and rebalancing U.S. force structure to fight the wars in which the United States is engaged today while looking ahead to the emerging security setting. The QDR further seeks to develop flexible and tailored capabilities to confront an array of smaller-scale contingencies, including natural disasters, perhaps simultaneously, as was the case with the war in Afghanistan, stability operations in Iraq, and the Haiti relief effort. The 2010 QDR highlights important trends in the global security environment, especially unconventional threats and asymmetric challenges. It suggests that a conflict with a near-peer competitor such as China, or a conflict with Iran, would involve a mix, or hybrid, of capabilities that would test U.S. forces in very different ways. Although predicting the future security setting is a very difficult if not an impossible exercise, the 2010 QDR outlines major challenges for the United States and its allies, including technology proliferation and diffusion; anti-access threats and the shrinking global basing infrastructure; the possibility of weapons of mass destruction (WMD) use against the U.S. homeland and/or against U.S. forces abroad; critical infrastructure protection and the massed effects of a cyber or space attack; unconventional warfare and irregular challenges; and the emergence of new issue areas such as Arctic security, U.S. energy dependence, demographic shifts and urbanization, the potential for resource wars (particularly over access to water), and the erosion or collapse of governance in weak or failing states. TECHNOLOGY DIFFUSION Technology proliferation is accelerating. Compounding the problem is the reality that existing multilateral and/or international export regimes and controls have not kept pace with technology, and efforts to constrain access are complicated by dual-use technologies and chemical/biological agents. The battlefields of the future are likely to be more lethal as combatants take advantage of commercially based navigation aids for precision guidance and advanced weapons systems and as global and theater boundaries disappear with longer-range missile systems becoming more common in enemy arsenals. Non-state entities such as Hezbollah have already used more advanced missile systems to target state adversaries. The proliferation of precision technologies and longer-range delivery platforms puts the United States and its partners increasingly at risk. This proliferation also is likely to affect U.S. operations from forward operating locations, placing additional constraints on American force deployments within the territories of allies. Moreover, as longer-range ballistic and cruise missiles become more widespread, U.S. forces will find it increasingly difficult to operate in conflicts ranging from irregular warfare to high-intensity combat. As highlighted throughout the conference, this will require that the United States develop and field new-generation low-observable penetration assets and related capabilities to operate in non-permissive environments. PROLIFERATION TRENDS The twenty-first-century security setting features several proliferation trends that were discussed in the opening session. These trends, six of which were outlined by Dr. Robert L. Pfaltzgraff, Jr., President of the Institute for Foreign Policy Analysis, and Shelby Cullom Davis Professor of International Security Studies, The Fletcher School, Tufts University, framed subsequent discussions. First, the number of actors–states and armed non-state groups–is growing, together with strategies and capabilities based on more widely available technologies, including WMD and conventional weapons. This is leading to a blurring of categories of warfare that may include state and non-state actors and encompass intra-state, trans-state, and inter-state armed conflict as well as hybrid threats. Second, some of these actors subscribe to ideologies and goals that welcome martyrdom. This raises many questions about dissuasion and deterrence and the need to think of twenty-first-century deterrence based on offensive and defensive strategies and capabilities. Third, given the sheer numbers of actors capable of challenging the United States and their unprecedented capabilities, the opportunity for asymmetric operations against the United States and its allies will grow. The United States will need to work to reduce key areas of vulnerability, including its financial systems, transportation, communications, and energy infrastructures, its food and water supply, and its space assets. Fourth, the twenty-first-century world contains flashpoints for state-to-state conflict. This includes North Korea, which possesses nuclear weapons, and Iran, which is developing them. In addition, China is developing an impressive array of weaponry which, as the Commander of U.S. Pacific Command stated in congressional testimony, appears “designed to challenge U.S. freedom of action in the region and, if necessary, enforce China’s influence over its neighbors – including our regional allies and partners’ weaponry.”2 These threats include ballistic missiles, aircraft, naval forces, cyber capabilities, anti-satellite (ASAT) weapons, and other power-projection capabilities. The global paradigm of the twenty-first century is further complicated by state actors who may supply advanced arms to non-state actors and terrorist organizations. Fifth, the potential for irregular warfare is rising dramatically with the growth of armed non-state actors. The proliferation of more lethal capabilities, including WMD, to armed non-state actors is a logical projection of present trends. Substantial numbers of fractured, unstable, and ungoverned states serve as breeding grounds of armed non-state actors who will resort to various forms of violence and coercion based on irregular tactics and formations and who will increasingly have the capabilities to do so. Sixth, the twenty-first-century security setting contains yet another obvious dimension: the permeability of the frontiers of the nation state, rendering domestic populations highly vulnerable to destruction not only by states that can launch missiles but also by terrorists and other transnational groups. As we have seen in recent years, these entities can attack U.S. information systems, creating the possibility of a digital Pearl Harbor. Taken together, these trends show an unprecedented proliferation of actors and advanced capabilities confronting the United States; the resulting need to prepare for high-end and low-end conflict; and the requirement to think of a seamless web of threats and other security challenges extending from overseas to domestic locales. Another way to think about the twenty-first-century security setting, Dr. Pfaltzgraff pointed out, is to develop scenarios such as the following, which are more illustrative than comprehensive: • A nuclear Iran that engages in or supports terrorist operations in a more assertive foreign policy • An unstable Pakistan that loses control of its nuclear weapons, which fall into the hands of extremists • A Taiwan Straits crisis that escalates to war • A nuclear North Korea that escalates tensions on the Korean peninsula What all of these have in common is the indispensable role that airpower would play in U.S. strategy and crisis management.

**Extinction**

**Starr 15** [Steven, Senior Scientist for Physicians for Social Responsibility (www.psr.org) and Director of the Clinical Laboratory Science Program at the University of Missouri. Starr has published in the Bulletin of the Atomic Scientists and the Strategic Arms Reduction (STAR) website of the Moscow Institute of Physics and Technology] “Nuclear War: An Unrecognized Mass Extinction Event Waiting To Happen.” Ratical. March 2015. https://ratical.org/radiation/NuclearExtinction/StevenStarr022815.html TG

A war fought with 21st century strategic nuclear weapons would be more than just a great catastrophe in human history. If we allow it to happen, such a war would be a mass extinction event that ends human history. There is a profound difference between extinction and “an unprecedented disaster,” or even “the end of civilization,” because even after such an immense catastrophe, human life would go on. But extinction, by definition, is an event of utter finality, and a nuclear war that could cause human extinction should really be considered as the ultimate criminal act. It certainly would be the crime to end all crimes. The world’s leading climatologists now tell us that nuclear war threatens our continued existence as a species. Their studies predict that a large nuclear war, especially one fought with strategic nuclear weapons, would create a post-war environment in which for many years it would be too cold and dark to even grow food. Their findings make it clear that not only humans, but most large animals and many other forms of complex life would likely vanish forever in a nuclear darkness of our own making. The environmental consequences of nuclear war would attack the ecological support systems of life at every level. Radioactive fallout produced not only by nuclear bombs, but also by the destruction of nuclear power plants and their spent fuel pools, would poison the biosphere. Millions of tons of smoke would act to destroy Earth’s protective ozone layer and block most sunlight from reaching Earth’s surface, creating Ice Age weather conditions that would last for decades. Yet the political and military leaders who control nuclear weapons strictly avoid any direct public discussion of the consequences of nuclear war. They do so by arguing that nuclear weapons are not intended to be used, but only to deter. Remarkably, the leaders of the Nuclear Weapon States have chosen to ignore the authoritative, long-standing scientific research done by the climatologists, research that predicts virtually any nuclear war, fought with even a fraction of the operational and deployed nuclear arsenals, will leave the Earth essentially uninhabitable.