## Private Actor Bad

#### Interpretation: The affirmative may not fiat the actions of private actors

#### Violation: Their plan is that private entities simply don’t appropriate, they do not advocate any legal changes to stop appropriation.

Prefer-

1. Object fiat – Private actor fiat allows the aff to fiat the object of the plan. They can wish away their harms by fiating that the agents causing them simply stop. This guts neg ground by robbing our ability to generate solvency deficits, CPs, or offense generated from the unanticipated consequences of the plan.
2. No logical decision maker – No actor could be faced with the choice of whether or not to do the plan, since it’s done by an indefinably large set of actors who share no institutional means for shared decision making. Destroys topic and real-world education by side stepping the relevant discussion of how organizations with the actual power to solve the issue ought to respond. Proven by the fact EVERY ONE of their “solvency advocate” cards are really suggesting that governments regulate lunar sites, not that private companies stop lunar activities.

#### Drop the debater to preserve fairness and education – use competing interps – reasonability invites arbitrary judge intervention and a race to the bottom of questionable argumentation. No RVIs – they don’t get to win for following the rules.

## PTScientists PIC

AND, If private actor fiat is ok, then I advocate that: Private entries ought to be able to appropriate lunar heritage sites as long as they follow NASA guidelines and their use does not disrupt the scientific utility of those sites.

If private actor fiat is OK, then there’s no principled reason to reject the CP.

SOLVES 100% of the aff since their advantages are about harmful uses of heritage sites, not appropriation as such. Vote neg on any risk of a DA to the plan.

#### PTScientists’s lunar missions will follow NASA guidelines and work with For All Moonkind, to ensure their scientific missions do not damage Heritage Sites. Proves the CP is viable.

Pearlman 17 [Robert Z. Pearlman, “PTScientists 'Mission to the Moon' to Take Care Not to Harm Apollo 17 Landing Site,” <https://news.yahoo.com/ptscientists-apos-mission-moon-apos-172800261.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAAC7DTulMNz7W_W8HX4g3JpQBuAQ3H7q1QW4ovrcteXAl-yNSn4abdU0TpqidRq3YFSbdYULjnxfmtfyiaPIxaVJAwrSFLXzxHpCHmwdkGVsr-MaAZf_wnMU_oGHOsC63OxKHfETs7QRd8_FuHPdb2uQ0gWOFMGmJto-BhX3VHZhL>] CT

A German company aiming to send robotic rovers on the first mission to return to the last Apollo moon landing site has pledged to respect and protect the historic artifacts present there. PTScientists announced it has entered a partnership with For All Moonkind, an organization that is advocating for the preservation of human heritage in space. The news of the partnership was timed to mark the 45th anniversary of the launch of NASA's Apollo 17 mission today (Dec. 7). "Apollo 17 marked the end of one chapter of exploration, but as we enter a new era of private exploration I want to create a new 'Apollo moment' to inspire a new generation of explorers, engineers and scientists," Robert Boehme, founder and CEO of PTScientists, said in a statement. "We want to visit the Apollo 17 site, not just to celebrate human achievement, but also to continue scientific learning." [Apollo 17 at 45: Q&A with Astronaut-Scientist Harrison Schmitt] For its first lunar mission, dubbed "Mission to the Moon," PTScientists aims to send two of its Audi-sponsored Lunar Quattro rovers to the moon's Taurus-Littrow Valley. One of the rovers will be used to approach the site of the Apollo 17 lunar roving vehicle. PTScientists plans to capture high-definition imagery of the Apollo 17 lunar rover, providing a first close-up look at how the moon buggy has fared since it was left on the surface by Harrison Schmitt and the late Eugene Cernan in 1972. "Mission to the Moon" is slated to launch in 2019, 50 years after the first moon landing by the Apollo 11 crew. The company announced in November 2016 it had signed a launch contract with Spaceflight Industries, a broker for secondary payloads on a number of launch vehicles. Prior to aligning itself with For All Moonkind, PTScientists worked with NASA engineers to ensure its "Mission to the Moon" does not pose a threat to damage the condition of the Apollo 17 landing site. According to the company, this experience identified the need for a wider conversation on protection and preservation of the site, and how it should be covered in a formal legal framework to protect all of the human heritage sites in outer space for future generations. For All Moonkind is working to develop and implement a binding international law to manage the preservation and protection of humanity's heritage in outer space, beginning with the Apollo landing sites. "Each of the Apollo lunar landing and similar sites in outer space, including, for example, Russia's Luna sites, are a fundamental part of our human heritage" Michelle Hanlon, co-founder of For All Moonkind, said in a statement. "They mark an achievement unparalleled in human history, and one that is common to all humankind." [Apollo 17: NASA's Last Apollo Moon Shot in Pictures] "The [sites] also hold valuable scientific and archaeological information and serve as poignant memorials to all those who work, and have worked in the past, to evolve humans into a spacefaring species," she added. "In short, they are unique and irreplaceable cultural and scientific resources. And they must be protected from intentional or accidental disturbance or desecration." PTScientists is one of the first private space companies to support the For All Moonkind initiative. The Berlin-based company has endorsed the organization's mission and is helping to spearhead an effort to involve all organizations in the space sector to sign a binding pledge to respect the lunar landing sites and all other human heritage in space. "We are very grateful for the support of PTScientists," said Hanlon. "They understand that our return to the moon is based on a deep, rich and shared history — one that must be preserved to guide into this new frontier." A former entrant in the Google Lunar XPrize, PTScientists is one of several international companies actively working to send commercial robotic rovers to the lunar surface. "The original space race was dominated by two countries, but today the competition between private companies is just as intense," stated Boehme. "I hope we all share one overriding goal: to make space accessible to all humanity." "As we take the next giant leap, we must be careful not to trample on the footsteps of those that came before us" he added. "As space fans ourselves, PTScientists is happy to support For All Moonkind and its mission to preserve our human heritage."

## Due Regard CP

#### CP: States ought to adopt a binding international agreement to regulate the protection of Lunar Heritage Sites.

#### The CP protects heritage sites while allowing development.

Hanlon 21 [Michelle Hanlon (The University of Mississippi School of Law), “Due Regard” for Commercial Space Must Start with Historic Preservation,” Global Bus. L. Rev. 130 (2021) https://engagedscholarship.csuohio.edu/gblr/vol9/iss1/6] CT

With this in mind, rather than embark upon the development of an entirely new legal regime to govern space resource utilization and flesh out the specifics of due regard, the international community, though UNCOPUOS, should initiate the important process by reaching agreement on how to protect humanity’s greatest treasures in space. Starting with humanity’s firsts on the Moon, like Luna 2, the first hard landing, Luna 9, the first soft landing, Apollo 11, the first crewed landing, the international community can consider each level of deference each object and site deserve. UNCOPUOS should then solicit expert testimony from geologists and engineers who can describe the effects and trajectory of the plume effect. From there, they can establish safety zones barring access to any of these sites, until humans have the technology to approach them without destroying them. Given the strong ownership structure of Article VIII of the Outer Space Treaty, any approach must be with the approval of the State that retains the ownership of the objects. These parameters will serve as the baseline, the most severe and rigorous protections any site on the Moon can enjoy. It is an ideal starting point to: first, make the international community comfortable with the concept of safety zones; and second, build the scientific understanding and knowledge necessary to combat both foreseen (intentional intrusion) and unforeseen (plume effect) hazards to objects on the Moon. Beyond these three firsts on the Moon, there will, no doubt, be required debate over the status of other sites and objects. But, these can be addressed in a manner similar to the process adopted by the World Heritage Convention. As a matter of first instance, UNCOPUOS must agree to a definitive list and location of all the sites and objects on the Moon. A digital catalog of these items is maintained by the nongovernmental organization For All Moonkind, and would be an excellent starting point.87 Once affirmed, sites and objects should be categorized. The two extreme categories would be: first, debris or trash, available for inspection, and even recycling and reuse upon negotiation with the State which is the owner of the object; and second, cultural heritage of universal value. The UNCOPUOS may initiate a nomination process and invite States to nominate their object and the sites upon which they sit for consideration of universal value. Subsequent categories may include an identification of operative equipment used for scientific purposes and operative equipment used for commercial purposes. Finally, the UNCOPUOS will need also to consider commercial property that has no purpose. For example, companies like Astrobotic are offering to take private objects to rest on the Moon as part of their trademarked DHL Moonbox kit,88 and Celestis89 promises to take human remains to the lunar surface. What should “due regard” entail for these items? Viewing all of these sites from the prism of history will provide new perspective on these important matters. A final benefit of approaching the task of implementing due regard through the establishment of a safety zone regime is that the entire process will be accomplished from a baseline of conservation rather than exploitation. As we have learned on Earth, development need not be halted by preservation efforts; however, humans have been given a unique gift in the 50-year gap between crewed visits to the Moon. The site of one of our own momentous evolutionary accomplishments sits pristine, waiting for our return. We will never know where our ancestors took their first bipedal footsteps, where we first harnessed fire, or where we made our first tools. But, we do know where exactly our first human-made object impacted the Moon, and where our first off-world footsteps were taken. These sites will forever hold the remnants of our birth as a spacefaring community, the cradle of our spacefaring species.

#### Solves the aff without modifying the status of private appropriation by building on the existing principles of “due regard” embedded in the OST.

Hanlon 21 [Michelle Hanlon (The University of Mississippi School of Law), “Due Regard” for Commercial Space Must Start with Historic Preservation,” Global Bus. L. Rev. 130 (2021) https://engagedscholarship.csuohio.edu/gblr/vol9/iss1/6] CT

Article II of the Treaty states that “[o]uter space, including the moon and other celestial bodies, is not subject to national appropriation by claims of sovereignty, by means of use or occupation or by any other means.”53 It is a principal so embedded in the bedrock of space exploration that it is considered by many to be not just a treaty obligation but customary international law.54 It is this provision which renders the World Heritage Convention ineffectual off-Earth. Under the Convention, a State may only nominate a site within its territory for recognition as a World Heritage site. Conversely, the Outer Space Treaty specifically prohibits a claim of territory by any means. There is also internal conflict within the Outer Space Treaty itself. Pursuant to Article VIII of the Outer Space Treaty, objects left in space remain under the ownership and control of the nation that put them there.55 Yet leaving the objects on site essentially results in perpetual occupation of the surface upon which they rest. This runs afoul of the principle of nonappropriation encapsulated in Article II. Additionally, Article IX of the Outer Space Treaty requires all activities in outer space be conducted with “due regard” to other States,56 which suggests that States should not interfere with or otherwise despoil the objects of another. Moreover, Article IX further requires that: [i]f a State Party to the Treaty has reason to believe that an activity or experiment planned by it or its nationals in outer space, including the Moon and other celestial bodies, would cause potentially harmful interference with activities of other States Parties in the peaceful exploration and use of outer space, including the Moon and other celestial bodies, it shall undertake appropriate international consultation before proceeding with any such activity or experiment.57 (emphasis added). Four other treaties related to sovereign space activities were negotiated in the wake of the Outer Space Treaty, colloquially known as the Rescue Agreement,58 the Liability Convention,59 the Registration Convention,60 and the Moon Agreement.61 As their names suggest, these agreements respectively offer more detailed guidance on how States Parties should act in relation to the rescue of astronauts, responsibility and liability for damage caused by space objects, and the registration of objects launched, or intended to be launched, into orbit.62 The agreements provide no further guidance as to the relationship between Articles II, VIII and IX. The Moon Agreement endeavors to provide further guidance regarding the exploration and use of celestial bodies by States and their citizens. However, to date, only eighteen nations have ratified the Agreement. None of China, the U.S., or Russia has done so. In April 2020, the U.S. president released an Executive Order which made clear both the U.S.’s unwillingness to enter into the Moon Agreement and its strategy to object to “any attempt to . . . to treat the Moon Agreement as reflecting or otherwise expressing customary international law.”63 Where does that leave cultural artifacts and operational equipment? Pursuant to Article VIII of the Outer Space Treaty, a State remains the owner of any object launched into space. There are already many of such objects on the Moon, and soon to be many more. What does it mean to show those objects “due regard?” Arguably, when approaching an object which is conducting scientific experiments or undertaking commercial activity, showing “due regard” would require maintaining a certain distance to assure the activity is not affected either directly or indirectly by another actor.64

## Settlement DA

#### Current law is not a barrier to space settlement.

Gesl 18 [Paul M. Gesl (Maj, USAF JD), “PREPARING FOR THE NEXT SPACE RACE: Legislation and Policy Recommendations for Space Colonies,” A Research Report Submitted to the Faculty In Partial Fulfillment of the Graduation Requirements for the Degree of MASTER OF OPERATIONAL ARTS AND SCIENCES (April 2018). <https://apps.dtic.mil/sti/pdfs/AD1053024.pdf>] CT

Existing Legal Framework for Space Colonies

In 1967, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (OST) entered into force.43 This document, which is over 50 years old, was drafted when space issues were very different, yet it is still the primary binding international law on space activities. The OST places several limitations on potential colonization; however, it does not forbid the activity.

The first hurdle to a potential colony is Article II of the OST. “Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”44 One could argue that this would prevent any colonization. In fact, some do just that. Attorney Michael Listner, who founded Space Law and Policy Solutions, views this article as a non-starter for colonization efforts. “When a private citizen makes a claim to private, real property, basically, that’s saying the United States is making a claim as well, because of that continuing jurisdiction, the U.S. government always has.”45 The publication theoutline.com, relying on an interview with Listner,took this one step further, arguing that this means “any base or settlement on Mars would have to be free to use by anyone who can travel there. A person can’t just set up a colony, claim independence, and create rules that restrict access to it.”46 However, Lister’s interpretation is incorrect as it is too strict an interpretation of the language. Theoutline.com appears to take the interpretation to an untenable conclusion that is not supported by the evidence. Even though this position is not credible, it is important to discuss because as the United States moves towards colonization, it will face similar criticisms from opponents. Article II of the OST was not written to ban establishing a colony on a celestial body. Instead it was written to prevent a country from claiming a celestial body, such as the moon, as their own sovereign territory. This more permissive interpretation is supported by other provisions of the OST.

The OST contains language that supports establishing colonies. Article IV, while generally a prohibitive Article, states, “The use of any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies shall also not be prohibited.”47 If this leaves any doubt, Article XII likely clears up the confusion.

All stations, installations, equipment and space vehicles on the Moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity. Such representatives shall give reasonable advance notice of a projected visit, in order that appropriate consultations may be held and that maximum precautions may be taken to assure safety and to avoid interference with normal operations in the facility to be visited.48

This Article establishes two important facts under the treaty. First, space colonization is acceptable under the OST. A colony easily fits within the definition of a station or installation. Quite simply, if the drafters of the OST intended to prevent States from establishing colonies, they would have most certainly done so in uncertain terms. Second, a State can establish a colony either unilaterally, or with a selected group of international partners. The visits discussed in Article XII would not be necessary if every colony needed to be open to the international community. This also eviscerates claims like those cited by theoutline.com, discussed above. If any colony were open to any party that could reach it, the visits by representatives in Article XII would be nonsensical. Looking at these details in the language of the entire treaty is important, because without it, one could argue that Article I in the OST would prevent a State from establishing a colony. If a space colony established by a single State would deny other states free access to an area of a celestial body (namely the area where the colony is established), then facilities would be banned outright. However, Article XII directly undercuts this weak argument.

It is important to note that the OST equally applies to commercial entities. Private corporations are currently leading the way in planning for space colonization. A company that did not sign, or even exist when the OST was signed, is still bound by its provisions. Article VI establishes that these entities have to conform to the treaty, and more importantly that “the appropriate State Party to the Treaty” must both authorize and supervise these companies. 49 While not binding, the United Nations has spoken on the matter.

Space activities should require authorization by a competent national authority; such authority or authorities, as well as the conditions and procedures for granting, modifying, suspending and revoking the authorization, should be set out clearly within the regulatory framework; States might employ specific procedures for the licensing and/or for the authorization of different kinds of space activities.”50

These two citations together indicate that the United States must authorize and supervise the activities of commercial companies operating in space. If those activities include colonization, then legislation must appropriately supervise it.

#### But, private non-appropriation makes space settlement impossible.

Kerkonian 17 [Aram Daniel Kerkonian (Institute of Air and Space Law Faculty of Law, McGill University Montréal, Quebec), “The Legal Aspects of Permanent Human Settlement on Celestial Bodies,” A thesis submitted to McGill University in partial fulfillment of the requirements of the degree of Masters of Laws (LLM) (Oct 2017). <https://escholarship.mcgill.ca/downloads/tq57nt396>] CT

Article II prohibits the appropriation of outer space, simultaneously limiting and preserving the rights afforded under Article I: States are limited from claiming ownership or securing property rights in space thereby preserving for all other States the general freedom to use and explore. As the “non-appropriation” principle, Article II prevents an entity from claiming ownership over a particular spot in space, a plot of land on a celestial body or even an orbit around a moon151; while exploration and use are permitted, ownership is prohibited. Therefore, regardless of the scope of use or degree of reliance on a particular phenomenon of outer space, an entity cannot claim an individual benefit permanently. As a result, the USSR could not claim the orbit in which Sputnik made its maiden voyage152, the USA could not claim the Sea of Tranquility as its territory after planting its flag on the Moon153 nor could the equatorial countries exclude others from using the geostationary orbit located approximately 36,000 km above their territories154.

Although the OST does not define “appropriation” 155, the prohibition outlined in Article II must be understood to limit not only explicit claims of property or ownership but also, what can be called, “appropriation by action” – an activity that, without ever claiming to do so, appropriates outer space through its indirect consequences. An appropriate understanding of appropriation, therefore, becomes vital when determining whether proposed new and emerging technologies (such as permanent human settlement or space mining) may appropriate outer space, in one way or another, without ever claiming to do so.156 Although a truly meaningful investigation into the definition of appropriation is outside the scope of this thesis, moving forward without a useful conceptualization would be imprudent; therefore, a brief investigation into the drafting parties’ motivations for including the non-appropriation principle is warranted.

During Article II’s deliberations, many State representatives announced their support of the non-appropriation principle as a way of ensuring space activities would not undermine the general objectives of the OST (that outer space serve the interest of all States and not just the State undertaking a particular activity). Specifically, there was a desire that outer space not devolve into another domain of exploitation and imperialism, as had the New World and Africa during the fifteenth through nineteenth centuries.157 As Judge Manfred Lachs reminds: “Need one recall how frequently the practices of dividing and disposing of lands and whole continents led to conflict and strife? The lesson should have been learnt.”158 Indeed, for many of the negotiating parties the lesson had been learned. Rather poignantly, the years in which such space-related discussions were taking place were also a period of great decolonization and independence, with States acutely aware and hyper-prescient of the consequences of imperialism.

Since there is no evidence that space harbours other life forms, some have argued that mimicking the imperialism of the past in space would not result in harm as it did on Earth. What must be remembered, however, is that imperialism generates great inequality aside from the fact that it often subjugates certain classes. Ambitious territorial landgrabs in space, currently only possible for developed space-faring States, would cement economic advantages far into the cosmos and further exacerbate the inequality amongst nations on Earth. This will be the case regardless of whether alien civilizations exist. There is no question that space affords humanity great opportunity – what is questionable is how such opportunity will be distributed.159 Prohibiting appropriation was one method chosen by the negotiating parties to ensure the satisfaction of the OST’s underlying objective that space activities benefit all of humanity and not simply those with exploitative capabilities.160

The appropriation of outer space, therefore, can be accomplished by an activity that results in the same kinds of consequences as private ownership – exclusive use, profiting, unilateral decision making, etc. While such characteristics are necessarily true of certain activities (such as orbital positions 161), they are temporary and often available for someone else to use nearly simultaneously. A human settlement, with its notable permanence in a particular location, is neither temporary nor can it be used by multiple users concurrently – once established, its location will be restricted to other users.162 The general argument that space is vast (and so a single settlement site will not reduce the available real estate or subsequent users can simply choose another suitable site) undercuts the reality that space, while expansive, offers certain irreplaceable advantages depending on location.163 Notwithstanding, any realistic permanent human settlement will necessarily require affixing its structures to the ground, thereby appropriating that specific area in favour of the structure’s owner. In discussing this position, Judge Lachs reiterates that all activities in space ought to be for the benefit of all countries and Dr. Nicolas Matte draws the conclusion that: “moveable objects ‘attached to celestial bodies become immovables’, which grants the State to which they belong a right to the ‘soil’ of celestial bodies or at least a right to the surface’. Thus it is contended that ‘we arrive at an ownership… by technical and industrial occupation, without giving it a name.”164 Both Judge Lachs and Dr. Matte warned against State appropriation of celestial bodies to avoid the ever-present conflicts on Earth caused by similar situations.

In an attempt to get around this prohibition on national appropriation, some private enterprise proponents developed a nuanced argument focussing on the inclusion of the word “national” to claim that private, non-governmental entities were not prohibited from appropriating outer space and celestial bodies.165 Indeed, a plain language, straightforward reading of Article II suggests that since only national sovereignty is listed as a prohibited ground, other forms of appropriation may be permitted. Notwithstanding that Article VI makes it clear that States are responsible for their private entities’ space activities (thus if a private entity claimed sovereignty, their State would be responsible and thereby violate Article II), most delegates participating in the negotiations of Article II were of the opinion that it prohibited both public and private appropriation.166 This remains the consensus today.167 Plainly, the appropriation of outer space by private entities would have similar consequences as State appropriation – imperialistic exploitation conducted by SpaceX is still imperialistic exploitation. Therefore, arguments that claim private entities can appropriate outer space are legally invalid.

The conclusion, therefore, seems to be that any permanent human settlement would necessarily appropriate the celestial body upon which it is located and therefore violate Article II. Although there is no denying that States or private entities can establish stations or installations in space, the intention and permanence of the structures may give rise to an activity that violates international law.168 However, if the settlement activity were undertaken in a particular manner (as will be explored more thoroughly in Chapter 165 “ 3, an interpretation of Article II, in light of the object and purpose of the overall treaty, may justify its violation.

#### Lunar exploration is key to space settlement – very feasible and necessary first step to further settlement.

Lowman 08 [Paul Lowman JR, “Why Go Back to the Moon?,” NASA, 01/14/2008. <https://www.nasa.gov/centers/goddard/news/series/moon/why_go_back.html>] CT

Returning to the 21st century: Given these splendid accomplishments by astronauts on the Moon, why bother to go back? Should we not "declare victory" and stay on (or near) Earth? Here are some reasons go back, although not necessarily to "colonize" the Moon. First, and most fundamental: the last few decades of space exploration and astronomy have shown that the universe is violent and dangerous, at least with respect to human life. To give a pertinent example: in 1908 an object of unknown nature – probably a comet – hit Siberia with a force equivalent to a hydrogen bomb. Had this impact happened a few hours later, allowing for the Earth’s rotation, this object would have destroyed St. Petersburg and probably much else. Going back some 65 million years, it is now essentially proven that an even greater impact wiped out not only the dinosaurs but most species living on Earth at the time. The importance of catastrophic impacts has only been demonstrated in recent decades, and space exploration has played a key role. The bleak conclusion to which these facts point is that humanity is vulnerable as long as we are confined to one planet. Obviously, we must increase our efforts to preserve this planet and its biosphere, an effort in which NASA satellites have played a vital role for many years. But uncontrollable external events may destroy our civilization, perhaps our species. We can increase our chances of long-term survival by dispersal to other sites in the solar system. Where can we go? At the moment, human life exists only on the Earth. But with modern technology, there are several other possibilities, starting with the Moon itself. Men have lived on the Moon for as long as three days, admittedly in cramped quarters, but they found the lunar surface easy to deal with and the Moon’s gravity comfortable and helpful. (Dropped tools, for example, didn’t float away into space as they do occasionally in Earth orbit.) To be sure, it would be an enormous and probably impossible task to transform the Moon into another Earth. However, it is clear that a lunar outpost comparable to, for example, the Little America of the 1930s, is quite feasible. But what could such an outpost accomplish? First, it could continue the exploration of the Moon, whose surface area is roughly that of North and South America combined. Six "landings" in North America would have given us only a superficial knowledge of this continent, and essentially none about its natural resources such as minerals, oil, water power, and soil. The Moon is a whole planet, so to speak, whose value is only beginning to be appreciated. The Moon is not only an interesting object of study, but a valuable base for study of the entire Universe, by providing a site for astronomy at all wavelengths from gamma rays to extremely long radio waves. This statement would have been unquestioned 30 years ago. But the succeeding decades of spectacular discoveries by space-based instruments, such as the Hubble Space Telescope, have led many astronomers such as Nobel Laureate John Mather to argue that the Moon can be by-passed, and that instruments in deep space at relatively stable places called Lagrangian points are more effective. A meeting was held at the Space Telescope Science Institute in Baltimore, in November 2006, on "Astrophysics Enabled by the Return to the Moon." This institute runs the Hubble Space Telescope program. However, the consensus emerging from the Baltimore meeting was that there are still valuable astronomical uses for instruments on the lunar surface. For example, low-frequency radio astronomy can only be effective from the far side of the Moon, where static from the Earth’s aurora is shielded. Another example of Moon-based astronomy can be the search for extraterrestrial intelligence (SETI), by radio telescopes that on the far side would be shielded from terrestrial interference. Small telescopes on the Moon’s solid surface could be linked to form interferometer arrays with enormous resolving power. Astronomy in a limited sense has already been done from the Moon, namely the Apollo 16 Ultraviolet telescope emplaced by Apollo astronauts and before that, the simple TV observations of Earth-based lasers by the Surveyor spacecraft. The much-feared lunar dust had no effect on these pioneering instruments. The Moon may offer mineral resources, so to speak, of great value on Earth. Apollo 17 astronaut Harrison Schmitt, working with the Fusion Technology Institute of the University of Wisconsin, has shown that helium 3, an isotope extremely rare on Earth, exists in quantity in the lunar soil, implanted by the solar wind. If – a very big if – thermonuclear fusion for energy is produced on Earth, helium 3 would be extremely valuable for fusion reactors because it does not make the reactor radioactive. A more practicable use of helium 3, being tested at the University of Wisconsin, is the production of short-lived medical isotopes. Such isotopes must now be manufactured in cyclotrons and quickly delivered before they decay. But Dr. Schmitt suggests that small helium 3 reactors could produce such isotopes at the hospital. In any event, research on the use of helium 3 would clearly benefit if large quantities could be exported to the Earth. Returning to the most important reason for a new lunar program, dispersal of the human species, the most promising site for such dispersal is obviously Mars, now known to have an atmosphere and water. Mars itself is obviously a fascinating object for exploration. But it may even now be marginally habitable for astronaut visits, and in the very long view, might be "terraformed," or engineered to have a more Earth-like atmosphere and climate. This was described in Kim Stanley Robinson’s trilogy, Red Mars and its successors Green and Blue Mars. A second Earth, so to speak, would greatly improve our chances of surviving cosmic catastrophes. Where does the Moon fit into this possibility? First, it would continue to give us experience with short interplanetary trips, which is what the Apollo missions were. These would demonstrably be relatively short and safe compared to Mars voyages, but would provide invaluable test flights, so to speak. More important, shelters, vehicles, and other equipment built for the Moon could be over-designed, and with modification could be used on Mars after being demonstrated at a lunar outpost. Where could humanity expand to beyond Mars and the Moon? At this point, still early in the history of space exploration, it is impossible to say. The Galilean satellites of Jupiter, in particular Ganymede, might be habitable, but we venture here far into the field of science fiction. However, an outpost on the Moon is clearly possible, and would provide an invaluable stepping-stone to Mars. A species living on three planets would be far more likely to have a long history than one living only on the Earth. To put the arguments for a return to the Moon, and a lunar outpost, in the most general terms: the Moon is essentially a whole planet, one that has so far been barely touched. But this new planet is only a few days travel away and we have already camped on it. To turn our backs on the Moon would be equivalent to European exploration stopping after Columbus’s few landings, or China’s destruction of its giant ships to concentrate on domestic problems in the 15th century.

#### Private companies are key to lunar exploration and space settlement. Also, turns the aff, without private companies space agencies can’t actually do the science the aff advantages are based on.

Pearson 21 [Ezzy Pearson, “How humanity will return to the Moon: The future of lunar exploration,” Science Focus, 06/12/2021. <https://www.sciencefocus.com/space/future-of-moon-exploration/>] CT

For almost 40 years, our nearest cosmic neighbour, the Moon, was left alone as we looked elsewhere in the Solar System. That changed in 2013, when China’s Chang’e 3 lander touched down on the lunar surface. Since then there’s been an explosion of interest in the Moon. NASA, China and even private companies are racing back to it, with dozens of robotic and human missions being planned. Things are set to get a lot more crowded on the lunar surface over the coming decade, but this time, we’ll be staying. “We know the Moon has potential resources that will be useful for space exploration,” says Ian Crawford, a professor in planetary science from Birkbeck, University of London. “Particularly water ice trapped in the very dark shadows of craters at the poles.” Unlike Earth, the Moon’s axis isn’t tilted at a large angle, so the Sun is constantly overhead when you’re at the lunar equator. If you’re at the lunar poles however, the Sun’s always on the horizon, creating long, permanent shadows in the surrounding craters. Hidden from the Sun for billions of years, temperatures in those craters are low enough that water ice has been able to survive in them and it’s this that’s captured everyone’s interest. “Water is an extremely useful substance for space exploration, certainly in the context of human exploration,” says Crawford. “It’s a requirement for life, but can also be broken down into oxygen and hydrogen. Combined, they’re a useful rocket propellant.” Though planetary geologists have seen signs of lunar ice for years, the first definitive proof of the presence of water came in 2018, following detailed analysis by NASA’s Moon Mineralogy Mapper on the Indian lunar orbiter Chandrayaan-1. While we have plenty of water here on Earth, it’s heavy – each cubic metre weighs 1,000kg. Launching it into space takes a huge amount of energy. If, instead, we could find a way to harvest water beyond Earth’s gravitational pull, it would allow for bigger and more ambitious projects, both on the Moon and beyond. “If we’re going to engage in a programme of human space exploration, the Moon is the obvious place to start,” says Crawford. While there appears to be water at both poles, it’s most concentrated in the south. A region known as the South Pole-Aitken Basin – the Moon’s largest impact crater – is home to several large deposits of ice. What’s not clear, however, is what form the ice takes. “We’re still in the initial prospecting phase,” says Crawford. “We don’t know whether we should be investigating big blocks of ice here and there, or just tiny, micron-sized grains of ice mixed in with the lunar soil.” NASA is planning a mission to send the Volatiles Investigating Polar Exploration Rover (VIPER) to the Aitken Basin in 2023. Once there, it will drive into the shadow of one of the craters to investigate the ice on the surface and, with its drill, two metres below it. The water is also of particular interest to scientists. As it has remained undisturbed for millions, or sometimes billions, of years, it gives planetary geologists a window into the past. “The Moon is very ancient and geologically inactive, which means that it’s sort of a museum to the evolution of rocky planets – [its rocks hold] a record of its earliest evolution from shortly after its formation,” says Crawford. The ice could act as an archive, detailing how water was brought to the Moon by comets and asteroids. As these would have also carried water to our planet, such an understanding would tell us as much about the history of Earth as it does the Moon. While many missions would like to follow the water and explore the polar regions, this isn’t without its challenges. Until now, most lunar missions have touched down around the sunlit equator where solar panels can easily supply power. It’s much trickier when you’re heading somewhere that’s in permanent darkness. Some early missions, such as VIPER, will use rechargeable batteries to undertake brief sojourns into the shadows, but longer-term missions will require more thought. If future astronauts plan on mining the lunar ice, they’ll need a permanent base to do so and that will require a very specific location to prosper. “The best place, if you could find it on the Moon, would be a permanently shadowed area with water, near a peak with persistent light that could stay sunlit almost all year for power from solar panels, and a cave for shelter,” says John Thornton from Astrobotic, the company contracted by NASA to transport VIPER to the Moon. “Caves provide a nice, thermal environment underground. If we could find that location, there’s no doubt that’s going to be the place where a human settlement pops-up.” Once a spot is found, it then becomes a case of building a base. Initially, this will probably be done with structures transported from Earth, though weight and size restrictions on launch vehicles will limit what can be sent, so it would be much better to build a base in situ. Fortunately, there are building materials everywhere on the Moon. Several projects are looking at harvesting regolith – the fine layer of dust created by micrometeorites pulverising lunar rocks – and using it to 3D print structures. In the longer term, it could be possible to extract iron and titanium from lunar rocks. We’d need to build a refinery to process them, but having access to such metals beyond Earth’s gravity would allow us to build much larger structures and spacecraft. The Clementine spacecraft, launched in January 1994, detected the highest levels of the metals around the lunar mare – the dark regions created by ancient lava flows. As an added bonus, most of the ores are oxides, so they’d produce oxygen as a by-product. But not all potential lunar resources are as easy to extract. There are an estimated billion tonnes of helium-3, a potential fuel source, on the lunar surface, but extracting it would require a huge industrial complex mining hundreds of tonnes of regolith every second – a prospect that’s centuries away from being feasible, even under the most ambitious circumstances. Such ambitious plans can’t be undertaken alone, however. Currently there are two superpowers working to put humans on the Moon: the US and China. Though US law prevents the two from collaborating, they’re both reaching out to other nations to help them achieve their goal. “Lunar exploration can become a tremendous focus for international cooperation, which I think would be highly desirable, especially in today’s international climate,” says Crawford. Despite having only sent its first ‘taikonaut’ into space in 2003, China’s space programme is making great strides. Its Chang’e series of robotic lunar missions has been wildly successful and saw the first landing on the far side of the Moon in 2019 (Chang’e 4) and plans to return the first samples from the lunar south pole with Chang’e 6 (due to launch in 2023). The Chang’e 4 mission carried instruments from the Netherlands, Sweden and Germany, while European astronauts have already run several training exercises alongside their Chinese counterparts. Though the Chinese are secretive about their precise plans, they’ve made it clear that these missions are a precursor to a lunar landing mission. With several decades more experience to call upon, the US efforts are a little more mature. Their current plans are centred around the Gateway, a lunar station that would orbit the Moon. The station would act as a staging post for missions to the lunar surface, and potentially Mars and beyond. The Japanese, Canadian and European space agencies have all signed up to help, agreeing to build parts of the station on the promise of one day sending their own astronauts to the Moon. The first sections of the Gateway are due to fly in 2023, with operations starting in 2026. Meanwhile NASA is already planning the Artemis mission, which will send the first woman to the lunar surface by 2024. These ambitions are also helping to foster a branch of space exploration that’s blossomed over the last decade: private enterprise. To encourage the growth of the space sector, NASA set up the Commercial Lunar Payload Services initiative, asking companies to transport the space agency’s science instruments to the Moon. “NASA has plans to buy at least two lunar missions per year for the next eight to 10 years,” says Thornton. “This is a first step towards commercialisation of routine, regular transport to the Moon.” As well as being much cheaper for NASA, it also creates opportunities for those with a much smaller budget. In late 2021, Astrobotic will be sending its Peregrine lander to the Moon with a dozen NASA instruments, but it also has room to transport other projects at the cost of $1.2m per kilo (approx £850,000). That might sound a lot, but in spaceflight terms it’s a bargain. “We have a broad array of customers, even just on our first mission,” says Thornton, who has seen universities, companies and even private individuals sign up to hitch a ride. “We have a payload from the UK that’s actually a fun little walking rover that’s going to walk across the surface.” Alongside Astrobotic are many other companies all preparing to head to the lunar surface. Though none of them has successfully landed yet, there’s no shortage of passengers waiting to hitch a ride. The lunar surface is about to get busier than it’s ever been.

#### Space Settlement is coming now and prevents inevitable extinction. Settlement requires private industry and rule of law.

Gesl 18 [Paul M. Gesl (Maj, USAF JD), “PREPARING FOR THE NEXT SPACE RACE: Legislation and Policy Recommendations for Space Colonies,” A Research Report Submitted to the Faculty In Partial Fulfillment of the Graduation Requirements for the Degree of MASTER OF OPERATIONAL ARTS AND SCIENCES (April 2018). <https://apps.dtic.mil/sti/pdfs/AD1053024.pdf>] CT

Why the United States Needs to Think About Space Colonization Now

The United States’ space policies under the previous two Presidential administrations have not matched the ambition of the commercial sector. The author has criticized the National Space Policies of both President Obama and George W. Bush as being too “Earth-Centric.”6 Based on the current state of technologies, it is easy to dismiss space colonization as, at best, a problem to worry about tomorrow and, at worst, mere science fiction. This is irresponsible. Reaching space is difficult. Colonizing it will be even more difficult; however, we cannot overlook it as a likely possibility. NASA viewed space colonization as an endeavor within humanity’s reach in the 1970s.7 Now it is beginning to take shape as a reality. In 2015 at the Pioneering Space National Summit, policy makers, industry leaders and advocates agreed that “The long term goal of the human spaceflight and exploration program of the United States is to expand permanent human presence beyond low-Earth orbit in a way that will enable human settlement and a thriving space economy. This will be best achieved through public-private partnerships and international collaboration (emphasis in original).”8 Additionally, there have been several attempts in Congress to pursue space settlement.9 Private industry appears to be taking the lead in this race. Elon Musk, the CEO of SpaceX intends to establish a colony of a million settlers on the surface of Mars.10 SpaceX is targeting the first manned missions to make this a reality to launch in 2024.11 Mr. Musk envisions the full colonization to take 40-100 years.12 Even if this timeline misses its ambitious deadline by a decade, humanity will be a multi-planetary species in many readers’ lifetimes. It is important to note that Mr. Musk recently stated that SpaceX is “building the first Mars, or interplanetary ship, and I think we’ll be able to do short trips, flights by first half of next year.”13 Even though he joked that the company might miss their timeline, his comments highlight that colonization is an issue that is fast approaching.14 Another factor to consider is that a legal framework needs to be developed before a Martian colony is at its full capacity. Mr. Musk envisions using SpaceX’s BFR to send approximately 100 people per flight to Mars.15 Additionally, SpaceX appears to be planning for humans living on the lunar surface in their Moon Base Alpha.16 SpaceX is not alone in their ambitions. United Launch Alliance (ULA) published their plans to expand the population of humans living and working in space. Their Cis-lunar 1,000 framework is a 30-year plan to develop the cis-lunar economy and grow the population of humans living and working in space from six to 1,000.17 Space colonization is more important to our species than the economic benefits of a space economy and the conquests of exploration. The current world population is 7.4 billion people.18 According to the World Wildlife Foundation and the Global Footprint Network, “the equivalent of 1.7 planets would be needed to produce enough natural resources to match our consumption rates and a growing population.”19 The problem will likely grow worse as the population of the planet continues to grow. According to the United Nations, the Earth’s population will grow to over 11 billion people by 2100.20 Based partially on this, “Prof [Stephen] Hawking said it was only a matter of time before the Earth as we know it is destroyed by an asteroid strike, soaring temperatures or over-population.”21 H

awking further stated that, “When we have reached similar crisis in or (sic.) history there has usually been somewhere else to colonise (sic.). Columbus did it in 1492 when he discovered the new world. But now there is no new world. No Eutopia (sic.) around the corner. We are running out of space and the only places to go are other worlds.”22 The late Professor Hawking is not alone in his view, the National Space Society observed the benefits of expanding into space. “Outer space holds virtually limitless amounts of energy and raw materials, which can be harvested for use both on Earth and in space. Quality of life can be improved directly by utilization of these resources and also indirectly moving hazardous and polluting industries and/or their waste products off planet Earth.”23 These are just several of the many compelling reasons to colonize space advocated by groups such as the National Space Society and the Space Frontier Foundation.24 ULA appears to be taking steps to meet their ambitions for the future. ULA announced the first step towards making their Cis-lunar 1,000 vision a reality. In October 2017, they announced a partnership with Bigelow Aerospace to launch a habitat to low lunar orbit.25 The launch is expected to be completed before the end 2022.26 Some feel that colonization is going to happen, no matter what governments do.27 If colonization is going to happen, then it is in the United States’ best interest to develop a legal framework that supports the efforts and protects our citizens who will travel to and live in these habitats. This is important for several reasons. First, private corporations appear to have an interest in colonizing space, so it is in humanity’s future whether the government is involved nor not. However, governments can take actions that will accelerate things.28 Second, it is in the best interest of the United States’ economy to support commercial companies that are expanding into space. Third, if the United States does not create a favorable legal framework for space colonization, someone else will. Finally, as humanity expands away from the surface of the Earth, it is important to create a free society based on the principles of the Rule of Law rather than some other form of government, or an anarchistic company town.

An extinction event is inevitable, unpredictable, and the risk is growing. Space settlement is the only solution and it requires a thriving private space industry including orbital installations, mining, and tourism.

Hertzler and Rench 16 [Kevin Hertzler and Rebecca McCauley Rench (PhD), “GLOBAL EXTINCTION or a Space-Industrial Complex,” Potomac Institute for Policy Studies (2016). <https://www.potomacinstitute.org/steps/images/PDF/Articles/HertzlerSTEPS_2016Issue3.pdf>] CT

Yet, the bigger existential threat of annihilation of all humanity, by nuclear holocaust or natural forces, is currently considered too remote to be taken seriously. The geological record has preserved the rise and decline of many species throughout earth’s history, whether their extinctions were the result of asteroid impacts, volcanic activity, solar flares, or gamma ray bursts from distant star systems. To think humanity above the historical trends of the universe is conceited and illogical. Perhaps it is time to reconsider the annihilation threat and to entertain the need for an off-Earth sustainable colony.

Humanity might not get a second chance at survival. The idea of an extinction event has long been fuel for science fiction writers, and is exemplified in the novel by Neal Stephenson entitled Seveneves. 3 In Seveneves, humanity will be wiped out on Earth within two years unless nations collaborate to put a small group of astronauts and scientists on the International Space Station in hopes they survive and repopulate the planet. Science fiction has been known to become science fact, both in ways that are beneficial to society, and in ways that have negative consequences. A study of threats and a dystopian future is also inculcated into academia, with Niklas Bostrom, the founder of the “Future of Humanity Institute,” as a recognized leader. While the risk in any given year might be quite small, there is almost certainly an eventual global extinction event. With a growing population and the speed of destructive technological advancements, the annual risk of humanity’s downfall may be increasing. When the inevitable is presented as a certain future, or happens before we can react, what will be humanity’s last collective thought? Given our current technological prowess, perhaps the time to take action is now. During a Wall Street Journal All Things Digital conference,4 Elon Musk said:

Either we spread Earth to other planets, or we risk going extinct. An extinction event is inevitable and we’r

e increasingly doing ourselves in.

World renown physicist Steven Hawking agrees and recently told a gathering at the Big Think:5

I believe that the long-term future of the human race must be in space. It will be difficult enough to avoid disaster on planet Earth in the next hundred years, let alone the next thousand, or million. The human race shouldn’t have all its eggs in one basket, or on one planet. Let’s hope we can avoid dropping the basket until we have spread the load.

The timing and the nature of this event remains truly unknown. Predictions suggest an existential event may come from space or be the product of our own hand, but we will likely remain ignorant of the cause until its near arrival. What we do know is that if humanity is still inhabiting only one planet, our unique life stories will be tragically and permanently erased. Thus, we confront the realization of the likelihood of a global extinction event that we have absolutely no control over, that we currently have no defense for, and no plans to escape from. We are deluded into believing that since an extinction event is rare, it can not occur in our lifetime. Consider the attitude expressed in the Jet Propulsion Laboratory’s Near Earth Object program’s website6 which states:

On an average of every several hundred thousand years or so, asteroids larger than a kilometer could cause global disasters … No one should be overly concerned about an Earth impact of an asteroid or comet. The threat to any one person from auto accidents, disease, other natural disasters and a variety of other problems is much higher than the threat from [Near Earth Objects] NEOs. Over long periods of time, however, the chances of the Earth being impacted are not negligible so that some form of NEO insurance is warranted. At the moment, our best insurance rests with the NEO scientists and their efforts to first find these objects and then track their motions into the future. We need to first find them, then keep an eye on them.

However, what will our response be if we find an NEO larger than a kilometer that is on a collision course with Earth? A database is not an insurance policy and leaves open the issue of an appropriate response. Currently, our only real hope lies with mitigation strategies predicated on intercepting7 or redirecting8 NEO objects. The former suggests using a robotic spacecraft that is weighted or carries a nuclear explosive and the latter will redirect the NEO object with a robotic spacecraft. However, as NASA states in their “Asteroid and Comet Watch” website9 a response requires decades of warning time if the NEO object is larger that a few hundred meters.

We needed Sputnik to motivate our resolve for the domination of space. The mental contrast of one day dreaming about space travel through science fiction, and then seeing it live on television in the living room, stimulated our imaginations. President Kennedy’s speech inspired a nation and the decade-long pursuit that saw a surge in academic scholarship and technological advances. There are many technologies and spinoffs10 woven into the fabric of the world culture that owe their birth to that speech and subsequent technology development.

Can we expect the development of a humanity insurance policy before a crisis begins? It might require funding of NASA at levels similar to the 1960s, when we successfully landed men on the moon. It might require the development of a space-industrial complex that could help drive future economic growth. It might require that we spread out to other planets and achieve Earth independence to stave off global human extinction, even on our watch. It does require that we take the threat, and its inevitability, seriously and devote resources to preventing our extinction.

The ancient seafarers were motivated to take risks for the sake of curiosity and the desire for exploration and resources.11 The drive to leave the planet and set up colonies is similar: There is the allure, the curiosity, the adventure, and the insurance. It could, and should, be an international effort justified based on the purpose of planning for the preservation of humanity.

Certain plans are underway. Mars One is a nonprofit organization that promotes its plans for a Mars settlement within fifteen years.12 Elon Musk’s company SpaceX is reportedly developing plans to send large numbers of people to Mars.13 And NASA recently released a comprehensive strategy14 that leverages nearterm space activities with a comprehensive capability development culminating in an independent human presence on Mars. The NASA plan, at a minimum, would provide a future with a sustainable presence for humanity in deep space and provide an answer to many global extinction scenarios. Some of these plans are more logistically feasible than others, but all demonstrate the ambition of a select sect of humanity interested in pursuing off-Earth colonization. This strategy is well reasoned and has the potential to save humanity as well as provide a much needed economic boost by creating a space-industrial complex with the nascent private-public partnerships15 for mining asteroids, manufacturing propellant on the moon, creating fuel depots, and launching humans into space. The spinoff technologies would fuel real job growth as evidenced by the Apollo program of the 1960s. Rather than a short lived event to win a space race, this modern space age will be designed as a sustained effort in human space colonization. The current roadblocks preventing this strategy from moving forward are budgets, political priorities, and the changeable public interests; the exact same denouement of the moon landings over 40 years ago. An article posted on the Washington Post website by Joel Achenbach made the following observation:16

At the moment NASA can’t even get an astronaut to the International Space Station without buying a seat on a Russian rocket. A new NASA space capsule that was conceived in 2005 likely won’t be ready until 2023, according to NASA’s latest estimate, and it’s built for 21-day missions, not for trips to Mars.

The same article quotes Doug Cooke, a former NASA associate administrator as saying:

There needs to be more of a plan for actually getting there [Mars]. You can’t have a flatline budget indefinitely and think you’re going to put all of this together by 2030.

We must support the mission of human space exploration and colonization with both our interests as well as our national budget priorities if we want any hope of surviving the inevitable existential global extinction event.