## 1AC – Public Trust

### 1AC – Heritage

#### Advantage 1 is Heritage:

#### Absent agreement on property and mining rights---conflict over resources is inevitable

John Myers 16, 2017 J.D. Candidate, University of San Diego School of Law, Extraterrestrial Property Rights: Utilizing the Resources of the Final Frontier, San Diego International Law Journal, Volume 18, Page 77–128, 2016, Accessed via Hein Online

The doctrine of discovery is a “top-down” approach to the acquisition of property: sovereignty and property are inherently intertwined. The topdown view of property traces its roots to the 1648 Peace of Westphalia; however, there is a strong tradition in Western scholarship and law that property law is grown and developed from the bottom up. For example, in Roman law, the Institutes of Justinian advanced the idea of ownership through occupancy. In addition, John Locke in England promoted the labor theory that allows ownership to be earned by the “sweat of your brow.” Most importantly, property today is largely viewed as a bundle of rights that include the rights to possess, use, exclude, and transfer. This bundle of rights is subject to reconfiguration depending on the form of property. Property rights in space are novel and therefore require a new configuration in the bundle of rights associated with that property. Moreover, the grant of property rights in space will prevent both the Tragedy of the Commons and the Tragedy of the Anticommons. In the first case, if property rights are not granted in space, it is foreseeable that conflicts will arise because multiple corporations could land on the same asteroid. Hypothetically, if a particularly resource-rich asteroid that would be easy to land on and mine is discovered, both an American corporation and a Chinese corporation could land on it and this would result in issues both in space and on Earth. In the second case, if property rights are not granted in space, it is as likely foreseeable that corporations will not invest in space and the resources of space will go underexploited. Currently there are analogous situations on Earth that the recognition of property rights in space will either avoid or emulate. In the case of African land grabs, there is virtually no government oversight and therefore resources are being overexploited. On the other hand, in the East and South China Seas, there are several governments claiming a number of islands and island groups leading to under-utilization of resources. Space offers an opportunity for a blank slate, provided the rights and obligations of nations are clear from the beginning. The deep seabed is perhaps the most closely analogous situation on Earth. Like outer space, the deep seabed is considered the “Common Heritage of Mankind.” The UNCLOS was intended to create an agreement to regulate the use and exploitation of the resources in the deep seabed. The United States, along with Japan, West Germany, and the United Kingdom, did not sign the convention, and instead created national legislation and other schemes to explore and exploit the deep seabed. The United States legislature enacted the DSHMRA that authorizes U.S. citizens to explore and exploit deep seabed resources. This Act further asserts that the United States is not exerting sovereignty over the deep seabed and recognizes the rights of other nations to engage in the same activities. Most importantly, the United States currently has bilateral and multilateral agreements with almost every nation capable of exploiting the deep seabed.

#### Preservation based approach to property that decouples commercial space mining from research is key to prevent conflict and create sustainable mining

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For one thing, it appears to violate international law, according to Congressional testimony by Joanne Gabrynowicz, a space law expert at the University of Mississippi. Before NASA’s moon landing, the United States—along with other United Nations Security Council members and many other countries—signed the 1967 Outer Space Treaty. “Outer space, including the moon and other celestial bodies,” it states, “is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.” The 1979 Moon Agreement went further, declaring outer space to be the “common heritage of mankind” and explicitly forbidding any state or organization from annexing (non-Earth) natural resources in the solar system. Major space-faring nations are not among the 16 countries party to the treaty, but they should arguably come to some equitable agreement, since international competition over natural resources in space may very well transform into conflict. Take platinum-group metals. Mining companies have found about 100,000 metric tons of the stuff in deposits worldwide, mostly in South Africa and Russia, amounting to $10 billion worth of production per year, according to the U.S. Geological Survey. These supplies should last several decades if demand for them doesn’t rise dramatically. (According to Bloomberg, supply for platinum-group metals is constrained while demand is increasing.) Palladium, for example, valued for its conductive properties and chemical stability, is used in hundreds of millions of electronic devices sold annually for electrodes and connector platings, but it’s relatively scarce on Earth. A single giant, platinum-rich asteroid could contain as much platinum-group metals as all reserves on Earth, the Google-backed Planetary Resources claims. That’s a massive bounty. As Planetary Resources and other U.S. and foreign companies scramble for control over these valuable space minerals, competing “land grabs” by armed satellites may come next. Platinum-group metals in space may serve the same role as oil has on Earth, threatening to extend geopolitical struggles into astropolitical ones. NASA’s increasing collaboration with space mining companies could distort and divert efforts previously focused on space exploration. Moreover, the technology that might enable this free-for-all—versatile “nanosatellites,” no larger than a loaf of bread—is relatively inexpensive. In December, while reporting for a story about these tiny satellites, also known as CubeSats, I came across some missions applicable to mining asteroids. In mid-2018, NASA will launch a satellite for a mission called Near-Earth Asteroid Scout, for example. It will deploy a solar sail, propel itself with sunlight, and journey to the asteroid belt, where it will scope out a particular asteroid and analyze its properties. Last June, NASA also awarded grants to Planetary Resources to advance the designs of spectral imagers and propulsion systems for CubeSats, and other missions will develop the satellites’ abilities to communicate and network with each other. NASA also awarded Deep Space Industries contracts to assess commercial approaches for NASA’s asteroid goals, which may involve hosting DSI’s asteroid-prospecting equipment on its missions. Like all forms of mining, it will be dangerous. If space-mining activities break up asteroids, the resulting debris could be hazardous for satellites, other spacecraft, and astronauts nearby. On the other hand, in a best-case scenario, space mining could be environmentally safe, capture only necessary minerals and water, and, in the more distant future even lead to the construction of a far-flung space station led by NASA and other space agencies, orbiting 200 million miles from Earth and serving as both a mining depot and a pit-stop for passing spacecraft. But it’s not clear that a pact between the commercial space mining industry and NASA would align with the public’s interest. NASA’s increasing collaboration with space mining companies could distort and divert efforts previously focused on space exploration and basic research and discourage public interest and engagement in astronomy. Last October, for example, Seager advocated for space mining at a science writing conference I attended. She’s part of a motley group of advisors for Planetary Resources, including the movie director James Cameron, a lawyer for a prominent Washington D.C. firm, and Dante Lauretta, another astronomer whom I respect. Seager seems to believe that encouraging private space mining will lead to more investments and technological innovation that would enable more scientific research. In a 2012 interview with The Atlantic, for instance, she said, “The bottom line is that NASA is not working the best that it could for space science right now, and so in order for people like me to succeed with my own research goals, the commercial space industry needs to be able to succeed independently of government contracts.” But if the U.S. and U.S.-based companies lay claim to the richest and most easily accessible prospecting sites, not allowing other companies and nations to share in the wealth, economic and political relations could be damaged. That’s why this seems to be a dangerous path for space explorers. Once you’re on board with the commercial space industry, then you as a researcher must accept, if not support, everything that comes with it. Seager and a few other researchers may be willing to take this risk, but what about the rest of the space science community? Moreover, to succeed, these businesses will seek profitable missions, while science, exploration, and discovery—goals that stimulate public interest—will inevitably have lower priority. (Other commercial spaceflight companies, like Elon Musk’s SpaceX, do generate public interest, but they’re not directly involved in mining asteroids.) NASA may have its shortcomings, but at least its missions and research goals answer to the public. It’s not exactly a welcome thought to imagine more and more of our presence and activity in space being ceded, with NASA’s help, to private industry. What should happen instead? Commercial space mining and science would both be served well by decoupling from each other. We should treat outer space like we do Antarctica. That icy landscape is humankind’s common heritage, where we encourage scientific investigations and conservation and forbid territorial claims. If some organizations want to mine asteroids, then we should take the time to develop and establish an international framework to regulate it properly. Space-mining is an exciting opportunity to articulate our species’ role in our little galactic fragment. But it’s not just about sustainably managing limited or dwindling resources. It’s about our interactions with the nature beyond our humble world. We should explore the solar system as its steward without repeating our economically rapacious past

#### Asteroid mining solves rare earth mineral shortages, resource conflicts, and toxic waste

Kevin MacWhorter 16, J.D. Candidate, William & Mary Law School, "Sustainable Mining: Incentivizing Asteroid Mining in the Name of Environmentalism", William & Mary Environmental Law and Policy Review, Vol 40, Issue 2, Article 11, https://scholarship.law.wm.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1653&context=wmelpr

A. Rare Element Mining on Earth

In the next sixty years, scientists predict that certain elements crucial to modern industry such as platinum, zinc, copper, phosphorous, lead, gold, and indium could be exhausted on Earth. 12 Many of these have no synthetic alternative, unlike chemical elements such as oil or diamonds.13 Liquid-crystal display (LCD) televisions, cellphones, and laptops are among the various consumer technologies that use precious metals.14Further, green technologies including wind turbines, solar panels, and catalytic converters require these rare elements. 15 As demand rises for both types of technologies, and as reserves of rare metals fall, prices skyrocket.16 Demand for nonrenewable resources creates conflict, and consumerism in rich countries results in harsh labor treatment for poorer countries.17

In general, the mining industry is extremely destructive to Earth’s environment.18 In fact, depending on the method employed, mining can destroy entire ecosystems by polluting water sources and contributing to deforestation.19 It is by its nature an unsustainable practice, because it involves the extraction of a finite and non-renewable resource.20 Moreover, by extracting tiny amounts of metals from relatively large quantities of ore, the mining industry contributes the largest portion of solid wastes in the world.21 The Environmental Protection Agency (EPA) describes the industry as the source of more toxic and hazardous waste than any other industrial sector [in the United States], costing billions of dollars to address the public health and environmental threats to communities. 22 Poor regulations and oxymoronic corporate definitions of sustainability, however, make it unclear as to just how much waste the industry actually produces.23

Platinum provides an excellent case study of the issue, because it is an extremely rare and expensive metal—an ore expected to exist in vast quantities in asteroids.24 Further, production of platinum has increased sharply in the past sixty years in order to keep up with growing demand for use in new technologies.25 In fact, despite their high costs, platinum group metals are so useful that [one] of [four] industrial goods on Earth require them in production. 26 Scholars do not expect demand to slow any time soon.27 Among other technologies, industries use platinum in products such as catalytic converters, jewelry production, various catalysts for chemical processing, and hydrogen fuel cells.28 While there is no consensus on how far the Earth’s reserves of platinum will take humanity, many scientists agree that platinum ore reserves will deplete in a relatively short amount of time.29

With the rate of mining at an all-time high,30 it is increasingly clear that historical patterns of mineral resources and development cannot simply be assumed to continue unaltered into the future. 31 The platinum mining industry, however, has a strong incentive to increase its rate of extraction as profits grow with the rate of demand. Without any alternative, this destructive practice will continue into the future.32

So-called platinum-group metal (PGM) ores are mined through underground or open cut techniques.33 Due to these practices, all but a very small fraction of the mined platinum ore is disposed of as solid waste.34 The environmental consequences of platinum production are thus quite significant, but like the mining industry in general, the amount of waste is typically under-reported.35

While this is due to high production levels at the moment, those levels will only increase given the estimated future demand of platinum.36 In spite of the negative consequences, mining continues unabated because it is economically important to many areas.37 The future environmental costs provide a major challenge in creating a sustainable system. Relegating at least some mining companies to near-Earth asteroids would reduce the negative effects of future mining levels on Earth. The economic benefits of mining need not be sacrificed for the sake of the environment.38

#### Mineral shortages prevent the transition to clean energy needed to solve warming

Nafeez Ahmed 18, DPhil in international relations from the School of Global Studies at Sussex University, an investigative journalist and international security scholar, Dec 12 2018, "We Don't Mine Enough Rare Earth Metals to Replace Fossil Fuels With Renewable Energy", Vice, https://www.vice.com/en\_us/article/a3mavb/we-dont-mine-enough-rare-earth-metals-to-replace-fossil-fuels-with-renewable-energy

A new scientific study supported by the Dutch Ministry of Infrastructure warns that the renewable energy industry could be about to face a fundamental obstacle: shortages in the supply of rare metals.

To meet greenhouse gas emission reduction targets under the Paris Agreement, renewable energy production has to scale up fast. This means that global production of several rare earth minerals used in solar panels and wind turbines—especially neodymium, terbium, indium, dysprosium, and praseodymium—must grow twelvefold by 2050.

But according to the new study by Dutch energy systems company Metabolic, the “current global supply of several critical metals is insufficient to transition to a renewable energy system.”

The study focuses on demand for rare metals in the Netherlands and extrapolates this to develop a picture of how global trends are likely to develop.

“If the rest of the world would develop renewable electricity capacity at a comparable pace with the Netherlands, a considerable shortage would arise,” the study finds. This doesn’t include other applications of rare earth metals in other electronics industries (rare earth metals are widely used in smartphones, for example). “When other applications (such as electric vehicles) are also taken into consideration, the required amount of certain metals would further increase.”

Demand for rare metals is pitched to rise exponentially across the world, and not just due to renewables. Demand is most evident in “consumer electronics, military applications, and other technical equipment in industrial applications. The growth of the global middle class from 1 billion to 3 billion people will only further accelerate this growth.”

But the study did not account for those other industries. This means the actual problem could be far more intractable. In 2017, a study in Nature found that a range of minerals essential for smartphones, laptops, electric cars and even copper wiring could face supply shortages in coming decades.

#### Warming causes extinction

Peter Kareiva 18, Ph.D. in ecology and applied mathematics from Cornell University, director of the Institute of the Environment and Sustainability at UCLA, Pritzker Distinguished Professor in Environment & Sustainability at UCLA, et al., September 2018, “Existential risk due to ecosystem collapse: Nature strikes back,” Futures, Vol. 102, p. 39-50

In summary, six of the nine proposed planetary boundaries (phosphorous, nitrogen, biodiversity, land use, atmospheric aerosol loading, and chemical pollution) are unlikely to be associated with existential risks. They all correspond to a degraded environment, but in our assessment do not represent existential risks. However, the three remaining boundaries (climate change, global freshwater cycle, and ocean acidification) do pose existential risks. This is because of intrinsic positive feedback loops, substantial lag times between system change and experiencing the consequences of that change, and the fact these different boundaries interact with one another in ways that yield surprises. In addition, climate, freshwater, and ocean acidification are all directly connected to the provision of food and water, and shortages of food and water can create conflict and social unrest.

Climate change has a long history of disrupting civilizations and sometimes precipitating the collapse of cultures or mass emigrations (McMichael, 2017). For example, the 12th century drought in the North American Southwest is held responsible for the collapse of the Anasazi pueblo culture. More recently, the infamous potato famine of 1846–1849 and the large migration of Irish to the U.S. can be traced to a combination of factors, one of which was climate. Specifically, 1846 was an unusually warm and moist year in Ireland, providing the climatic conditions favorable to the fungus that caused the potato blight. As is so often the case, poor government had a role as well—as the British government forbade the import of grains from outside Britain (imports that could have helped to redress the ravaged potato yields).

Climate change intersects with freshwater resources because it is expected to exacerbate drought and water scarcity, as well as flooding. Climate change can even impair water quality because it is associated with heavy rains that overwhelm sewage treatment facilities, or because it results in higher concentrations of pollutants in groundwater as a result of enhanced evaporation and reduced groundwater recharge. Ample clean water is not a luxury—it is essential for human survival. Consequently, cities, regions and nations that lack clean freshwater are vulnerable to social disruption and disease.

Finally, ocean acidification is linked to climate change because it is driven by CO2 emissions just as global warming is. With close to 20% of the world’s protein coming from oceans (FAO, 2016), the potential for severe impacts due to acidification is obvious. Less obvious, but perhaps more insidious, is the interaction between climate change and the loss of oyster and coral reefs due to acidification. Acidification is known to interfere with oyster reef building and coral reefs. Climate change also increases storm frequency and severity. Coral reefs and oyster reefs provide protection from storm surge because they reduce wave energy (Spalding et al., 2014). If these reefs are lost due to acidification at the same time as storms become more severe and sea level rises, coastal communities will be exposed to unprecedented storm surge—and may be ravaged by recurrent storms.

A key feature of the risk associated with climate change is that mean annual temperature and mean annual rainfall are not the variables of interest. Rather it is extreme episodic events that place nations and entire regions of the world at risk. These extreme events are by definition “rare” (once every hundred years), and changes in their likelihood are challenging to detect because of their rarity, but are exactly the manifestations of climate change that we must get better at anticipating (Diffenbaugh et al., 2017). Society will have a hard time responding to shorter intervals between rare extreme events because in the lifespan of an individual human, a person might experience as few as two or three extreme events. How likely is it that you would notice a change in the interval between events that are separated by decades, especially given that the interval is not regular but varies stochastically? A concrete example of this dilemma can be found in the past and expected future changes in storm-related flooding of New York City. The highly disruptive flooding of New York City associated with Hurricane Sandy represented a flood height that occurred once every 500 years in the 18th century, and that occurs now once every 25 years, but is expected to occur once every 5 years by 2050 (Garner et al., 2017). This change in frequency of extreme floods has profound implications for the measures New York City should take to protect its infrastructure and its population, yet because of the stochastic nature of such events, this shift in flood frequency is an elevated risk that will go unnoticed by most people.

4. The combination of positive feedback loops and societal inertia is fertile ground for global environmental catastrophes

Humans are remarkably ingenious, and have adapted to crises throughout their history. Our doom has been repeatedly predicted, only to be averted by innovation (Ridley, 2011). However, the many stories of human ingenuity successfully addressing existential risks such as global famine or extreme air pollution represent environmental challenges that are largely linear, have immediate consequences, and operate without positive feedbacks. For example, the fact that food is in short supply does not increase the rate at which humans consume food—thereby increasing the shortage. Similarly, massive air pollution episodes such as the London fog of 1952 that killed 12,000 people did not make future air pollution events more likely. In fact it was just the opposite—the London fog sent such a clear message that Britain quickly enacted pollution control measures (Stradling, 2016). Food shortages, air pollution, water pollution, etc. send immediate signals to society of harm, which then trigger a negative feedback of society seeking to reduce the harm.

In contrast, today’s great environmental crisis of climate change may cause some harm but there are generally long time delays between rising CO2 concentrations and damage to humans. The consequence of these delays are an absence of urgency; thus although 70% of Americans believe global warming is happening, only 40% think it will harm them (http://climatecommunication.yale.edu/visualizations-data/ycom-us-2016/). Secondly, unlike past environmental challenges, the Earth’s climate system is rife with positive feedback loops. In particular, as CO2 increases and the climate warms, that very warming can cause more CO2 release which further increases global warming, and then more CO2, and so on. Table 2 summarizes the best documented positive feedback loops for the Earth’s climate system. These feedbacks can be neatly categorized into carbon cycle, biogeochemical, biogeophysical, cloud, ice-albedo, and water vapor feedbacks. As important as it is to understand these feedbacks individually, it is even more essential to study the interactive nature of these feedbacks. Modeling studies show that when interactions among feedback loops are included, uncertainty increases dramatically and there is a heightened potential for perturbations to be magnified (e.g., Cox, Betts, Jones, Spall, & Totterdell, 2000; Hajima, Tachiiri, Ito, & Kawamiya, 2014; Knutti & Rugenstein, 2015; Rosenfeld, Sherwood, Wood, & Donner, 2014). This produces a wide range of future scenarios.

Positive feedbacks in the carbon cycle involves the enhancement of future carbon contributions to the atmosphere due to some initial increase in atmospheric CO2. This happens because as CO2 accumulates, it reduces the efficiency in which oceans and terrestrial ecosystems sequester carbon, which in return feeds back to exacerbate climate change (Friedlingstein et al., 2001). Warming can also increase the rate at which organic matter decays and carbon is released into the atmosphere, thereby causing more warming (Melillo et al., 2017). Increases in food shortages and lack of water is also of major concern when biogeophysical feedback mechanisms perpetuate drought conditions. The underlying mechanism here is that losses in vegetation increases the surface albedo, which suppresses rainfall, and thus enhances future vegetation loss and more suppression of rainfall—thereby initiating or prolonging a drought (Chamey, Stone, & Quirk, 1975). To top it off, overgrazing depletes the soil, leading to augmented vegetation loss (Anderies, Janssen, & Walker, 2002).

Climate change often also increases the risk of forest fires, as a result of higher temperatures and persistent drought conditions. The expectation is that forest fires will become more frequent and severe with climate warming and drought (Scholze, Knorr, Arnell, & Prentice, 2006), a trend for which we have already seen evidence (Allen et al., 2010). Tragically, the increased severity and risk of Southern California wildfires recently predicted by climate scientists (Jin et al., 2015), was realized in December 2017, with the largest fire in the history of California (the “Thomas fire” that burned 282,000 acres, https://www.vox.com/2017/12/27/16822180/thomas-fire-california-largest-wildfire). This catastrophic fire embodies the sorts of positive feedbacks and interacting factors that could catch humanity off-guard and produce a true apocalyptic event. Record-breaking rains produced an extraordinary flush of new vegetation, that then dried out as record heat waves and dry conditions took hold, coupled with stronger than normal winds, and ignition. Of course the record-fire released CO2 into the atmosphere, thereby contributing to future warming.

Out of all types of feedbacks, water vapor and the ice-albedo feedbacks are the most clearly understood mechanisms. Losses in reflective snow and ice cover drive up surface temperatures, leading to even more melting of snow and ice cover—this is known as the ice-albedo feedback (Curry, Schramm, & Ebert, 1995). As snow and ice continue to melt at a more rapid pace, millions of people may be displaced by flooding risks as a consequence of sea level rise near coastal communities (Biermann & Boas, 2010; Myers, 2002; Nicholls et al., 2011). The water vapor feedback operates when warmer atmospheric conditions strengthen the saturation vapor pressure, which creates a warming effect given water vapor’s strong greenhouse gas properties (Manabe & Wetherald, 1967).

Global warming tends to increase cloud formation because warmer temperatures lead to more evaporation of water into the atmosphere, and warmer temperature also allows the atmosphere to hold more water. The key question is whether this increase in clouds associated with global warming will result in a positive feedback loop (more warming) or a negative feedback loop (less warming). For decades, scientists have sought to answer this question and understand the net role clouds play in future climate projections (Schneider et al., 2017). Clouds are complex because they both have a cooling (reflecting incoming solar radiation) and warming (absorbing incoming solar radiation) effect (Lashof, DeAngelo, Saleska, & Harte, 1997). The type of cloud, altitude, and optical properties combine to determine how these countervailing effects balance out. Although still under debate, it appears that in most circumstances the cloud feedback is likely positive (Boucher et al., 2013). For example, models and observations show that increasing greenhouse gas concentrations reduces the low-level cloud fraction in the Northeast Pacific at decadal time scales. This then has a positive feedback effect and enhances climate warming since less solar radiation is reflected by the atmosphere (Clement, Burgman, & Norris, 2009).

The key lesson from the long list of potentially positive feedbacks and their interactions is that runaway climate change, and runaway perturbations have to be taken as a serious possibility. Table 2 is just a snapshot of the type of feedbacks that have been identified (see Supplementary material for a more thorough explanation of positive feedback loops). However, this list is not exhaustive and the possibility of undiscovered positive feedbacks portends even greater existential risks. The many environmental crises humankind has previously averted (famine, ozone depletion, London fog, water pollution, etc.) were averted because of political will based on solid scientific understanding. We cannot count on complete scientific understanding when it comes to positive feedback loops and climate change.

#### Conflicts coming over water scarcity---extinction

Daniel Darling 19, senior international military markets analyst at Forecast International Incorporated, an aerospace and defense consulting firm located in Newtown, Connecticut, where he covers the Europe and Asia-Pacific markets, “The Coming Wars over Water,” The National Interest, 4/14/19, https://nationalinterest.org/blog/buzz/coming-wars-over-water-52147

But another looming issue confronting global leaders involves the earth’s most precious resource: water.

In many regions of the globe—from Northern Africa to the Middle East to Central and South Asia—efforts to manage internal freshwater supplies or conserve transboundary water agreements are under strain as scarcity rises in parallel with population growth, consumption and warming temperatures.

A World Bank study on the global water picture in 2016 noted that entire regions may see their gross domestic product decline by up to 6 percent by 2050 due to water-related losses in agriculture, health, income and property. The areas highlighted consist of many of the world’s largest population concentrations, regions with developing economies, intensive and unsustainable agricultural practices and high occurrences of drought.

Dam-building and its downstream effects across national borders—as in the case of Ethiopia’s Grand Ethiopian Renaissance Dam and China’s water diversion project from the Yarlung Tsangpo River in southern Tibet—threaten to escalate tensions or redefine national claims over disputed regions.

Such disputes could mushroom across the globe in the face of broader demographic and resource shifts.

According to the Pacific Institute’s water conflict chronology database, eighteen water-related incidents occurred in 2018 alone, ranging from violence erupting at protests over water management to outright fighting between competing communities over access to water and herding rights.

These incidents appear destined to become more a norm than an outlier as water resources are consumed faster than rainfall replenishment in some areas and limitations exacerbate longstanding tensions, be they ethnic, tribal or national-based. Delicate tradeoff systems between nations located upstream and downstream of major rivers threaten to be undone by disruptions, as in the case of Central Asian countries sharing parts of the Fergana Valley.

In addition, scarcity issues may create internal security pressures by leading to radicalization amongst vulnerable population sectors.

With water a vital and finite resource, the world’s industrialized nations are naturally protective of local supply and place a premium on water security in instances where water flows across shared borders. When mixed with political disputes or rivalries, resource pressures may act as a catalyst for armed conflict.

Wars over water resources are not without precedent. The Six-Day War of 1967, for instance, was in part an Israeli military response to a Syrian attempt to dam the Yarmuk River, a tributary of the Jordan River, a crucial water source for Israel.

Another potential flashpoint exists in one of the world’s most tense arenas: the border between India and Pakistan. There the potential repudiation of a water-sharing agreement brokered by the World Bank in 1960, the Indus Waters Treaty, would serve to further damage relations between Pakistan and India, potentially sending the two rivals spiraling into a conflict that might draw in other nations.

The treaty remains in place despite two wars conducted over that time between the neighboring rivals. This is a credit to the cornerstone of the agreement: the rational self-interest of both signatories. With water at a premium for both, any war over it would threaten the supply of each actor, thus ostensibly negating the pretense for armed conflict.

But with Pakistan facing declining water availability and blaming its situation on India's “water terrorism,” the potential for crisis increases.

India, which plans for a presumptive “collusive threat” on both its northeast and northwest borders from China and Pakistan, must tread carefully in order to avoid reciprocity from Beijing should the latter turn its back on water rationality. While India holds an upstream riparian advantage over Pakistan in regards to the Sutlej, Beas and Ravi Rivers, so too does China as it relates to major rivers flowing into India from Tibet.

Considering Pakistan’s water vulnerability—which involves exploding population growth, poor water utilization and infrastructure maintenance, and unsustainable usage patterns—any threat by India to abrogate the treaty or maximize its use of water from any of the rivers covered under the IWT would be seen by Islamabad as tantamount to an act of war.

Factor in Pakistan’s strategic alignment with China and any outbreak of conflict might draw Beijing into the scrum, thereby resulting in India confronting the two-front war its planners most fear. Under this scenario, in which three nuclear-armed nations conduct military operations at some level of intensity, the rest of the world would be left scrambling to mediate the crisis at zero hour.

### 1AC – Solvency

#### Plan: States ought to apply the principles of the Public Trust Doctrine to outer space as well as the limited use of private property management claims

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* CPR = common pool resource
* Outlines normal means

The PTD offers both an approach for managing an open access commons and a gap-filling tool until a regulatory regime is adopted.507 The doctrine is based on the idea that the “sovereign holds certain common properties in trust in perpetuity for the free and unimpeded use of the general public.”508 The public’s right to access and use trust resources is never lost, and neither the government nor private individuals can alienate or otherwise adversely affect those resources unless for a comparable public purpose.509 The resources the doctrine protects “have long been part of a ‘taxonomy of property’ [that recognizes] the division of natural wealth into private and public property.”510 “The doctrine places on governments ‘an affirmative, ongoing duty to safeguard the long-term preservation of those resources for the benefit of the general public,’”511 thus limiting the sovereign’s power on behalf of both present and future individuals.512 It directs the government to manage trust resources for public benefit, not private gain.513 It applies to private as well as public resources and is used to preserve the public’s access to CPRs.514 Government agencies have the non-rescindable power to revoke uses of trust resources that are inconsistent with the doctrine.515 This effectively places a permanent easement over trust resources that burdens their ownership with an overriding public interest in the preservation of those resources.516 However, trust resources can be alienated in favor of private ownership, if the alienation will still serve the public’s interest in those resources and not interfere with trust uses of the remaining land.517 The PTD, therefore, protects the “people’s common heritage,”518 just as Article 11 of the Moon Treaty protects outer space as part of the common heritage of mankind.519 The doctrine also appears to be infinitely malleable. Original uses of the doctrine were restricted to only that “aspect of the public domain below the low-water mark on the margin of the sea and the great lakes, the waters over those lands, and the waters within rivers and streams of any consequence,”520 and covered only traditional uses of those lands, like fishing and navigation.521 Over time, the scope and application of the doctrine broadened to protect more public resources and different uses.522 Thus, the doctrine expanded to protect new trust resources, such as dry sand beaches, inland lakes, groundwater, dry riverbeds, and wildlife,523 and passive uses of those resources, like scientific study.524 The original link to navigable water and tidelands disappeared.525 Supporters of the doctrine successfully advocated that it be applied to “wildlife, parks, cemeteries, and even works of fine art,”526 while arguing more recently its application to the atmosphere.527 A doctrine that imposes a perpetual duty on the sovereign to preserve trust resources, prevents their alienation for private benefit, assures public access to them, and can be invoked by anyone seems particularly useful as a management tool in outer space.528 The fact that public access to trust resources is so central to the doctrine makes it reflective, not contradictory, of international space law’s bar against appropriation of outer space and of the principle of space being the “province of all mankind.”529 It avoids the problems of alienation and exclusion associated with any of the management approaches associated with some form of private property and requires neither the creation of a new administrative authority nor the presence of a close-knit group of like-minded people.530 Members of the public, both rich and poor, can invoke and enforce the doctrine as easily as the sovereign.531 It is cost effective to the extent that no separate apparatus is required to implement it, and the doctrine has shown itself to be highly adaptable and innovative as different needs arise.532 It could also fill the gap in international law with respect to managing celestial property. Therefore, of all the management approaches studied here, the PTD seems the most suited to keep order in space until a regulatory regime is imposed. However, the doctrine provides no incentives for development of trust resources; rather, it might be used to limit or curtail that development, making it an imperfect, perhaps even counter-productive solution by itself to the extent that such development might be beneficial.533 Modifying the doctrine to allow limited use of private property management approaches, like tradable development claims, might buffer that effect—a form of overlapping hybridity between one type of property, a commons, and a management regime from another, private property, enabled by application of the PTD.

#### The plan is the only sustainable solution that’s consistent with international law and allows for private development of resources

Babcock 19 [Hope M. Babcock, Professor Babcock served as general counsel to the National Audubon Society from 1987-91 and as deputy general counsel and Director of Audubon’s Public Lands and Water Program from 1981-87. Previously, she was a partner with Blum, Nash & Railsback, where she focused on energy and environmental issues, and an associate at LeBoeuf, Lamb, Leiby & MacRae where she represented utilities in the nuclear licensing process. From 1977-79, she served as a Deputy Assistant Secretary of Energy and Minerals in the U.S. Department of the Interior. Professor Babcock has taught environmental and natural resources law as a visiting professor at Pace University Law School and as an adjunct at the University of Pennsylvania, Yale, Catholic University, and Antioch law schools. Professor Babcock was a member of the Standing Committee on Environmental Law of the American Bar Association, and served on the Clinton-Gore Transition Team, 2019, Syracuse Law Review, https://scholarship.law.georgetown.edu/facpub/2201] simha

“Only a legal system that accommodates both the human need for resources and the necessary preservation of mankind’s common heritage can fulfill these criteria.”534 The future is now with regard to the development of outer space and its resources—it is no longer a question of whether humans will engage in these activities, but how soon they will. Technically advanced countries and private commercial enterprises are probing outer space and preparing for landing on an asteroid or the moon to extract their resources.535 Speculators are selling deeds to the moon’s surface and preparing to exploit the tourism potential that space offers.536 But, the legal framework for managing these initiatives is almost nonexistent.537 International treaties came into being before all this activity began in earnest and national laws that might apply are stunted by jurisdictional quandaries like the absence of national boundaries in outer space.538 Thus, there is an urgency to figure out how to control what happens in outer space before its resources are irreparably damaged or permanently monopolized by powerful countries and individuals. In the absence of regulation, much of the current debate centers on what property regime should be applied in outer space.539 The assumption is that by only allowing private property rights in space, countries and commercial enterprises will undertake the risks and costs of space development.540 However, unless international space law changes, it may prevent this from happening. If it changes, strong management controls will be necessary to prevent destruction or over-consumption of celestial resources, as well as monopolization and competitive behavior by participants, which could lead to hostilities and inequities. This Article examines various private property regimes, including those of less than full fee ownership, to see if any would avoid the conflict with the international prohibition on appropriation of outer space and its resources. It concludes that none will because each retains the right to exclude and each is insensitive to the treaties’ equity concerns. In contrast, considering outer space to be common is consistent with international space law in both respects. Hypothesizing that private property in outer space may yet prevail, this Article investigates different private property management approaches, such as the right of first possession, lotteries, and tradable development rights, to see if any would be cost effective, easy to implement and equitable, and would also prevent over-consumption, monopolization or the slide into rivalrous behavior. The Article concludes that each comes up short in some respect. Social norms as a management tool for property held in common, although compliant with international law, are also not up to the task. Instead, although ancient, the PTD, with its malleability, easy and cost-effective implementation and enforcement, non-consumption principle, and consistency with the goals that animate international space treaties, seems best suited to the task of protecting the public’s interests in the global commons that is outer space as it has done for centuries in Earth-bound commons. But, as its principal terrestrial use has been to protect trust resources from development, the doctrine needs some modification to encourage development of celestial resources. Hence, this Article suggests that modifying the PTD to allow the application of private property management tools, like tradable development rights, will not only allow development, but also will assure that when it happens, it will not be just profitable for a few, but will also be sustainable and equitable.

### 1AC – Norming

#### Advantage 2 is Norming:

#### Private business activity runs counter to basic international space law and poses a threat to legal norms

Paliouras 14 [ZACHOS A. PALIOURAS, National & Kapodistrian University of Athens, International Law, Alumnus, 2014, The Non-Appropriation Principle: The Grundnorm of International Space Law, Leiden Journal of International Law, 27, pp 37-54 doi:10.1017/S0922156513000630] simha

* lato sensu = generally
* res communis omnium = common heritage of humankind
* corpus juris spatialis = the body of space law
* grundnorm = basic law

The preceding paragraphs have hopefully contributed to a more concise understanding of the non-appropriation principle envisaged in Article II of the Outer Space Treaty. This article has attempted to clarify that outer space lato sensu has always been a res communis omnium and therefore it has never been subject to occupation or any other mode of territory acquisition under general public international law. It has been also submitted that the prohibition of the exercise of territorial sovereignty in outer space does not impair the exercise of states’ other inherent sovereign rights thereto. Further, this article purported to stress that the reaffirmation of the status of outer space by the corpus juris spatialis and its standing as customary international law are of critical importance primarily because of the fact that the non-appropriation principle, which constitutes the cardinal norm in international space law, is the cornerstone of the whole legal architecture of the norms that govern the activities of states and thus of private individuals in outer space. It has to be borne in mind that the contractual recognition of the fact that outer space is unsusceptible to national or private appropriation allowed the orderly development of space activities for more than forty years and has effectively prevented a colonial race in the high frontier. With due regard to this belief, the preceding paragraphs addressed the Bogota Declaration as the most severe of the few instances ` where the non-appropriation principle was defied, notwithstanding that the private sector, especially in the United States, has been increasingly involving itself in business projects that pose a direct threat to the Grundnorm of international space law. In this respect, the activities of private entities are well known and due to the lack of adequate space have not been addressed in this article. Moreover, the increasing number of claims raised by private individuals on celestial bodies, including the Sun, must not go unnoticed. Accordingly, the initiatives undertaken by the International Law Association and the International Institute of Space Law in defence of the non-appropriation principle deserve high praise. It is hoped that efforts to increase awareness of the precise legal status of the vast territories of outer space make some contribution not only to scholarly debates but also to the ever-increasing practice of states that long ago have ceased to be constrained by our planet’s gravitational field.

#### Breakdown of the non-appropriation principle risks war and prevents economic harmonization – multilateral action key

Tronchetti 07 [Fabio Tronchetti, Dr. Tronchetti holds a PhD in International Law (Leiden University), an Advanced LL.M in International Relations (Bologna University, Italy) and studied at the University of Cambridge, England (UK). He is the co-recipient of the 2015 International Academic of Astronautics Social Science Book Award for the best book of 2015 in the field of social science for the book “Handbook of Space Law”, co/authored with Prof. Frans von der Dunk, 2007, “THE NON-APPROPRIATION PRINCIPLE UNDER ATTACK: USING ARTICLE II OF THE OUTER SPACE TREATY IN ITS DEFENCE”, https://iislweb.org/docs/Diederiks2007.pdf] simha

4) The abrogation of the non-appropriation principle will generate the collapse of the system of space law

If the non-appropriation principle was removed, it is very likely that the system of space law as we have know it so far would cease to exist. In a future space scenario without the presence of the non-appropriation principle, conflicting claims among States would arise. This situation would engender international tension and increase the risk for armed conflict in outer space. Moreover, as soon as a State was able to gain control over an area of a celestial body, there would be nothing to prevent such a State to impose taxes and royalties for the acquisition of rights by private operators to use such area and its resources. As indicated by Sters and Tennen, in a similar scenario the costs for utilizing space resources and for carrying out exploitative missions would increase36. Therefore, the abrogation of the nonappropriation principle would prevent instead of favour, as it is suggested by some, the commercial development of outer space. Additionally, if States were allowed to acquire sovereignty rights over parts of outer space, obviously they would pursue their own purposes and interests. Thus, the idea that the exploration and use of outer space is the “province of all mankind” would lose its relevance.

5) Special responsibility and consequences for the violation of the non-appropriation principle

As we have just seen, if the non-appropriation principle was removed, the risk for an armed conflict in outer space would be high. Therefore, States have a special duty to act in conformity with such principle. But what if a State should suddenly decide to violate such principle and to appropriate one part of outer space? What would be the legal consequences of such behaviour? Considering the fact that Article III of the OST makes international law, including the Charter of the United Nations, applicable to the exploration and use of outer space and having in mind that Article I (1) of the UN Charter lays down the obligation to maintain peace and security, and to prevent or remove threats to peace, the individual violation by a State of the principle contained in Article II of the OST should be considered a threat to international peace. Such a State should be seen as responsible for an act of particular gravity towards the whole community of States. Therefore, in a similar situation the other States would be entitled to act collectively through the United Nations to stop such behaviour and to remove this threat to peace. A joint effort and pressure in that direction should be likely to restore the status quo ante. The argument could be put forward that if a State should decide to withdraw from the Outer Space Treaty, it would be no longer bound by the provisions of Article II and thus it could appropriate parts of outer space. This argument should be rejected on the basis that even after that withdrawal, such a State would be obliged to respect the non-appropriation 9 principle in consideration of its structural and special status.

CONCLUSION

The non-appropriation principle represents the basic principle of space law. Considering its importance and its role in providing the conditions for the peaceful and orderly management and development of space activities, this paper has put forward the hypothesis of considering that principle a structural rule of international law. As it has been shown, there exist several historical and modern examples which confirm the peculiar status of the principle contained in Article II of the Outer Space Treaty. Having in mind the special characteristics of the non-appropriation principle, the theories proposing its abrogation or suggesting unilateral State actions against it are unacceptable. If these theories were put into practice, the use of outer space would evolve into a situation of chaos and, moreover, its commercial development would be hindered instead of favoured. Any hypothetical amendment of the nonappropriation principle should be carried out by all States acting collectively. This would be the only option to prevent the risk of war in outer space and to allow the harmonized management of space activities in the era of space commercialisation.

#### It’s possible to establish people’s common heritage as customary international law

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* CHM = common heritage of mankind\*
* Opinio juris is established when States believe international law compels them

Relevance of common heritage of mankind

The Moon contains resources of value in Helium-3, water, and other rare Earth minerals.64 These resources are potentially capable of solving Earth’s problems of energy production, potable water, as well as increasing production rates for various technologies. While presently, it cannot be stated that resource mining on the Moon is the answer to the resource crisis on Earth, the fact of the crisis on Earth suggests that an attempt to further clarify its feasibility is important. Further, the concept of lunar mining will become more feasible over time due to lower costs of exploration, advances in technology for lunar mining, and better characterization on the minerals found on the Moon.65 There are multiple considerations while undertaking lunar activities, such as mining. Key ones include the economic feasibility of the venture, environmental damage caused to the Moon, and changes in the physical nature of the Moon where a lessening of lunar mass due to resource extraction affects tides on Earth. Another important concern is the legal implications of space mining and whether the current regime allows private parties to undertake these ventures. Various developing countries argue that there exists a moratorium on exploitation of resources on the Moon based on the moratorium imposed in Antarctica, as well as the high seas. To add, a proposal by developing states to allow for exploration of resources only for experimental purposes was advanced.66Though, this was rejected by most states. The developed states argued that there exists no moratorium against mining on the Moon since it is not expressly provided for in the Moon Agreement and it was not discussed during the drafting history.

Customary nature of common heritage of mankind

Although CHM is enshrined in the Moon Agreement, there exist only 18 state parties67 with none of the major spacefaring states being a part, though France and India as space powers are signatories. Under Article 38 of the Statute of ICJ, the first two sources of law are deemed to be treaty law and customary international law.68 Since there are only 18 state parties to the Moon Agreement, it is not universal as treaty law under Article 38(1)(a) Statue of the International Court of Justice. An argument that is premised on provisions being custom is necessary only if the treaty itself is not easily applicable as treaty law. Here, since very few states are party to the Moon Agreement, it cannot be widely applicable as treaty law. By extension, the CHM principle in the Moon Agreement cannot be deemed to be the governing law to understand the status of the Moon. Scholars recognize the non-applicability of the Moon Agreement on a universal scale and put forth arguments regarding the applicability of CHM as general principles of law,69 jus cogen, 70 or that of a political nature.71 At the same time, some scholars support in the international legal spectrum that the CHM principle is customary international law.72 This argument regarding the customary status of CHM is premised on the universal acceptance of UNCLOS and the unanimous acceptance of the UN General Assembly. It is argued that since no state had any objections to the General Assembly Resolution on Declaration of Principles, and over 114 states adopted the Resolution, they showed their willingness to be bound by the concept. Given the acceptance of UNCLOS, which contains the CHM Principle, the CHM principle itself is of opinion juris. 73 Nevertheless, this argument does not find credit with scholars from developed states owing to various persistent objectors to the concept of CHM applicable to the Moon and other celestial bodies.74 Additionally, General Assembly Resolutions are not considered binding upon states and are only recommendatory in nature. Further, a principle that is enshrined in a treaty that failed to garner acceptance in the international community is not evidence that the principle is afforded a customary status in international law.

#### Only strong space norms can solve space war and militarization --- malleable laws are key in outer space

Hart 21 [Amalyah Hart, Amalyah Hart is a science journalist based in Melbourne, 11-19-2021, "Do we need new space law to prevent space war", Cosmos Magazine, https://cosmosmagazine.com/people/society/space-law-to-prevent-space-war/] simha

The week before last, a UN panel approved the creation of a working group to discuss next-generation laws to prevent the militarisation of space. The move comes as space 2.0 seems to be going into hyper-drive, with countries and corporations racing to claim their stake in the final frontier. It’s timely, as the potential for friction is gathering by the day, with China, India, Russia and the US testing anti-satellite missiles on their own satellites and creating worrisome clouds of debris. This week’s destruction by Russia of its “dead” satellite, Cosmos 1408, underlined the issue. Meanwhile, the orbital space around Earth is becoming jammed with machinery; currently, there are 3,372 active satellites whizzing around Earth, but in one or two decades that number is set to leap to potentially 100,000 or more. And that’s ignoring the space stations, telescopes and spyware already in orbit as countries flex their aerospace muscles. It’s a cosmic fracas. And contested territory is prime fodder for international disputes, as we know. It’s these kinds of disputes the group of UK diplomats who proposed the UN motion want to prevent, by coming to an agreed-upon set of norms for behaviour in space. Space law: what are the issues at stake? The current international framework for law in space is the UN’s 1967 Outer Space Treaty (OST), which sets governing principles for the exploration of space, including that space should be free for use by all nations, that celestial bodies like the Moon should be used exclusively for peaceful purposes, and that outer space should not be subject to national appropriation. Under international law, any and all objects being launched into space must be registered to avoid collisions. On top of these global laws, each nation-state has its own legal framework around the registering and launching of objects into space. But as technology evolves and new opportunities arise, are these old laws equipped to govern new problems? The UN’s 1967 Outer Space Treaty sets governing principles for the exploration of space, including that space should be free for use by all nations. “There exists an incredible amount of applicable law already, and it has served us really well,” says space law expert Steven Freeland, an emeritus professor at Western Sydney University and professorial fellow at Bond University. Freeland is vice-chair of a UN Committee on the Peaceful Uses of Outer Space (COPUOS) working group that is developing laws around the exploitation of resources in space. “There’s a lot of law at the multilateral level that then filters down to other layers of bilateral or ‘minilateral’ agreements and national laws. But clearly things move so quickly with technology, we’re doing so many more things in space that were beyond the contemplation of the drafters of the original treaties. Ideally we need more.” Freeland says there are myriad complex, interconnected issues in space that need tighter laws. These include the increasing militarisation of space; the proliferation of satellites, which can lead to overcrowding of “popular” orbits and increased demand for radio-wave spectra; ethical issues around human spaceflight; and the possible extraction of resources on celestial bodies like the Moon. Resource exploitation It might sound like science fiction, but mining in outer space is looking increasingly likely in the not-too-distant future. In September 2020, NASA announced that it would award contracts to private companies for the extraction and purchase of lunar regolith (rock matter) from the surface of the Moon, which could be mined and then studied in situ by the company, before the data and rights are transferred to the space agency. The move heralds what our space-based future might look like, with private companies mining celestial bodies for their precious resources. In our solar system, composed of millions of celestial bodies both large and small, the opportunities for cashing in look potentially endless – provided technology advances to the level of practical spaceflight. “Most wars on Earth have historically been fought over a quest for resources,” says Freeland, “so it’s incredibly important [to have appropriate space laws].” Just last month, scientists announced the discovery of two extraordinarily metal-rich near-Earth asteroids (NEAs), comprised of roughly 85% metals like iron, nickel and cobalt, which are thought to exceed Earth’s entire known metallic reserves. These three highly valuable metals, often known as the “iron triad”, are particularly critical for the energy supply chain and a renewable energy future; they’re used to build lithium-ion batteries, electrochemical capacitators for storing energy, and nano-catalysts for use in the energy sector. Under the OST, outer-space resources cannot be appropriated by nations, but the law and principle around the commercial use of space resources is less clear. The 1979 Moon Treaty holds that any celestial body is under the jurisdiction of the international community and therefore subject to international law. The treaty outlaws the military use of any celestial body as well as providing a legal framing for the “responsible” exploitation of celestial resources. But, to date, no space-capable nation has ratified the treaty. Militarisation That brings us to the militarisation of space. As technology advances, the potential avenues for weapons that cross the border from terrestrial to cosmic continue to proliferate. So, what laws protect us from a space war? “The issues about security in space have historically been dealt with by the CD, the Conference of Disarmament, but more recently the UK has led discussions at the United Nations that effectively seek to change the diplomatic language and thinking about space security,” says Freeland. Currently, the principles for governing space under the OST forbid the military use of space, but space is already used for military purposes such as surveillance, and some missiles carve a path through outer space on their journeys to their targets. As it currently stands, the only weapons found in space are the TP-82 Cosmonaut survival pistols that Russian astronauts regularly take on board the Soyuz spacecraft, intended to protect them from a potential wild animal attack if they are forced to emergency land in “off-the-map” territory. But as technology proliferates, the opportunities for space-based militarisation also grow. The existing laws were drafted long before many of these technologies were even dreamed up. The most worrisome technologies currently being trialled are anti-satellite missiles. “We have this strategic competition going on amongst the major powers,” says Gilles Doucet, a space security consultant based in Canada who worked for 35 years with the Canadian Department of National Defence. Doucet is both an engineer and an expert in space law. “They all wish to be dominant and make sure that their national security is secured by controlling, or at least not having other people control, outer space.” But what kinds of defence technologies are being developed in space? Doucet says the most worrisome technologies currently being trialled are anti-satellite missiles of the sort that Russia deployed earlier this week. Known as direct-ascent anti-satellite missiles (DA-ASAT), they can destroy satellites in low Earth orbit. “This essentially looks a lot like ballistic missile defence, but it’s happening in outer space against satellites,” he says. In fact, DA-ASAT technology is dependent on the same technology used for midcourse ballistic missile defence – the technology that the US, for example, deploys to defend itself from potential ballistic missile attacks on North America. These missiles fly at altitudes of around 3,000 to 4,000 kilometres, well within the low-Earth orbit many satellites operate in. This technology is being developed and tested by the US, China, India and Russia. “Destroying another country’s satellites would only occur in an armed conflict scenario,” Doucet says. “It would be because the other country’s satellite is providing an important military role – for example, a GPS satellite for directing munitions or an imagery satellite for locating your forces.” Other military applications in space, Doucet says, include the jamming of satellite communications and navigation, as well as interference with some GNSS signals, of which GPS – the satellite navigation system we all use for things like Google Maps – is one. Satellite jamming can have major disruptive potential. “You might be conducting an operation in a conflict – let’s say you wish to target a certain facility. Your missile system or your drone-launching missiles rely on GPS to guide them,” Doucet says. “So if you’re on the other end of it wanting to protect yourself, then you’ll send out jamming signals.” But while these signals can help defend a military target, Doucet says many satellites provide services for military and civilian companies and organisations at once. In this case, jamming a satellite’s signal may also interfere with civilian services it provides, including aircraft and ship navigation, car mapping, even timing signals for financial transactions. This means satellite jamming has major disruptive potential. And there are other areas where satellite technology could have duplicitous or combative potential. “Close proximity operations seem to get countries a bit upset,” says Doucet. Close proximity operations, as the name suggests, involve satellites moving close to other satellites. “One reason might be intelligence or inspection, just to take close images to understand how it’s built. But you may be getting close to intercept signals or to interfere with signals. “So that is a concern, because it’s one thing to get close for passively collecting information, but if you’re close you may also be in a position to interfere.” What might new space law systems look like? “We have a lot of space systems that are dual use, that have the potential to do harm,” Doucet says. “I’d like to see some transparency on the mission, on what you’re doing, to help alleviate concerns. “That might sound like a small step, but to militaries it’s actually a really big step to provide transparency.” Doucet says he’d also like to see clarification of the existing principles for space law already set out in the OST and other treaties. In fact, he’s currently working on the MILAMOS Project, developing a Manual on International Law Applicable to Military Uses of Outer Space at Canada’s McGill University. “I would like to see the existing legal regime being given a bit of life,” he says. “We’ve got tremendously good outer space principles, but over several decades countries have kind of refused to give them life because it’s too controversial. “The third thing I’d like to see is the major space powers sit down and talk. They’re all potentially losers if this keeps going down this path. I don’t think there’s a winner in a space war.” For all these complex problems, Doucet is cautiously optimistic about our chances of avoiding a space war. “I don’t think the issue about space security is as unique as people think,” he says. “Yes, it’s a very unique domain, but the actors are all the same, the interests are all the same. It’s the same people that have struggled over ballistic missile proliferation, nuclear weapons proliferation, treaties about the high seas, about aviation and all kinds of things. “So, we shouldn’t think this is an unsolvable problem. We may take lessons from how we’ve managed to agree to disagree in other areas beyond national jurisdiction.” Freeland agrees that even if international tensions may simmer at home, it’s in the best interest of major global powers to come to agreements about laws in space. “When it comes to these really big issues, particularly issues that have the propensity to go horribly wrong if we follow an irresponsible path, in the end it’s in [governments’] common interest to agree to the rules of the road,” he says. “The important element is that they have had the opportunity to buy in on the framing of those rules.“I think we need to be optimistic. With a great deal of caution, cool heads will prevail.”

#### Space conflicts go nuclear---both fast and probable

Laura Grego 15, a physicist in the Global Security program at UCS. She is an expert in space weapons and security; ballistic missile proliferation, and ballistic missile defense, "Preventing Space War", https://allthingsnuclear.org/lgrego/preventing-space-war

So says a very good New York Times editorial “Preventing a Space War” this week. Sounds right, if X-Wing fighters come to mind when you think space conflict. But in reality conflict in space is both more likely than one would think and less likely to be so photogenic. Space as a locus of conflict The Pentagon has known that space could be a flash point at least since the late 1990s when it began including satellites and space weapons in earnest as part of its wargames. The early games revealed some surprises. For example, attacking an adversary’s ground-based anti-satellite weapons before they were used could be the “trip wire” that starts a war: in the one of the first war games, an attack on an enemy’s ground-based lasers was meant to defuse a potential conflict and protect space assets, but instead was interpreted as an act of war and initiated hostilities. The games also revealed that disrupting space-based communication and information flow or “~~blinding~~” could rapidly escalate a war, eventually leading to nuclear weapon exchange. The war games have continued over the years with increased sophistication, but continue to find that conflicts can rapidly escalate and become global when space weapons are involved, and that even minor opponents can create big problems. The report back from the 2012 game, which included NATO partners, said these insights have become “virtually axiomatic.” Participants in the most recent Schriever war games found that when space weapons were introduced in a regional crisis, it escalated quickly and was difficult to stop from spreading. The compressed timelines, the global as well as dual-use nature of space assets, the difficulty of attribution and seeing what is happening, and the inherent vulnerability of satellites all contribute to this problem. Satellite vulnerability & solutions Satellites are valuable but, at least on an individual basis, physically vulnerable. Vulnerable in that they are relatively fragile, as launch mass is at a premium and so protective armor is too expensive, and a large number of low-earth-orbiting satellites are no farther from the earth’s surface than the distance from Boston to Washington, DC.

#### Commercial space innovation stops extinction

Charles Beames 18, Chairman of the SmallSat Alliance, Executive Chairman of York Space Systems, former Principal Director of Space and Intelligence in the Office of the Undersecretary of Defense for Acquisition, Technology, and Logistics (OUSD(AT&L)), Col. (ret.) in the USAF where he served 23 years in space & intelligence leadership positions around the world, 8/8/18, “Op-ed | SmallSat Alliance is on a path toward a new space horizon,” <https://spacenews.com/op-ed-smallsat-alliance-is-on-a-path-toward-a-new-space-horizon/>

We find ourselves still at the dawn of a new space century, mindful of the victories and setbacks of our past, eager to pass the torch to the next generation of space visionaries, scientists, engineers, and enthusiasts. We look to the future not just to see how much bigger, faster, or higher we can reach, but also how the United States, and specifically the U.S. space community, can again inspire the nations of the world to align with us, as it did in the 20th century.

The SmallSat Alliance is an alliance of companies developing, producing, and operating in all segments of the ‘next generation’ space economy; championing renewed U.S. leadership in the burgeoning commercial space economy, and advocating for the transformation of government-led space capabilities. We are experienced space professionals who have chosen to join with others leveraging our decades of hard-won experience, to develop smarter ways to explore space in the 21st century.

A wonderful outgrowth of the legacy space program is the commercial, entrepreneurial, and job-creating commercial space business that it bequeathed. These next-generation enterprises range from multi-million-dollar startups providing rideshare opportunities or components for small satellites to multi-billion-dollar space data-analytic platforms reinventing urban car service and agricultural production. The early returns of this economic revolution are already on our doorstep: space data capabilities are exponentially growing elements of the 21st century world economy.

Beginning with the dreams and funding by successful tech entrepreneurs, enormous venture investments are already delivering wondrous benefits to the world.

Commercial Space – Profit and Non-Profit

There are really two major categories in the commercial sector, the profit driven and the non-profit. The classic for-profit companies include not only those designing, building, launching, and operating satellites but also the tech sector that is turning that raw space data into gold through machine-learning analytics. Since for-profit companies are no longer dependent upon the revenues generated by the Cold War space race culture of a bygone era, this new generation of space companies is able to more efficiently capitalize on Moore’s Law, the nonstop exponential growth in chip density, and the associated networking technology co-evolving with it. This new generation is building profitable businesses helping to clean up our oceans of garbage and debris with satellite surveillance, reconnoitering to assist in enforcing laws that protect our oceans from illegal, unregulated, unlicensed fishing, something that is rapidly depleting the world’s most valuable and essential lifeforms. It’s leading in the innovative use of low-cost satellite constellations to produce ubiquitous remote-sensing data, enabling small business owners to be more profitable and less wasteful. For example, precise timing signals from space are already optimizing transportation of people, goods, and services, with even further gains anticipated with the introduction of artificial intelligence to assist drivers, perhaps even someday replacing them entirely.

The non-profit sector is the other side of commercial space, concerned more for the general welfare of society, but every bit as integral to this new space enterprise. Much like every century before it in human history, ours is not without its unique challenges, some of which have been a consequence of the last, and all of which the space data domain can be leveraged to help solve. Examples are endless, but one challenge that this new space community is uniquely well-adapted for is to further inform worldwide resource allocation for the 21st century and beyond. These two primary resources are sustainable water and the materials needed for adequate housing for an ever-increasing human population. As cities and urbanization continue to expand, governmental planning challenges such as transportation design optimization for goods and services are only the beginning. Additionally, through using inexpensive remote sensing technologies, some members are designing space data analytics to mitigate human suffering from plagues, contain outbreaks, and combating illegal poaching. Some are connecting with other non-profits to curtail human trafficking for the sex trade or forced labor for migrant debt repayment. Still others are helping non-governmental organizations in their work to expose the use of children as soldiers. Addressing these challenges has little to do with resuscitating dreams conceived by long deceased science-fiction writers and much more to do with turning “swords back into plowshares” to solve real threats to humanity.

Other non-profit initiatives include pursuing an even more foundational understanding of who we are and how to be the best custodians of our environment. Much as exploring and monitoring the world’s oceans has advanced civilization through a better understanding of human life and the planet, so too does exploring and monitoring from space. Low Earth orbit (LEO) provides a unique vantage point to look back on the planet and understand what is happening, anticipate what might happen and prepare for the future. In addition to better understanding Earth, responsible and rapid exploitation of the low Earth orbit domain will enhance the understanding of the solar system and the rest of the universe. Small satellites already offer low-cost platforms to study and explore what lies beyond the Earth. Other members are pioneering the use of zero-carbon, hydrogen-based reusable propulsion systems to ensure we don’t worsen our atmosphere using kerosene-fueled rockets for the coming tsunami of satellite launches. Finally, a mission ensuring the general welfare and planet survival for the next thousand years is finally confronting the existential threat that asteroids and comets pose to humanity. These extra-terrestrial, deep-space threats are passing dangerously close to our planet, and today we have no solar map of them and no defense.

#### Acquiescence to binding norms of global governance catalyzes international regulation of emergent technology---extinction.

Burrows ’16 [Mathew; September 16; Director of the Strategic Foresight Initiative at the Atlantic Council, Ph.D. in European History from Cambridge University; Atlantic Council Strategy Papers, “Global Risks 2035: The Search for a New Normal,” https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/Global\_Risks\_2035\_web\_0922.pdf]

Need for a Second-Generation US and Western Leadership Model

War is not, and should not be, inevitable as the West struggles with the growing clout of China and other developing states on the world stage. Unlike during other transitions, the tools exist for ensuring more peaceful outcomes. They will require Western acquiescence to greater roles for the developing world to set and implement new rules of the road for the international order. A key feature of the post-1945 US design for the world order is its multilateralist structures. Many of these operate below most people’s radar. This plumbing of the international system has enabled the daily functioning of globalization. To keep it viable, China, as well as other developing countries, must be accorded more representation. There are too many long-term risks involved, for example, in China having only the equivalent of France’s voting rights in the IMF, when it is the first or second economic power in the world. This is how resentments are nurtured—all the more dangerous in China’s case because of its underlying “century of humiliation” mental complex. As emerging technologies come online, the lack of a truly global institutional framework could be particularly dangerous. Assuring the future security of the Internet is particularly important in this regard, because all the new emerging technologies—bio, 3D printing, robotics, big data—take for granted a secure, global Internet. Everyone loses if cybercrime and cyber terrorism undermine the Internet. In the worst case scenarios, in which cyber crime proliferates or strong national borders fragment the Internet, an Atlantic Council study, as mentioned, found that the economic costs could be as much as $90 trillion out to 2030, in addition to the risk of open conflict.102 Besides bringing the emerging powers into leadership roles in the panoply of multilateral institutions, the United States will need to temper its often “exemptionalist” stance to ensure the survival of the multilateralist order. According to the Council on Foreign Relations’ Patrick Stewart, a prominent scholar of global governance, one of the persistent paradoxes of the post-1945 decades has been that the “United States is at once the world’s most vocal champion of a rules-based international order and the power most insistent on opting out of the constraints that it hopes to see binding on others.”103 No country has the networks and connections that the United States does, but the system is now polycentric, rather than unipolar, and others resent the “exceptional” privileges that the United States claims. The Global Trends works have talked about the need for a new model of US global leadership. The United States needs to be guiding the international system as a “first among equals,” and willing to play by its own rules. Paradoxically, there is likely to be no vibrant global-governance system without US and Western leadership, but too much domineering behavior could doom it. Even if the United States adapted its global role, this is not to say that the tensions and differences with many emerging powers would all disappear, or that the governance system would function seamlessly. In addition to the growing number of new state actors, the increasing importance of nonstate actors adds a new complexity to the functioning of global institutions. Moreover, there are clear-cut differences between the West and emerging powers on values-based issues, such as democracy promotion and the responsibility to protect. Many developing-country publics still resent Western colonialism and equate any intrusion with past historical wrong. They point to the 2011 humanitarian intervention in Libya, for example, as cover for the Western goal of regime change. Hence, the UN Security Council failure to stop the fighting in Syria, with more than two hundred thousand killed and 7.6 million displaced. Russia and China want to make a stand against the United States and the West getting their way and ousting the Assad regime. On the other hand, the lack of a solution smacks more of anarchy than global governance. Certainly, it shows one of the gaps that remains, and likely will remain, limiting global governance because of differences in values. The speed with which new technologies are coming online and becoming an important political, military, and economic tool—for both good and bad—carries big risks for global governance. Stewart Patrick lists four potential new technologies that “cry out for regulation”: geoengineering, drones, synthetic biology, and nanotechnology. Without some setting of rules for their operation, there is the risk of major disruptions, if not catastrophes, stemming from their abuse. The recent advances in synthetic biology lower the bar to abuse by amateurs and terrorists alike, forever affecting human DNA. Geoengineering involves planetary-scale interventions that could interfere with complex climatic systems. However cumbersome, politically unpopular, and ineffective at times, there is little alternative to increased global cooperation if one does not want to see higher risks of conflict and economic degradation. Without some sort of bolstered global governance, the West would end up with less sovereignty in a “dog-eat-dog” world, in which it was increasingly in the minority. But can the United States and the West rise to the challenge of investing in a global-governance system that will not always favor their interests on every issue? Historically, the United States could be especially generous because it was on top of the world in about everything after the Second World War. Europeans came to truly believe in pooling sovereignty and joint governance after centuries of internecine conflict. The tough economic times at home have seen US and European publics become distrustful of overarching multilateral institutions, believing the will of the United States or individual European countries will not be served. It is oftentimes easier for political leaders to fall in with the public mood rather than display leadership that might appear to work against it.