# PRIV ACTOR FIAT

### 1

#### 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.

### 2

#### **CP: 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."

### 3

**CP: States ought to use a Social License to Operate model administered by non-governmental organizations to regulate activities on the moon.**

* **Solves the aff by protecting lunar heritage sites**
* **Competes since it allows regulated commercial activities and hands over exclusive control of the moon to NGOs which are private entities**
* **Works by creating standards that must be agreed to before parties engage in lunar activities. Violators would not receive new approvals and the most desirable proposals are reserved for actors with the best history of compliance.**

**Salmeri and Jiménez 20** [Antonino Salmeri (University of Luxembourg) & María Camila Villegas Jiménez (Colombian Air Force – Space Affairs Office), “A Social License to Operate for Lunar Resources Activities: Towards a Fair and Sustainable Era of Space Exploration,” 71st International Astronautical Congress (IAC): “The Cyberspace Edition”,12-14 October 2020. <https://orbilu.uni.lu/bitstream/10993/44632/1/A.Salmeri%20%26%20M.%20Villegas%2C%20Social%20License%20to%20Operate%20for%20Lunar%20Resources%20Activities.pdf>] CT

What is a Social License to Operate (SLO)?¶ Throughout history, humankind has relied on natural resources for its survival first, and for the development of the economy then. In this way, resource extraction practices such as mining, agriculture, and energy production have been most useful for the regional development of the community where the extraction site is located. At the same time, these activities have also a significant impact on both the lives of local communities and the environment in which they live. Accordingly, local communities are demanding more involvement in decision-making around such operations. Inter alia, these communities expect to receive a greater share of the benefits from extraction operations and require assurances that the industries involved are appropriately regulated. The combination of increasing pressures on industry performance and the related societal acceptance of such operations has been described as ‘social license to operate’ (SLO). 20 **An SLO is determined by the relationship between** local **community and extraction industries**, **to establish guidelines for a win-win** approach at the social, environmental, and operational levels. Due to their high activity in the extraction of natural resources, States such as Australia, Canada, Ghana, New Caledonia, Bolivia, and Colombia are some of the major supporters of communities granting SLOs. Figure 1 shows the normative components of SLO: the community/stakeholder perceptions of the social legitimacy and credibility of the project, and the presence or absence of true trust. These elements are acquired sequentially and are cumulative in building towards an operational SLO.21¶ In practice, **the absence of legitimacy leads to the immediate rejection** of a project**,** while the presence of minimum legitimacy and credibility can bring to its acceptance. However, **only a project with a high level of** legitimacy and **credibility can generate** the necessary trust which is the basis for **approval.** In fact, studies show that the most significant form of SLO, coownership, can only occur when a high level of trust is present. 22 It is important to note that SLO is linked to the development of dedicated Social Management Plans and, in certain States, is required to grant mining titles. Some of the benefits of granting a SLO are:¶ Strength and maintain positive relations among project´s stakeholders and local communities.¶ Develop social and economic opportunities in the project’s area and spread its benefits, with the participation of the community. ¶ Prevent, mitigate, and attend social impacts that may arise from the development of the project. • Decrease unemployment rate. • Protection of ethnic groups’ rights. ¶ Fostering equality among those who benefit from extracting natural resources and those who feel (tangible and intangible) disadvantages from such activities.¶ Just in the State of Australia, approximately 79 SLOs related to mining have been granted. Specifically, in Pilbara, Western Australia region, commonly known for its iron reserves and oil, the extraction of natural resources has significantly contributed to the regional economy. According to the Western Australian Department of Mines, Industry Regulation and Safety, the Pilbara region produced approximately $62.4 billion worth of minerals and petroleum in 2017-18. The following are direct contributions from mining to the Pilbara region in 2015-16: 23¶ 13,140 direct employees living in the region; ¶ $2.7 billion paid in wages and salaries; ¶ $743 million in business purchases, community contributions and local government payments; and ¶ 395 local businesses supported¶ Another example for Latin America is Colombia. In this Country the mining sector represents approximately 2% of the national GDP, directly creating 350,000 jobs and indirectly creating one million more through its production chains. In 2018, Colombian’s Foreign Direct Investment (FDI) flows reached USD 11.5 billion - of which 34% corresponded to the energy and mining sector, with an annual growth of 21%. At present, 7,652 mining titles are currently granted in Colombia. 24 To summarize, an SLO represents a shared plan between a local community and mining companies for the fair redistribution of the wealth generated through extraction activities. Additionally, SLOs are also developed to minimize the negative consequences of mining activities at both social and environmental levels. If developed properly, an SLO is ultimately structured to achieve a win-win outcome for the benefit of both the local communities and the companies operating therein.¶ Why Developing a Social License to Operate for Lunar Resources Activities?¶ According to the first paragraph of Article I OST, “the exploration and use of outer space, including the Moon and other celestial bodies, shall be conducted for the benefit and in the interest of all Countries [...] and shall be the province of all mankind”.25 Pursuant to this provision, space activities are of natural and inherent interest for the entire global community, which according to Article I OST itself is composed not only of States but also of “mankind”. On the one hand, it is true that the term "mankind" does not refer to any specific legal person, which in turn complicates the exercise of legal actions. At the same time, the “province of all mankind” clause has been included in the text of Article I OST to signify the global relevance of space activities for humanity as a whole.26 Precisely because of that, **SLO could** work as an alternative scheme to **protect** and defend **the interests of (hu)mankind** in accordance with Article I OST. Such a scheme would be **particularly** needed **in the case of lunar activities**, in light of the special role that the Moon has for our species for biological, cultural, and spiritual reasons. Affording some protection to these interests is also in the best interest of lunar resources operators, insofar as it could increase the level of trust and support from the general public, exactly as it already happens for terrestrial mining. Even if it may seem counter-intuitive, **a Lunar SLO would** in fact ultimately **protect a range of interests** that are very **similar to** those covered on **Earth**. The first of those interests is related to the protection of certain features of the lunar environment. Despite the fact that there is no local community on the Moon, one could perhaps argue that alterations to certain features of its environment would adversely affect many of us on Earth. For instance, the far side of the Moon is known for its complete radio silence, which enables unprecedented studies on the origins and evolution of the Universe. Accordingly, the unbalanced proliferation of electronic and radio communications on this side of the Moon could undermine or even jeopardize these unique radio-astronomy studies, which rely on the maintenance of a noise-free environment. Truth to be told, in principle these interests could be protected by the principle of due regard under Article IX OST.27 However, the application of this principle lacks any State practice when it comes to the utilization of another celestial body, thus creating a high degree of uncertainty. 28 Mutatis mutandis, there is a similar risk for **the protection of culturally significant sites on the lunar surface, such as Armstrong’s footprint**. Not by chances, both these issues have already been addressed by NASA within the main principles developed for the negotiations of the Artemis Accords, a series of international bilateral agreements between the United States and the various partners of the Artemis program.29 However, the commitments eventually taken under the Artemis Accords will only be binding for its partners, thus leaving uncovered other lunar actors outside the Artemis group. On the contrary, aLunar SLO could offer a flexible way to ensure that certain interests, representative of the various facets of humankind, could be defended for the benefit of all actors operating on the lunar surface. Another reason to develop a Lunar SLO is that it could represent a good compromise for the implementation of the principles of non-discrimination and equality as laid down in the second paragraph of Article I OST.30 According to this provision, “outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law”.31 During the negotiations of the OST, the Soviet Union insisted repeatedly on the above formulation as a necessary mean to foster international cooperation.32 Through the SLO model, entities conducting Lunar activities could commit to ensure diversity in the composition of their lunar missions in terms of human resources, capital participation and payload development. Accordingly, this would satisfy the OST requirement of international cooperation without placing an unsustainable burden over Lunar operators. From a strictly operative viewpoint, a Lunar SLO could also be adopted to ensure fair and equitable access33 to the “most wanted” areas of the Lunar surface: the permanently shadowed craters and the peaks of eternal light. Through SLO, Lunar operators reaching those areas first could be obliged to preserve a certain portion for international uses, or alternatively to share their infrastructure with future interested actors. On the same line of reasoning, SLO could serve to place a limit over the deployment of safety zones, thus preventing monopolist behaviors 34 especially if directed to special areas of the Moon. The same concept can also be applied with specific reference to extraction activities, insofar as **a Lunar SLO may include provisions obliging operators not to spoil** certain lunar **resources that could be** either commercially or **scientifically valuable**. This is particularly significant since the natural resources of the Moon are nonrenewable, meaning that every misuse of resources will never be compensated in the future. For instance, operators mining lunar ice for the purpose of obtaining hydrogen should also account for the preservation of the oxygen which will be freed in the process. Obviously, SLO requirements imply additional costs which should not be exclusively borne by operators. Acting otherwise would make lunar operations unfeasible, while also being unfair towards those actors who are already taking significant risks and sustaining enormous costs to break the initial barriers of lunar operations. Not by chance, **the greatest merit of SLO is** its suitability **to work as a reasonable compromise between society and operators.** ¶Three Fundamental Features for Lunar SLOs¶ As discussed in the previous section, the SLO model presents a lot of potential to address the many challenges raised by upcoming Lunar activities. Accordingly, we believe that every **Lunar SLOs** shouldinclude the following three fundamental features. First, in compliance with the global relevance of lunar activities, the **governance** of Lunar SLOs **should be** both **multilevel & multi-stakeholder**. Second, given the many interests involved in the utilization of the Moon, Lunar **SLOs should be** multi-purposes, i.e. sufficiently **flexible** to achieve different goals. Finally**, to preserve the economic feasibility of** pioneering **lunar activities,** Lunar SLOs **should** also **include** proportionate **incentives for operators**. To begin with the first feature, we believe that governance tasks for Lunar SLOs should be divided between the national and international levels and distributed among different actors. First, to foster the development of standardized types of Lunar SLOs, their design should happen at the international level. 35 Following the efforts recently promoted by the Moon Village Association, 36 this could be part of a broader global efforts for the development of recommended best practices for sustainable lunar activities. Those best practices can then serve as a shared ground from which each State can then tailor its own licensing requirements, including the SLO ones. Following, because **lunar extraction activities will be** likely **conducted by commercial entities**, we propose that the actual implementation of Lunar SLOs should primarily take place at the national level, as per the tenets of Article VI OST.37 However, in accordance with MVP principle 2, such national implementation should also make sure that lunar activities are conducted “in a manner that takes into account the interests of other actors and benefits all countries and humankind”.38 Accordingly, we propose that the management of **nationally granted Lunar SLOs should be entrusted to representatives of the** broader **international community,** to be **chosen among the nongovernmental entities admitted to observe** the work of the **UNCOPUOS** committee. 39 While each State should remain free to choose the specific entity it prefers, we believe that selected Lunar SLO Managers should coordinate with each other at the global level for the collective exercise of their national SLOs responsibilities. Following the principle of adaptive governance, this collective exercise could initially be structured on a case-by-case basis, through open multilateral and multi-stakeholder consultations with interested parties. Later on, in parallel with the growing scale of lunar operations and global involvement, these consultations could then be institutionalized under the umbrella of dedicated global consortiums. Finally, we propose that also the enforcement of Lunar SLOs should involve both the national and international dimensions. Every year, each SLO Manager should present to its national regulator a Report assessing the observed level of compliance and the initiatives taken during the year. When necessary, the Report should also include a section with proposed sanctions in case the operator has breached its SLO conditions. Significantly, in this scheme the power to enact sanctions and take actual enforcement measures will always remain with the national licensing authority, thus avoiding legitimacy problems. At the same time, SLO Managers will also be free (and maybe even encouraged) to pursue alternative routes for maintaining a good level of compliance. Measures of this kind should be essentially based on derivates of the name & shame technique, which is meant to publicly embarrass non-compliant operators.40 The name & shame technique has proven to be quite successful in sectors whereby reputation and trust guide the allocation of public funds, the subscription of private debts as well as the market choices of both other operators and end-users.41 Since those elements are also typical of the space industry, the idea is that the fear of losing trust from the general public will push operators to voluntarily meet their SLO obligations without having to resort to sanctions. Ultimately, our proposed governance for Lunar SLOs is based on a multi-level and multi-stakeholder distribution of governance tasks. Under this scheme, **international NGOs** would act as representatives of the global community, **interacting with both** private **companies and national regulators** within different national jurisdictions.¶ A Practical Example¶ Before concluding our analysis, one example might help to clarify. **To ensure the protection of heritage sites** on the Moon, the US Government could **entrust the n**on**g**overnmental **o**rganization known as **“For all Moonkind**”42 **as international manager for all Lunar SLOs** given to US companies. Following the multistakeholder governance system, “For all Moonkind” will have to include other potentially interested entities, such as the Space Generation Advisory Council43 or the abovementioned Moon Village Association, in the exercise of its SLO powers. Under the principle of adaptive governance, such collective exercise could initially be ensured **through multi-lateral consultations** with representatives of these organizations. Later on, these three entities could establish a “Sustainable Lunar Consortium” for the collective exercise of their various SLO powers under a more institutionalized framework. At the end of every year of operations, **For all Moonkind would prepare a report accounting for** the level of **compliance** shown by US-licensed companies, further **complemented by** relevant **recommendations** to maintain or increase respect for Lunar SLO conditions. Lastly, on account of the efforts made**, compliant companies would be granted priority** within either the allocation of governmental funds or the development of public/private partnerships on future lunar activities. Obviously, the proposals developed in this paper are just a starting point within the broader multi-lateral debate on sustainable lunar exploration. Above all, we hope that this paper contributed to the understanding that we need to have this conversation now that there is sufficient time to develop a reasonable compromise. Should we wait too long, we may lose the opportunity of a lifetime. ¶ Conclusions¶ In line with the spirit of cooperation and sustainability of the Moon Village, this paper addressed how lunar resource activities can become a model for fair and sustainable space exploration through the development of a Social License to Operate (SLO). To this end, Chapter 1 described the main features of terrestrial SLO and how this tool is used on Earth to reinforce the social dimension of extraction activities. Due to its flexible nature and its successful results, the chapter concluded by praising SLO as a fair tool that goes hand in hand with the spirit of the Outer Space Treaty. Accordingly, a Lunar SLO could work as an alternative scheme to protect and satisfy the main interests of (hu)mankind and all countries under Article I OST related to lunar activities. Inter alia, Chapter 2 showed how **a LunarSLO could be used to protect natural or heritage sites on the Moon**, as well as to ensure the fair participation of all Countries in activities thereby. Further, a Lunar SLO would also be a suitable tool to ensure equitable access to “unique” areas on the Moon, such as the peak of eternal lights, **as well as to prevent the uncontrolled dispersion of scarce or perishable lunar resources.** Based on these findings, Chapter 3 suggested three basic features for the development of Lunar SLOs. First, in compliance with the global relevance of lunar activities, the governance of Lunar SLOs should be both multilevel & multi-stakeholder. Second, given the many interests involved in the utilization of the Moon, Lunar SLOs should be multi-purposes, i.e. sufficiently flexible to achieve different goals. Finally, to preserve the economic feasibility of pioneering lunar activities, Lunar SLOs should also include proportionate incentives for operators. As to the first, Chapter 3 proposed a multi-level and multi-stakeholder distribution of governance tasks for Lunar SLOs. Under this scheme, international NGOs would act as representatives of the global community, interacting with both private companies and national regulators within different national jurisdictions. Concerning the second feature, Chapter 3 identified five potential purposes for the development of Lunar SLOs. Considered altogether, these five purposes would account for the essential requirements of any sustainable lunar settlement: an open international environment fostering a shared and rational utilization of the Moon for exclusively peaceful purposes. Finally, in order to meet the needs of commercial operators, Chapter 3 proposed a system of proportionate incentives, complementary to the five goals mentioned above, as the third fundamental feature for Lunar SLOs.

### 4

#### 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 Hawking 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.

# CASE

### Advantage

#### Non-unique and turn – lunar base not needed for aquaculture because **Przybyla 21 says** any long-term stay in space would encourage people to invest in the field, which means space settlement DA turns

#### TURN: Private companies are key to scientific research anywhere on the moon, including the study of moon dust. The aff reads no arguments to prove heritage sites are any different.

Wendel 20 [JoAnna Wendel, “NASA unveils 16 payloads that private lunar landers will take to the moon,” Space.com, 01/31/2020. <https://www.space.com/nasa-private-moon-lander-science-experiments.html>] CT

WASHINGTON — The commercial spaceflight industry is thriving, and regulators won't get in the way. That's the message that speakers at the 23rd Annual Commercial Space Transportation Conference in Washington this week want to get out. "The innovation, the technology, the leading edge, in many cases, is coming from the private sector," said Rep. Garret Graves, R-LA, of the U.S. House Transportation and Infrastructure Committee's Aviation Subcommittee. "As we move forward on establishing the right type of government structure, all of us are very aware and cognizant that we've got to be very careful about stymieing innovation." NASA is certainly leaning into the push for commercial spaceflight. Just last week, the space agency unveiled 16 scientific experiments and technology demonstrations that will hitch a ride to the moon aboard landers built by two private companies: Astrobotic of Pittsburgh and Intuitive Machines LLC of Houston. The two landers are slated to launch in July 2021 on United Launch Alliance's Vulcan Centaur rocket and Space X's Falcon 9, respectively. Astrobotic's Peregrine lander will carry instruments to study several aspects of the moon's environment. This work will help prepare for the arrival of astronauts and the establishment of a sustainable human presence on and around Earth's nearest neighbor, one of the chief goals of NASA's Artemis program. The different instruments will study the chemistry of materials in the lunar regolith, which future astronauts could harness and use; the radiation environment, which is perhaps the biggest obstacle to human survival and well-being on the moon; and the chemistry of the moon's thin atmosphere, or exosphere. Intuitive Machines will fly experiments that will test autonomous orbital and surface navigation as well as communication experiments and a camera that will monitor the spacecraft's landing plume. The latter experiment is critical to planning for missions to Mars, where NASA wants to send astronauts in the 2030s. Both private landers will carry instruments to aid navigation and help scientists on Earth locate the spacecraft after landing. You can learn more about all 16 science experiments here. The newly announced NASA payloads will fly under the agency's Commercial Lunar Payload Services (CLPS) program, which aims to help pave the way for Artemis and the landing of people near the moon's south pole in 2024. CLPS picked 14 private companies in 2018 to potentially fly NASA payloads to the lunar surface. "The innovation of America's aerospace companies, wedded with our big goals in science and human exploration, are going to help us achieve amazing things on the moon and feed forward to Mars," NASA Administrator Jim Bridenstine said in November 2018, when the agency announced nine CLPS partner companies.

#### Their Shekhtman 21 evidence is game over for the advantage. It proves that lunar heritage is NOT NECESSASRY for basing. It says that NASA is planning bases on the SOUTH POLE of the moon, not the equatorial regions visited on past missions that would be protected by heritage sites. The evidence proves that basing is coming now, even though heritage sites are not protected.

#### TURN: poo paradox – The establishment of lunar heritage sites would make the removal of human waste left behind during previous missions impossible. Unless removed the poop bags will wreck the scientific value of lunar landing sites through contamination. CPs would protect sites while facilitating removal.

Lopez 20 [Hugo Lopez (master 1 in public international law and European law), “Chapter 11 The Protection of Cultural Heritage Sites on the Moon: The Poo Bags Paradox,” Protection of Cultural Heritage Sites on the Moon, edited by Annette Froehlich, Springer International Publishing AG, 2020. ProQuest Ebook Central, http://ebookcentral.proquest.com/lib/harvard-ebooks/detail.action?docID=6157437. Created from harvard-ebooks on 2022-02-14 22:12:36.] CT

Abstract

During the several human Moon missions, astronauts left more than 100 metric tons of objects on and around the landing sites. Among them, there are scientific materials, symbolic, commemorative and personal artefacts as well as bags containing human wastes (feces, urine and vomit). Today, some initiatives have been started in order to declare these sites as «cultural heritage» by both States and regional organisations. However, the very presence of these «poo bags» raises some issues for public international law. Indeed, they could constitute a real threat to the lunar environment and for scientific activities carried out on the Earth’s natural satellite. This article aims to present the paradox of these bags which, on the one hand need to be protected according to their future status of «cultural heritage» and part of cultural sites on the Moon and, on the other, should be removed in order to protect both scientific interests and the lunar environment.

11.1 Introduction

«Yeah, we left a few things up there».1 Here is another sentence from Neil Armstrong which will, later, resonate into the moon tourists’minds, facing one of the rare cultural heritage sites beyond Earth limits. In front of them, take place the memories of Apollo 11 moon landing, as beached in the middle of this magnificent desolation described by Buzz Aldrin a century ago. When the speaker inside their astronaut helmet is turned off, the silence is impressive. Turned on, it is possible to hear a few eco-friendly tourists grumbling about the large amount of wastes, covered by the voice of a guide praising the American success. They are right, even this guy, driving a four-wheel drive car on Earth, not particularly of the environment, finds the cleanliness quite unusual for a cultural site. It must be said that, according to the guide’s speech, there are around 100 different objects that have been abandoned on place. Among them, there is, of course, scientific material, but also symbolic, personal, commemorative, and… organic artefacts. He is now realizing that he has under is eyes, feces, vomit and urine bags constitutive of a human cultural heritage. «A few things up there…».

It is estimated that, since 1959,2 it is more than 100 metric tons which have been accumulated on the Moon’s surface.3 Among these human relics can be found 96 bags full of the organic wastes from the “envoys of mankind”. These wastes are today, for better or worse, part of the few 80 Moon landing sites of human and/or robotics missions, likely to be qualified as “cultural heritage sites” according to the 1972 World Heritage Convention.4 The latter defines a cultural site as the “works of man or the combined works of nature and man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view”.5 More than 40 years after the adoption of this convention, it seems that its implementation has, following the words of Janet Blake, “slowly moved away from the notion of ‘iconic’, ‘wonder of the world’ approach, toward the idea of exemplars of cultural heritage that are ‘representative of the best’ in a particular cultural area, region, them or historical period”.6 Even though there is this drifting in the very notion of cultural heritage, sites like the Apollo 11 one could be considered as such, either on the ‘iconic’ basis or on the ‘representative of the best’ one. To be qualified as a national, regional or international cultural heritage site, a request must be submitted to the competent national, regional or international organisation, which, for the case of the Moon, can raise some issues.

The protection of these sites represents today an important issue with regards to the expansion of commercial space activities and the upcoming advent of space tourism. Indeed, the visit of the sites or the landing next to them could potentially deteriorate them in a permanent and pronounced way. In response to this, initiatives have been launched in order to ensure a national and/or an international protection of these cultural heritage sites. In this respect, it has been required for both the US National Aeronautics and Space Administration (hereinafter ‘NASA’) and the US Keeper of the National Register of Historic Places to the Tranquility base Moon site in the American National Historic Landmark in 2000. The NASA’s Deputy General Counsel answered:

I must inform you that we cannot support your proposal to have Tranquility Base declared a National Historic Landmark (NHL). The Treaty [outer space treaty] declares that there can be no claims of sovereignty or territory by nations over locations in space … ‘by means of use or occupation, or by any other means.’ The listing of lunar areas as NHL’s is likely to be perceived by the international community as a claim over the Moon.7

The Keeper of the National Register followed the NASA’s answer in a letter dated from August 18, 2000, addressed to the authors of the request (the Lunar Legacy Project).8 However, it seems that the State practice is evolving. If, at the moment, it is not possible, according to the Treaty on the principles governing the activities of states in the exploration and use of outer space, including the Moon and other celestial bodies (hereinafter the space treaty), to claim sovereignty over the Moon and other celestial bodies9—or part of them—, the NASA changed its view since the request. The American space agency has revised its initial position and set, in 2011, recommendations aiming to protect the American artefacts located on the Moon. These recommendations establish exclusion zones around the Moon landing sites of Apollo missions, robotic missions (e.g. Surveyor sites), impact sites (e.g. Ranger, S-IVF, LCROSS, …) and other indicators of US human, human-robotic lunar presence, including footprints, rover tracks, etc.10 The breadth of the exclusion zone is set on a case-by-case basis. For instance, for the Apollo 11 Moon landing site, its diameter from the lunar module descent stage is of 75 m and of 225 m for the Apollo 17 one.11 Furthermore, the American Congress adopted in 2013, the Apollo Lunar Landing Legacy Act12 in order protect the Apollo missions’ sites. In addition, two States (California13 and New Mexico14) have added Tranquillity Base to their list of protected heritages sites. Despite being non-legally binding at an international level, it seems that, up to now, no State has been opposed to the US Moon cultural heritage protection policy. A second indicator of the evolution of the Sate practice toward a full protection of such sites, is the statement of the European Space Agency’s (hereinafter ‘ESA’) director general Jan Wörner, who wishes to recognize them as “cultural heritage”.15 This call for article is likely to be the omen of the Agency’s intention. It could be the catalyst of an evolution, if not, an adaptation of space law in this way.

However, in addition to the question about the legality of the acknowledgment of the status of «cultural heritage» to the human relics on the Moon’s surface and of the creation of exclusion zones, the question of their protection raises many issues. For instance, the single presence of bags containing human organic waste challenges public international law on several aspects which will be studied all along this article. Indeed, the contents of these bags could, in the long run, cause major concerns for the lunar environment as well as for the human scientific activities carried out on the Moon. Regarding the first issue, the introduction of terrestrial substances onto the Moon or other celestial bodies could, permanently, jeopardize the existence of possible indigenous life forms.16 Concerning the second issue, these life forms or organisms left on the Moon by humans could distort the results of scientific researches carried out into outer space. If scientists, one day, discover a life form on the Moon, how would they know if the organism found was already present or if it is coming from one of these bags? Up to now, a such situation on the Moon is quite probable, but the treatment of the Earth’s natural satellite must be an example for the next human missions later carried out on Mars and other celestial bodies. For international law, this situation is paradoxical. Indeed, how to ensure a full protection of a cultural heritage site located on theMoon when one of its components is likely to contaminate and deteriorate it? The question of the protection of the sites this threat will be studied in a second part (II). The first part will be dedicated to the study of the legal status of these «poo bags» and consequently, the competences of the States over them (I). The understanding and the determination of the jurisdiction and control of a State over such objects is indeed, a substantial condition to the resolution of the «poo bag paradox».

11.1.1 From Human Waste to Cultural Heritage or How a Poo Bag Becomes a Cultural Heritage Protected Under Public International Law

The legal obligations and competences of a State in outer space are enunciated in the corpus of space law. This one is based on several international instruments and has as Magna Carta17 the 1967 Outer Space Treaty. From these different treaties, it is possible to identify three categories of statutes, subject to different legal regimes: one for the space objects (including launchers, spacecraft, modules, …), one for the astronauts, and one for the Moon and other celestial bodies. For instance, an astronaut is considered as an “envoy of mankind” and therefore, benefits from a particular protection. Article VIII of the space treaty provides that a State retains its jurisdiction and control over its space objects launched into outer space as long as they stay there. The question, in order to determine if a State could remain competent over the human waste bags located on a cultural heritage site on the Moon, is now to know if such object could be considered as a space object (A) or if they shall be considered differently. Then, it will be possible to study the management of the overlap between the status of space object and the status of cultural heritage (B). This will allow us to understand the competences of the State to remove them—or not—from their location in order to ensure a full protection of the lunar environment as well as the scientific interests of other States in the second part.

11.1.1.1 The Uncertain Legal Status of the Poo Bags Located in Outer Space

The characterization of the legal status of the organic waste bags is a prior condition to be able to determine if a State retains control and jurisdiction over them. As seen above, there are three categories of legal statutes established by the different space treaties: one for the space objects, one for the astronauts and one for the Moon and other celestial bodies. If the latter can easily be excluded, the question is, which status fits the human waste located in outer space? Can human waste be considered as a space object? This would be in contradiction with the customary rules of the 1969 Vienna Convention on the law of treaties according to which a provision of a treaty “must be interpreted in good faith, in accordance with the ordinary meaning given to their terms in their context and in the light of the object and purpose of the Convention”.18 It is clear that the ordinary meaning of “object” does not ordinarily include human wastes. But, do these wastes fit the ordinary meaning of the term “astronaut” as well? The legal status of the human wastes is uncertain and could be debated. Indeed, the very term of “space object”, however central in space law, did not receive any legally binding definition within the space treaties, but only some indicative elements. Notably, the Convention on international liability for damage caused by space objects19 (hereinafter ‘the liability convention’) provides that the term “space object includes component parts of a space object as well as its launch vehicle and parts thereof ”.20 This implies that each object and its components—and the debris they could potentially generate—located in space are considered as space objects. The definition of the space object is even more important since it implies a full jurisdiction and control of the State of registry over them, during all the time that they are in outer space.21 Bin Cheng established a definition derived from an analysis of the State practice and affirms that the term space object is “the generic term used to cover spacecraft, satellites and, in fact, anything that human beings launch or attempt to launch into space, including their components and launch vehicles, as well as parts thereof ”.22 Stephen Gorove reached a more precise definition and interpretation of the term space object.He explains that “a “space object”may mean any object which was designed to be launched into outer space […]. The component parts of a space object would include all elements normally regarded as making up the space object, including fuel tanks and perhaps even the fuel itself. Thus any object, without which the space spacecraft would be regarded incomplete, may be taken to constitute a component part”.23 However, concerning human wastes, this definition, and more generally, the lack of definition, raises some questions. Indeed, should they be considered as a “space object”? These wastes are certainly part of a space object (a launcher, a module, …) but are not themselves coming from a space object since they have been ejected by an “envoy of mankind”. Although this expression is a fiction impregnated by the philosophy of the space treaties,24 the legal framework applicable to a human being in space is different than the one applicable to a space object. Thus, it does not seem possible, like it is the case for space object, to consider as “envoys of mankind” each of their constitutive elements. Such a consideration would imply, for instance, a duty of the States to rescue25 the astronauts’ organic wastes as well as their limbs—in the improbable case of a dismemberment—which would be disproportionate regarding the cost of a space mission and the benefit of the “rescue”. This issue regarding the legal status of human wastes or limbs is debatable and will probably remain unsolved, but in the case of such wastes found on the Moon cultural heritage sites, it is possible to answer by surrounding it. Indeed, on theMoon, the wastes are contained in bags and consequently, it is possible to distinguish the content from the container. If the content of the bags cannot be defined, the bags can be since they were boarded on the spacecraft and, therefore, were part of them. Moreover, these bags have been thought and developed to be embarked during space mission to contain human waste, it is arguable that they have to be regarded as part of the spacecraft and consequently, as a space object. Following this reasoning, States do not have the full jurisdiction and control over the human waste directly but over its containers, giving them the possibility to adopt laws and regulations to manage them on the Moon and, for instance, by acknowledging them as cultural heritage.

11.1.1.2 From Space Object to International Cultural Heritage

Once the status of the human organic wastes located on the Moon sites identified, it is interesting to turn to the question of the modalities and legal consequences of its evolution to a “cultural heritage”. The studied bags are today part of the different Moon landing sites which, according to the definition from the 1972World Heritage Convention, could be qualified—in case of request from the Statewho has jurisdiction over these elements—as cultural sites. The first raising issue is to discover to what extent a State could make such a request. For instance, the 2001 Convention on the protection of the underwater cultural heritage establishes a time condition, as well as a condition related to the cultural, historical or archaeological importance of the object/site located underwater. This convention provides that to be qualified as underwater cultural heritage, the “traces of human existence” must be “partially or totally under water, periodically of continuously, for at least 100 years”.26 It seems however, that the reasoning by analogy with theMoon cultural sites has not vocation to apply since some States already wish to qualify them as such, regardless of any time condition.27 The exceptional character of human missions on the Moon seems therefore to be self-sufficient to consider their sites as cultural heritage. A bag full of organic wastes should not, in itself, be considered as a cultural heritage, but it is arguable that its very presence in the heart of a cultural site, since its origin, is enough to convey it this qualification. However, who is competent to decide if a Moon site, consequently located in an area beyond national jurisdiction, could be qualified as such? The World Heritage Convention stipulates, indeed, that States can only submit to the UNESCO sites within their territory.28 The US Apollo Lunar Landing Legacy Act, to this extent, provides that a request shall be sent to the UNESCO to register Apollo mission sites on the World Heritage list.29 To date, no such request seems to have been made. The protection of the Moon cultural sites would therefore not be ensured through the World Heritage Convention and, would rather have to be either national or regional (in the case of future ESA’s Moon’s surface mission for instance30). Another solution would be to adopt, like it is the case for Antarctica, an international instrument, specific to this issue in this international area.31 However, today, some States, including the United States, constantly reject the multilateralist basis in space law matters. De facto, this branch of public international law is no more developed through the consensualist basis, but rather upon the adoption of technical regulations, within the works of the Committee on the Peaceful Uses of Outer Space (UNCOPUOS)’s Scientific and Technical Subcommittee.32 This organ would then be competent to adopt legal—non-binding—norms aiming to protect the cultural heritage sites on the Moon. It is also possible that a multilateral convention, specific to this issue, might be adopted since the main obstacle to space law negotiations—the United States—has, firstly, the will to protect such sites and, secondly, interests in doing so. Indeed, the measures they have adopted until now are not binding for third States. Pending an international protection regime, the States remain competent over cultural sites on the Moon through the jurisdiction and control they exercise on their space objects,33 including, as seen before, human organic waste bags. Consequently, the overlapping between the status of space object and the status of cultural heritage does not pose any difficulties as in both cases, States retain jurisdiction over the artefacts located on the Moon. However, what would happen if these relics received the status of “cultural heritage” at the international level (on the UNESCO World Convention or other multilateral agreement basis)? Does a status would have to be prioritized over the other? For instance, if aMoon tourist uses the golf club abandoned by Alan Shepard during the Apollo 14 mission, to beat another tourist, causing him a “personal injury”, does the responsibility of United Stated could be engaged under the Liability convention? In the case where the object is part of the cultural site but conserves its status of space object, this would be possible. Otherwise, if the object, part of the cultural site, only keeps the status of “cultural heritage”, the responsibility of United States would not be engaged. Insofar, as these objects were and are space objects by nature and have only been qualified as cultural heritage after recognition, it is arguable that the second should be given precedence over the first and that only the “cultural heritage” qualification should be retained. Thus, the organic waste bags can be qualified as “cultural heritage”, which could, at first glance, be puzzling with respect to the vision of human that we wish to leave to future generations.34 However, in addition to the arguable nature of cultural heritage, these bags represent a real threat for the lunar environment as well as for the scientific activities carried out on the Moon and, according to space law and international environmental law, should not have been abandoned up there.

11.1.2 From Cultural Heritage to Interplanetary Threat: The Poo Bag Paradox

During the future acknowledgement, either national, regional or international, of lunar cultural sites, States would have to face a reality: the “poo bags” are a threat for the Moon’s environment. The situation is then paradoxical as they will have to be protected and conserved regarding their status of cultural heritage, despite the fact that their very presence is prohibited under space and international environmental law. First, it will be show to what extent their presence at theMoon’s surface is breaching international law (A) and, secondly, it will be studied what are the solutions to this paradoxical situation (B).

It is estimated that more than a billion bacteria are present per grams of wet stool, turning a simple excrement into a complex bacterial ecosystem. These stools could have harmful consequences into outer space. For instance, within the International Space Station (ISS), it is acknowledged by the American Federal Astronautical Administration (FAA) that the organic wastes can cause damages. In a report, the FAA recognized that “Biological solid waste, such as those from food, are generally not stable, as they contain 40-90% moisture and soluble organic compounds. As a result, these wastes cannot be stored for extended periods, because they will decompose, leading to the growth of undesirable anaerobic microorganisms (which could pose a threat to crew health), produce noxious gases (including N2O, NH3, H2S), and create foul odors from volatile fatty acids”.35 Once on the Moon, it is possible that similar harmful effects could occur: The Earth already showed us the effects of the introduction of alien species from an environment into another.36 On the Moon, scientists still do not know if the bacteria present in these bags are still alive, but this possibility has not been rejected.37 Even more, there is a theory, called “Panspermia”, still under debate among the scientific community, according to which the life on Earth has been brought by space bodies such as asteroids38 and therefore, can survive during an interplanetary journey. It is then arguable that life could survive longer than 50 years on the Moon’s surface. Without entering into this scientific debate, bacteria can be found in the harshest environment on Earth: in the deep seabed area, within glaciers, … Their survival up there is therefore possible. Such a possibility would thus imply the violation of public international law on two basis. Firstly, the organic waste bags are constitutive of a risk for the lunar environment, and, secondly, could potentially jeopardize the scientific activities carried out on the Moon.

Concerning the threat to the lunar environment, the 1967 outer space treaty provides that “States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination […]”.39 In addition, it is also possible to take into account the whole corpus of international environmental law in this case as article III of the same treaty enunciates that States have to conduct their activities in accordance with international law.40 Thus, this “contact clause” between space law and international law, allows for the application of the sic utere tuo ut alienum non laedas principle (use your own property in such a manner as not to injure that of another)41 codified in the principle 21 of the 1972 Stockholm Declaration42 and in the principle 2 of the 1992 Rio Declaration.43 According to this principle, “States have […] the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction”.44 Even though the customary nature of this principle is still under debate,45 this one is considered as “a cornerstone of international environmental law”,46 nay as a “generally accepted principle of international law”.47 However, no damages to the environment has been demonstrated up to now and it is unlikely that this would occur one day, without eliminating the risk. The precautionary principle would imply that States have a duty to remove the organic waste bags from the lunar surface, even if they are considered as “cultural heritage” of the Moon. Further development will be given about this issue in the next Sect. 11.1.2.2. Concerning the possible harm to the States’ interests in the conduct of their activities in outer space, these bags could also constitute a threat to their scientific activities. Activities which, historically, are at the heart of the space conquest.48 Indeed, in the case of the discovery of a life form on the Moon, how would it be possible to know if it was already present in situ or if it comes from one of the bags’ content abandoned by astronauts? In order to mitigate this issue, the Committee on Space Research (COSPAR), in the continuity of article IX of the space treaty, has adopted non-legally binding guidelines which it regularly modifies.49 In these, the COSPAR aims to protect scientific activities and interests of the States by the implementation of technical requirements in order to avoid the contamination of the space environment. Despite being inexistent at the time of the Apollo missions, it is arguable that, today, the abandonment of human organic waste on the Moon would be prohibited.

The very presence of this kind of bags is therefore in contradiction with both space and international environmental law. The raising question is therefore, what should we do with them? Could we remove them from a cultural heritage site located on the Moon?

11.1.2.2 The Removal of the Poo Bags from the Moon: An Unsolvable Equation

Once the organic waste bags qualified by States as a cultural heritage, they will entail into a paradoxical situation. On the one hand, their very presence is in breach of public international law and a threat to the whole site on which they are located—and more generally, the Moon’s environment—and, on the other hand, they will have to be protected due to their status. The question is now to know what should the States do to deal with this issue? Should they remove them, at the risk of degrading the cultural site or, on the contrary, should they leave them up there at the risk of contaminating the Moon?

In the first case, if, for instance, United States want to remove these bags located on the Apollo 11 site, they would have to face a reality: the removal would imply the denaturation of the site, and not only by the destruction of a cultural object. In the case of a human mission aiming to take them back to Earth, the footprints of the astronauts would either be confused with Armstrong or Aldrin’s ones or would deteriorate them. In the case of a robotic mission, this would imply the creation of new prints which would also deteriorate permanently the site. Finally, in the case of an airlift by a probe—which is unlikely because of the poor lunar atmosphere— the blow would have for consequence to raise particles which could then cover the footprints of our space pioneers. Moreover, the removal would necessarily be in breach with the national, regional or international rules relating to the protection of the cultural heritage as both are incompatible. Indeed, it is unlikely that the cultural regulation will allow the permanent removal of one of the objects constitutive of a cultural site. Lunar sites are therefore victims of their own protection…

### Solvency

#### Damage inevitable -- All lunar activity causes damage to heritage sites. So, double bind: either the aff doesn’t solve or the entire moon is off limits, super-charging the DAs.

Greenfieldboyce 19 [Nell Greenfieldboyce, “How Do You Preserve History On The Moon?,” NPR, 2/21/19. <https://www.npr.org/2019/02/21/696129505/how-do-you-preserve-history-on-the-moon>. Accessed 2/14/22] CT

Since no one has tried to protect any cultural artifacts on the moon before, it's unclear exactly how to preserve them.

But some thinking has already gone into this, because a group formed by NASA made recommendations that "space faring entities" could voluntarily follow if they ventured to the moon. The recommendations set out areas around the fragile sites that should not be entered with rovers, for example, and warn against touching any hardware without prior permission from NASA.

These recommendations were created in response to the Google Lunar X Prize, a competition that began in 2007 and offered a cash prize to the first privately funded effort that successfully landed a robotic spacecraft on the moon. It offered a huge bonus if the spacecraft could beam back images or video of one of the multiple Apollo project landing sites, which alarmed some experts because of the possibility of inadvertent destruction.

"I was contacted by some of the companies that were competing for the Google Lunar X Prize," recalls Philip Metzger, a planetary scientist now at the University of Central Florida. At the time, Metzger was at NASA studying the blast effects from the Apollo lunar landings, and he and his colleagues found that the landings created surprisingly violent blasts of grit and dust. "[The companies] wanted to go visit the Apollo sites during those missions, and they didn't want to sandblast and ruin the Apollo sites."

Metzger knew it was a real danger. In 1969, the Apollo 12 astronauts landed 160 meters away from the Surveyor III spacecraft that had been on the moon for a couple of years. The astronauts walked over and removed some pieces of the craft to bring them home for analysis to see how the lunar environment affected equipment. "Well, the main thing we discovered was that it was sandblasted like crazy from the landing of the Apollo lunar module," Metzger says.

That was a shock, since NASA thought it had landed far enough away for the robotic spacecraft to be safe. But Surveyor III suffered so much damage that it changed color, going from white to brown, as tiny bits of lunar soil got blasted onto its surface. And Surveyor III was even spared the worst of the damage because it was in a crater and protected from the main spray of debris.

Since then, Metzger says, they've analyzed videos showing that the Apollo landings could eject gravel and even fist-sized rocks at high velocity. "If you landed within 100 meters of something sensitive, you could definitely have a bad day by hitting it with a rock at 50 miles an hour," he says.

In fact, computer modeling shows that it's impossible to have a major landing on the moon without causing some degree of damage from all the dust and rock that gets stirred up — and that made it difficult for the NASA group to come up with recommendations about how future missions should go forward without unduly damaging the Apollo treasures. "Every time you land on the moon within 100 kilometers, you're going to cause a little bit of damage," says Metzger, "and so we were faced with this impossible question: How far away is OK to land your rocket on the moon?"

The group eventually settled on a recommendation to keep landings about 2 kilometers away from the Apollo sites. "The boundary has nothing to do with real science," Metzger notes. "It's just a number we made up because we couldn't do any better at the time."

He says it's important to retain access to the Apollo sites, for science and cultural reasons, while protecting them from excessive damage. "We would love to have people visit those sites and send back imagery. Not only for the scientific value, but for the cultural value, so that people can see again that we have visited the moon and it will inspire people to want to go back," Metzger says.

#### Free use – Their own authors prove no solvency. If there is a problem, appropriation is not it, the OSTs principle of free use is the sticking point. Only the CP solves since it actually regulates the use of space.

Hertzfeld and Pace 13 RECUT [Henry R. Hertzfeld and Scott N. Pace ,“International Cooperation on Human Lunar Heritage,” SCIENCE VOL 342 29 NOVEMBER 2013. <https://cpb-us-e1.wpmucdn.com/blogs.gwu.edu/dist/7/314/files/2018/10/Hertzfeld-and-Pace-International-Cooperation-on-Human-Lunar-Heritage-t984sx.pdf>] CT

Less than 2 years before the first footsteps on the lunar surface on 20 July 1969 (see the image) , the United Nations Outer Space Treaty (OST) was drafted, ratified, and came into force ( 1). Article II of the OST reinforced and formalized the international standard that outer space, the Moon, and other celestial bodies would not be subject to claims of sovereignty from any nation by any means, including appropriation. The OST prohibits ownership of territory or its appropriation by any state party to the treaty, which includes the United States, Russia, and 126 other nations. It does not prohibit the use of the Moon and its resources. In fact, the treaty emphasizes the importance of freedom of access to space for any nation and the importance of international cooperation in space exploration. These principles of the space treaties have enabled gains in science and technology and have contributed to international stability in space. New attention is being focused on the lunar surface. China has an active Moon exploration program and is considering sending astronauts (taikonauts) to the Moon. Private fi rms are contemplating robotic missions that could land in the vicinity

of the historical sites of Apollo and other missions. Although we might assume the best of intentions for such missions, they could irreparably disturb the traces of the fi rst human visits to another world. NASA has taken steps to protect the lunar landing sites and equipment and to initiate a process to create recognized norms of behavior. In July 2011, guidelines were issued for private companies competing in the Google Lunar X Prize that established detailed requirements for avoiding damage to U.S. government property on the Moon ( 2). H.R. 2617, The Apollo Lunar Landing Legacy Act, was introduced into the U.S. Congress on 8 July 2013 ( 3). In essence, it proposes to designate the Apollo landing sites and U.S. equipment on the Moon as a U.S. National Park with jurisdiction under the auspices of the U.S. Department of the Interior. Although the bill acknowledges treaty obligations of the United States, it would create, in effect, a unilateral U.S. action to control parts of the Moon. This would create a direct confl ict with international law and could be viewed as a violation of U.S. commitments under the OST. It would be an ineffective way of protecting historical U.S. sites, and it fails to address interests of other states that have visited and will likely visit the Moon. It is legally fl awed, unenforceable, and contradictory to our national space policy and our international relations in space ( 4).