## 1AC---Policy

### 1AC---Plan

#### Plan - Private entities ought not appropriate lunar heritage sites

Harrington 19, Andrea J. "Preserving Humanity's Heritage in Space: Fifty Years after Apollo 11 and beyond." J. Air L. & Com. 84 (2019): 299. (Associate Professor and Director of the Schriever Space Scholars at USAF Air Command and Staff College)//Elmer

The issue of humanity’s cultural heritage in space has arisen as one of many unanswered questions in space law, with no international agreements specifically addressing it. With the beginning of the space age fifty-six years ago and a series of remarkable achievements in space exploration behind us, it is necessary to determine what should be done regarding the “artifacts” of this exploration. NASA has promulgated their recommendations for spacefaring entities with the goal of protecting the lunar artifacts left behind by the Apollo missions.8 These recommendations establish “keep-out zones” of up to a four kilometer diameter with the aim of protecting the artifacts, particularly from dangerous, fastmoving particles that arise as a result of craft landings.9 Experience has shown that even artifacts that are sheltered by craters can be significantly sandblasted and pitted as a result of the moving particles.10 These recommendations, supposedly drafted in conformity with the Outer Space Treaty, however, are completely nonbinding.11 Legislation that has passed the U.S. Senate and is under consideration by the House of Representatives as of July 2019 would make these recommendations binding on U.S. entities seeking to land on the Moon.12 Accidental damage from unrelated missions, however, is only one of many threats to space artifacts. With the impending return to the Moon, it is likely that individuals and corporations will be looking to turn a profit from space heritage, without concern for the protection of such heritage. Tourists may disrupt sites with careless expeditions and landing sites may be desecrated so that the items can be sold. A Russian Lunakhod lunar rover has already been sold at auction to a private party, though it has not yet been moved from its original position on the Moon.13 While national heritage legislation can protect space artifacts from citizens of their own countries, there is currently no effective means in the present space law regime by which a country can protect its heritage from other countries.14 Both California and New Mexico have added Tranquility Base to their list of protected heritage sites.15 However, this solution, and those proposed in the bill put forth to the U.S. House of Representatives, only serve to restrict the activities of a small subset of the potential visitors to the Moon. Though the Senate bill calls for the President to initiate negotiations for a binding international agreement, there is still a long road from this bill to a potential agreement.16 A solution is needed to prevent the damage, destruction, loss, or private appropriation of our cultural heritage in space.

#### Appropriation means taking from others without the owners permission. O/Ws since it’s first definition which is most predictable

Oxford. Lexico. Appropriation. https://www.lexico.com/en/definition/appropriation

the action of taking something for one's own use, typically without the owner's permission.

### 1AC---Lunar Heritage ADV

#### The Advantage is Lunar Heritage:

#### Private moon rush now.

Sample 19 Ian Sample 7-19-2019 “Apollo 11 site should be granted heritage status, says space agency boss” <https://www.theguardian.com/science/2019/jul/19/apollo-11-site-heritage-status-space-agency-moon> (PhD at Queens Mary College)//Elmer

But protecting lunar heritage may not be straightforward. On Earth, the United Nations Educational, Scientific and Cultural Organisation (Unesco) decides what deserves world heritage status from nominations sent by countries that claim ownership of the sites. Different rules apply in space. The UN’s outer space treaty, a keystone of space law, states that all countries are free to explore and use space, but warns it “is not subject to national appropriation by claim of sovereignty”. In other words, space is for all and owned by none. Wörner is not put off and sees no need for troublesome regulations. “My hope is that humanity is smart enough not to go back to this type of earthly protection. Just protect it. That’s enough. Just protect it and have everybody agree,” he said. A no-go zone of 50 metres around Tranquility base should do the job, he added. Martin Rees, the Cambridge cosmologist and astronomer royal, said there was a case for designating the sites so future generations and explorers were aware of their importance. “If there are any artefacts there, they shouldn’t be purloined,” he said. “Probably orbiting spacecraft will provide routine CCTV-style coverage which would prevent this from being done clandestinely.” Beyond the dust-covered hardware that stands motionless on the moon, Lord Rees suspects future activity could drive calls for broader lunar protection. The Apollo 17 astronaut and geologist Harrison Schmidt has advocated strip mining the moon for helium-3, a potential source of energy. The proposal, which Rees suggests has raised eyebrows in the community, could potentially provoke a backlash. “There might be pressure to preserve the more attractive moonscapes against such despoilation, and to try to enforce regulations as in the Antarctic,” he said. Fifty years on from Apollo 11, the moon is still a place to make statements. In January, the Chinese space agency became the first to land a probe on the far side. On Monday, India hopes to launch a robotic probe, the delayed Chandrayaan-2 lander that is bound for the unchartered lunar south pole. Far more is on the cards. Major space agencies, including ESA and Nasa, plan a “lunar gateway”, described by Wörner as a “bus stop to the moon and beyond”. His vision is for a “moon village”, but rather than a sprawl of domes, shops and a cosy pub, it is more an agreement between nations and industry to cooperate on lunar projects. The private sector is eager to be involved. Between now and 2024, at least five companies aim to launch lunar landers. In May, Nasa selected three companies to design, build and operate spacecraft that will ferry scientific experiments and technology packages to the moon. The coming flurry of activity may make protection more urgent. Michelle Hanlon, a space lawyer at the University of Mississippi, co-founded the non-profit organisation For all Moonkind to protect, preserve and memorialise human heritage on the moon. While she conceded that not all of the sites that bear evidence of human activity needed protection, she said many held invaluable scientific and archaeological data that we could not afford to lose. “These sites need to be protected from disruption if only for that reason,” she added. The protection should be far wider, and more formal, than Wörner calls for, Hanlon argues. “It is astounding to me that we wouldn’t protect the site of Luna 2, the very first object humans crashed on to another celestial body, and Luna 9, the very first object humans soft-landed on another celestial body,” she said. The Soviet Luna programme sent robotic craft to the moon between 1959 and 1976. “The director general has a much more optimistic view of human nature than I do,” Hanlon said. “I completely agree that the entities and nations headed back to the moon in the near future will take a commonsense approach and give due regard to the sites and artefacts. However, that is the near future. We have to be prepared for the company or nation that doesn’t care. Or worse, that seeks to return to the moon primarily to pillage for artefacts that will undoubtedly sell for tremendous amounts of money here on Earth.”

#### Corporate development, tourism, and looting will destroy scientifically rich Tranquility base artifacts.

Fessl 19 Sophie Fessl 7-10-2019 “Should the Moon Landing Site Be a National Historic Landmark?” <https://daily.jstor.org/should-the-moon-landing-site-be-a-national-historic-landmark/> (PhD King’s College London, BA Oxford)//Elmer

When Neil Armstrong set foot on the moon on July 20, 1969, the pictures sent to Earth captured a historical moment: It was the first time that any human set foot on another body in our solar system. Fifty years later, experts are debating how to preserve humankind’s first steps beyond Earth. Could a National Park on the moon be the solution to saving Armstrong’s bootprints for future archaeologists? Flags, rovers, laser-reflecting mirrors, footprint—these are just a few of the dozens of artifacts and features that bear witness to our exploration of the moon. Archaeologists argue that these objects are a record to trace the development of humans in space. “Surely, those footprints are as important as those left by hominids at Laetoli, Tanzania, in the story of human development,” the anthropologist P.J. Capelotti wrote in Archaeology. While the oldest then known examples of hominins walking on two feet were cemented in ash 3.6 million years ago, “those at Tranquility Base could be swept away with a casual brush of a space tourist’s hand.” Fragile Traces Just how fragile humankind’s lunar traces are was seen already during Apollo 12. On November 19, 1969, Charles “Pete” Conrad and Alan Bean manually landed their lunar module in the moon’s Ocean of Storms, 200 meters from the unmanned probe Surveyor 3, which was left sitting on the moon’s surface two years earlier, in 1967. The next day, Conrad and Bean hopped to Surveyor 3. As they approached the spacecraft, they were surprised: The spacecraft, originally bright white, had turned light brown. It was covered in a fine layer of moon dust, likely kicked up by their landing. Harsh ultraviolet light has likely bleached the U.S. flag bright white. Without Apollo 12 upsetting the moon dust, Surveyor 3 would likely have remained stark white. Unlike Earth, the moon has no wind that carries away the dust, no rain to corrode materials, and no plate tectonic activity to pull sites on the surface back into the moon. But the moon’s thin atmosphere also means that solar wind particles bombard the lunar surface, and harsh ultraviolet light has likely bleached the U.S. flag bright white. The astronauts’ first bootprints will likely be on the moon for a long time, and will almost certainly still be there when humans next visit—unless, by tragic coincidence, a meteorite hits them first. Had LunaCorp not abandoned the idea in the early 2000s, the company’s plan to send a robot to visit the most famous sites of moon exploration could have done a lot of damage. And with Jeff Bezos’ recent unveiling of a mock-up of the lunar lander Blue Moon, it is only a matter of time before corporate adventurers and space tourists reach the moon. Historians and archaeologists are keen to avoid lunar looting. Roger Launius, senior curator of space history at the National Air and Space Museum in Washington, D.C., warned: “What we don’t want to happen is what happened in Antarctica at Scott’s hut. People took souvenirs, and nothing was done to try to preserve those until fairly late in the game.” On the other hand, there is a legitimate scientific interest in investigating how the equipment that’s on the moon was affected by a decades-long stay there.

#### Private entities are a unique threat---universal rules key.

* Private Key Card – AT: Alt Causes
* AT: Unilat CP
* AT: Adv CP
* AT: Generic DA
* AT: OST DA
* Solvency Advocate

Hertzfeld and Pace 13 (, H. and Pace, S., 2013. International Cooperation on Human Lunar Heritage. [online] Cpb-us-e1.wpmucdn.com. Available at: <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> [Accessed 18 January 2022] Dr. Hertzfeld is an expert in the economic, legal, and policy issues of space and advanced technological development. Dr. Hertzfeld holds a B.A. from the University of Pennsylvania, an M.A. from Washington University, and a Ph.D. degree in economics from Temple University. He also holds a J.D. degree from the George Washington University and is a member of the Bar in Pennsylvania and the District of Columbia. Dr. Hertzfeld joined the Space Policy Institute in 1992. His research projects have included studies on the privatization of the Space Shuttle, the economic benefits of NASA R&D expenditures, and the socioeconomic impacts of earth observation technologies. He teaches a course in Space Law and a course in microeconomics through the Economics Department at G.W. Dr. Hertzfeld has served as a Senior Economist and Policy Analyst at both NASA and the National Science Foundation, and has been a consultant to many U.S. and international organizations, including a recent project on space applications with the OECD. He is the co-editor of Space Economics (AIAA 1992). Selected other publications include a study of the issues for privatizing the Space Shuttle (2000), an analysis of the value of information from better weather forecasts, an analysis of sovereignty and property rights published in the Journal of International Law (University of Chicago, 2005), and an economic analysis of the space launch vehicle industry (2005). Dr. Hertzfeld has also edited and prepared a new edition of the Study Guide and Case Book for Managerial Economics (Sixth Edition, W.W. Norton & Co.). Dr. Scott N. Pace is the Deputy Assistant to the President and Executive Secretary of the National Space Council (NSpC). He joined the NSpC in August 2017. From 2008-2017, he was the Director of the Space Policy Institute and a Professor of the Practice of International Affairs at George Washington University’s Elliott School of International Affairs. From 2005-2008, he served as the Associate Administrator for Program Analysis and Evaluation at NASA. Prior to NASA, he was the Assistant Director for Space and Aeronautics in the White House Office of Science and Technology Policy. From 1993-2000, he worked for the RAND Corporation’s Science and Technology Policy Institute, and from 1990-1993, he served as the Deputy Director and Acting Director of the Office of Space Commerce, in the Office of the Deputy Secretary of the Department of Commerce. In 1980, he received a Bachelor of Science degree in Physics from Harvey Mudd College; in 1982, Masters degrees in Aeronautics & Astronautics and Technology & Policy from the Massachusetts Institute of Technology; and in 1989, a Doctorate in Policy Analysis from the RAND Graduate School.)-rahulpenu

International Cooperation on Human Lunar Heritage The U.S. Apollo Space Program was a premier technological accomplishment of the 20th century. Preserving the six historic landing sites of the manned Apollo missions, as well as the mementos and equipment still on the Moon from those and other U.S. (e.g., Ranger and Surveyor) and Soviet Union (e.g., Luna) missions is important. Some of the instruments on the lunar surface are still active, monitored, and provide valuable scientifi c information. But recent government and **private**-**sector** **plans** to explore and potentially use lunar resources for commercial activity raise questions about the use of the Moon and potential accidental or purposeful threats to the historic sites and scientific equipment there. Although some steps to protect these sites have been proposed, we suggest a better way, drawing on international, not U.S. unilateral, recognition for the sites. Less than 2 years before the fi rst footsteps on the lunar surface on 20 July 1969 (see the image) , the United Nations Outer Space Treaty (OST) was drafted, ratifi ed, 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** **firms** 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 first **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** **conflict** **with** **i**nternational **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** **flawed**, **unenforceable**, and **contradictory** **to** our national **space** **policy** and our international relations in space ( 4). There is a better way for the United States to protect its historic artifacts and equipment on the Moon. The fi rst step is to clearly distinguish between U.S. artifacts left on the Moon, such as fl ags and scientifi c equipment, and the territory they occupy. The second is to gain international, not unilateral, recognition for the sites upon which they rest. Aside from debris from crash landings (by Japan, India, China, and the European Space Agency), there are only two nations with “soft-landed” equipment on the lunar surface: the United States and Russia. China has plans to soft-land Chang’e 3 on the Moon in December 2013. All three nations (and any others wishing to participate) have much to gain and little or **nothing** **to** **lose** **from** a **multinational** **agreement** based on mutual respect and mutual protection of each other’s historical sites and equipment. Legal Issues Although ownership of planets, the Moon, and celestial bodies is prohibited, ownership of equipment launched into space remains with the nation or entity that launched the equipment, wherever that equipment is in the solar system. Under the OST, that nation is both responsible and liable for any harmful acts that equipment may create in space. There are no prescribed limits on time or the amount of damage a nation may have to pay. The U.S. government therefore still owns equipment it placed on the Moon. Ownership has the associated right of protecting the equipment, subject to using necessary and proportional means for protection. But, because no nation can claim ownership of the territory on which equipment rests, there is an open issue of how to control the spots on the Moon underneath that equipment, because the site is **integral** **to** the **historical** **signifi** **-** **cance**. In H.R. 2617, establishment of Apollo sites as a unit of the U.S. National Park System could be interpreted as a declaration of territorial sovereignty on the Moon, even though ensuing paragraphs specify the Park’s components as the “artifacts on the surface of the Moon” at those sites. This problem needs international legal clarifi cation, achievable via a formal agreement among those nations that have the technological ability to directly access the Moon ( 5). Section 6(a) raises another legal issue. The bill proposes that the Secretary of the Interior shall administer the park in accordance with laws generally applicable to U.S. National Parks. It also requires the Secretary to act in accordance with applicable international law and treaties. The U.S. National Park System Act states that the Parks are “managed for the benefi t and inspiration of all the people of the United States” ( 6). The OST clearly emphasizes that the exploration and use of space by nations is to benefi t all peoples. The laws and space policies of the United States have always emphasized peaceful uses of space and the benefi ts of space for humankind. It may not be possible to implement and execute provisions of this Bill without raising important and fundamental questions about these contradictions between the language of the treaty and the mandates of our National Park Service. A third legal issue is raised in section (6) (c)(2) that allows private donations and cooperative agreements to “provide visitors centers and administrative facilities within reasonable proximity to the Historical Park.” This **implies** **future** **private** **use** of the Moon **under** **rights** **granted** **by** the **U.S.** government. **Unilateral** **granting** **of** lunar territorial **rights** to private individuals and implicit sovereign protection of that territory **violates** the **OST**. Finally, section 8 of the bill requires the Secretary of the Interior to submit the Apollo 11 lunar landing site to the United Nations Educational, Scientifi c, and Cultural Organization (UNESCO) for designation as a World Heritage Site. This violates Article II of the OST. All current World Heritage Sites are located on sovereign territory of nations. The only exception is a separate treaty that allows UNESCO to designate underwater sites (such as sunken ships) as protected cultural sites ( 7). These designations are very limited, and although the convention has been ratifi ed by 43 nations, the United States, Russia, and China are not among them. Thus, any new treaty of this type specifi cally for outer space would have little chance of being ratifi ed by the major space-faring nations. A Proposal to Protect Lunar Sites Although a new U.N. treaty for space artifacts of signifi cant cultural and historic importance may be reasonable someday, this would start a very long process with unknown outcomes. Such a treaty could be delayed to a point beyond the time when nations and/or companies may be active on the Moon ( 8). Our suggested alternative is to create a bilateral agreement between the United States and Russia, offered as a multilateral agreement to other nations with artifacts on the Moon. This would be more legally expedient, politically sustainable, and would more likely meet and exceed the stated goals of the bill. It would also emphasize the important role of national laws to implement and enforce these international space agreements. **Any** **nation** **with** **assets** on the lunar surface will **endeavor** **to** **protect** those assets. This creates a situation where those nations have a **timely**, **current**, and **common** **interest** incorporating important implications for peaceful uses of outer space; **scientific** **research** and the advancement of **knowledge**; and **cultural** **and** **heritage** **value**, either presently or in the foreseeable future. The United States, Russia, and China all engage in multilateral cooperative space programs. They share many economic and trade dependencies adding to the international importance of promoting cooperation in space and commerce. In spite of today’s charged political environment, an **agreement** of the type we propose may still be possible to negotiate because it **focuses** **on** the **culture** **of** **space**, the use of space to benefit humankind, and the **archaeological** **record** of our civilization. It specifi cally would not touch sensitive issues of real property rights, export controls, human rights, or the weaponization of outer space. **Cooperation** on recognizing and protecting each other’s interests in historical sites and on equipment and artifacts also has no signifi cant security, prestige, or technological impediments. It reinforces the basic principles of the existing space treaties, avoids declarations of sovereignity on the Moon, and encourages multilateral cooperation resulting in a more stable and predictable environment for private activities on the Moon. The best mechanism for implementing a new agreement would be direct negotiations at highest levels of government in the United States, Russia, and China, with priority to include Russian sites in a proposal that protects U.S. sites. It could be included in meetings of heads of state of those nations, either jointly or sequentially among the three nations. Such an agreement could be executed in a relatively short period of time, setting precedents for peaceful and coordinated research, exploration, and exploitation of the Moon ( 9). An international agreement on lunar artifacts among the United States, Russia, and China would be a far superior and long-lasting solution than the unilateral U.S. proclamation in H.R. 2617. Enforcement of the agreement would be through each nation’s national laws, applying to those entities subject to the jurisdiction or control of the agreement members. Each nation’s property would be protected and preserved. Other nations should be free to join the agreement, and particularly encouraged to do so if they have the ability to access the Moon. An important result would be to develop a new level of trust among nations that could then lead to more **comprehensive** **future** cooperative agreements on **space**, **science**, **exploration**, **commerce**, **and** the use of the Moon and **other** **celestial** **bodies**.

#### Heritage Sites are critical for science research around Dust.

OSTP 18 Office of Science and Technology Policy March 2018 “PROTECTING & PRESERVING APOLLO PROGRAM LUNAR LANDING SITES & ARTIFACTS” (The Office of Science and Technology Policy is a department of the United States government, part of the Executive Office of the President, established by United States Congress on May 11, 1976, with a broad mandate to advise the President on the effects of science and technology on domestic and international affairs.)//Elmer

The Moon continues to hold great significance around the world. The successes of the Apollo missions still represent a profound human technological achievement almost 50 years later and continue to symbolize the pride of the only nation to send humans to an extraterrestrial body. The Apollo missions reflect the depth and scope of human imagination and the desire to push the boundaries of humankind’s existence. The Apollo landing sites and the accomplishments of our early space explorers energized our Nation's technological prowess, inspired generations of students, and greatly contributed to the worldwide scientific understanding of the Moon and our Solar System. Additionally, other countries have placed hardware on the Moon which undoubtedly has similar historic, cultural, and scientific value to their country and to humanity. Three Apollo sites remain scientifically active and all the landing sites provide the opportunity to learn about the changes associated with long-term exposure of human-created systems in the harsh lunar environment. These sites offer rich opportunities for biological, physical, and material sciences. Future visits to the Moon’s surface offer opportunities to study the effects of long-term exposure to the lunar environment on materials and articles, including food left behind, paint, nylon, rubber, and metals. Currently, very little data exist that describe what effect temperature extremes, lunar dust, micrometeoroids, solar radiation, etc. have on such man-made material, and no data exist for time frames approaching the five decades that have elapsed since the Apollo missions. While some of the hardware on the Moon was designed to remain operational for extended periods and successfully telemetered scientific data back to the Earth, much of what is there was designed only for use during the Apollo mission and then abandoned with no expectation of further survivability. How these artifacts and their constituent materials have survived and been altered while on the lunar surface is of great interest to engineers and scientists. The Apollo artifacts and the impact sites have the potential to provide unprecedented data if lunar missions to gather and not corrupt the data are developed. These data will be invaluable for helping to design future long-duration systems for operation on the lunar surface. NASA has formally evaluated the possible effects of the lunar environment and identified potential science opportunities. For example, using Apollo 15 as a representative landing site, the crew left 189 individually cataloged items on the lunar surface, including the descent stage of the Lunar Module, the Lunar Roving Vehicle, the Apollo Lunar Surface Experiments Package, and a wide variety of miscellaneous items that were offloaded by the astronauts to save weight prior to departure. The locations of many of these items are well documented, and numerous photographs are available to establish their appearance and condition at the time they were left behind.

#### Moon Dust Research key to Moon Basing.

Smith 19 Belinda Smith 7-18-2019 “Who protects Apollo sites when no-one owns the Moon?” <https://www.abc.net.au/news/science/2019-07-19/apollo-11-moon-landing-heritage-preservation-outer-space-treaty/11055458> (Strategic Communications Advisor at Department of Education and Training at University of Victoria)//Elmer

It's not just about history Alongside heritage value, the bits and pieces left on the Moon have enormous scientific significance. Take moon dust. It's a real problem for moon-bound equipment because it's made of fine, super sticky and highly abrasive grains, which have a habit of clogging instruments and spacesuits. But as Armstrong and Aldrin trotted across the surface, the footprints they left behind gave us valuable information into the properties of moon dust, Flinders University space archaeologist Alice Gorman said. "The ridges on the boots were meant to measure how far they sank into the dust. "Then they used the light contrast between the ridges to measure the reflectance properties of the dust." A boot print in grey dust. This iconic photo of Buzz Aldrin's footprint is also a science experiment. (Supplied: NASA) It's data like this that will help if we want a long-term base on the Moon — we need to know how our gear will stand up to lunar conditions. Apart from the sticky, gritty dust, the lunar surface is also peppered with meteorites and cosmic rays. So, Dr Gorman said, one of the very few reasons to revisit a moon site is to collect some of the equipment left behind and see how it fared. "What has happened to this material in 50 years of sitting on the lunar surface? "This is going to be really interesting scientific information because it will help planning for future missions and get an understanding of long-term conditions." And NASA has already done this. The Apollo 12 mission, which landed on the Moon four months after Apollo 11, collected parts from the 1967 Surveyor probe and brought them back to Earth. An astronaut standing next to a piece of equipment on the lunar surface Along with rocks and soil samples, Apollo 12 astronauts collected pieces of the Surveyor 3 probe for analysis back on Earth. (Supplied: NASA) Another reason to preserve the equipment left on the Moon is to prove we really went there, Professor Capelotti said. "There's a lot of people out there who still don't believe it happened. "The stuff on the Moon is a testament to what we did and when we did it."

#### Scenario 1 – Warming:

#### Lunar observatory solves warming adaptation.

Ding et al. 17 (, Y., Liu, G. and Guo, H., 2017. Moon-based Earth observation: scientific concept and potential applications. [online] Volume 11, 2018. Available at: <https://www.tandfonline.com/doi/full/10.1080/17538947.2017.1356879> [Accessed 22 January 2022] Yixing Ding - Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing, People’s Republic of China Guang Liu - Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing, People’s Republic of China Huadong Guo - Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing, People’s Republic of China.)-rahulpenu

4. Scientific goal of moon-based earth observation A basic question for moon-based Earth observation is, ‘What to see?’ According to the characteristics of moon-based Earth observation, the phenomena suitable for Moon-based Earth observation may have at least one of the following features: long-lasting, related to Sun–Earth–Moon motion, requires stable baseline observation, large-scale and describes multiple parameters. In the following sections, we will present several observation objectives to discuss in detail. 4.1. Solid earth dynamics Solid Earth tides, continental plate movement and glacier isostatic adjustment (GIA) are three typical large-scale solid Earth movements (Jiang et al. 2016), the measurement of which is a basic task of geodesy. For a uniform layered Earth, accurately predicting tidal movement can be done theoretically, but complex ocean tides and the inelasticity and heterogeneity of Earth’s interior material make the solid tide of the real Earth difficult to research theoretically. For GIA studies, prior knowledge about ancient ice cover evolution and a large amount of observational data are needed. Plate tectonics theory is a quantitative description of Earth plate movement (Ni et al. 2016). It may well explain the movement of most oceanic plates, but still have some problems to explain the mechanism of strong continental earthquakes, large-scale continental deformation, as well as the movements of other oceanic plates (Bird 2003). Accurately **measuring** solid **Earth** **dynamics** is **beneficial** **to** **understanding** solid Earth **tides**, **continental** **plate** **movement** and **GIA**, and provides further support for geodynamics and seismology. Devices such as a superconducting gravimeter and global navigation satellite system are currently used to measure small deformations of solid Earth, but these point-by-point methods are spatially limited to certain regions. Spaceborne InSAR measures deformation continuously, but the swath is not wide enough for mapping large-scale solid Earth movement. The Moon is a vast and stable platform that can provide sufficiently long and stable baseline interferometry. Its movement is easier to predict and the time interval of repeat-pass interferometry could be reduced to one day (Fornaro et al. 2010). In addition, the Moon is one of the main sources of tides on the Earth; so if we compare two measurements at different times, the lunar tide portion can be subtracted, leaving only the solar tide portion. After proper processing, it may help us learn more about the interior structure of Earth’s crust. To measure the large-scale deformation, a Moon-based repeat-pass InSAR system needs to be carefully designed. Except for the general SAR parameters, the critical baseline is a key factor that impacts its performance. The critical baseline Bc leading to a complete spatial decorrelation is given by Bc = BlDem tan ui c . (7) In this equation, the incidence angle ui is related to the observational geometry, while l and B are optional. When the bandwidth is 100 MHz and the incidence angle is 25°, the critical baselines are 14,000, 3300 and 1770 km at the L-band, C-band and X-band, respectively. In order to keep the correlation between two repeat passes, a practical baseline must be smaller than Bc. Therefore, from a practical point of view, the L-band is better than the C-band or X-band. Figure 4 shows the simulation results of one-day interval interferometry, but the side-looking constraints are not involved. In this case, the temporal decorrelation is highly reduced. It is obvious that the interferometric area is larger in the L-band than in X-band. Meanwhile, when the declination of the Moon is near the extremes, the interferometric area becomes larger. When the declination of the Moon is near the equatorial plane, one-day interval repeat-pass interferometry is not feasible, but a half month or one month interval repeat-pass interferometry is available. The magnitude of the solid Earth motion is not large. For example, the typical solid Earth tide amplitude is dozens of centimetres in one day. A resolution of hundreds of metres or even coarser will be enough if the wave is stably scattered. 4.2. Energy budget of earth Fundamentally, **climate** **change** **depends** **on** Earth’s **radiation** **balance**. **Observation** **of** both the solar **radiation** **and** Earth’s **reflection** and emission will **depend** **on** **accurate** **measurement** with space technology. Since the late 1970s, the United States and Europe have launched a number of missions to measure solar and terrestrial radiation, such as NASA’s Active Cavity Radiometer Irradiance Monitor Series programme (ACRIM1, 1980–1989; ACRIM2, 1991–2001; ACRIM3, 2000–present), Earth Radiation Budget Experiment (ERBE, 1984–1994), Clouds and Earth’s Radiant Energy System (CERES, 1997–present), Solar Radiation and Climate Experiment (SORCE, 2003–present) and the French Megha-Tropiques satellite on the Scanner for Radiation Budget (ScaRaB, 2011–present). These missions have greatly improved our understanding of Earth’s energy system. The Deep Space Climate Observatory (DSCOVR), placed at the earth–Sun first Lagrangian point, has been designed to measure the outgoing radiation of the sunlit Earth disk with a constant look angle. But in the outgoing radiation, the reflected shortwave **radiation** is **highly** **affected** **by** **albedo** **and** **atmospheric** **conditions**, showing obvious anisotropy. **Lack** **of** **sampling** in space and time is **vulnerable** **to** **uncertainties**. The **lunar** **observatory** **provides** **large**-**scale** **observation** **with** continuously **changing** **angles**, enabling it to calibrate the **data** of satellites in different orbits at different times. Its most important property is that it can provide a **very** **long**-**term** time series from a single orbit platform. In a year, the time series covers all local times, all seasons (different weather pattern) and all Earth phases for all underlying surfaces (Pallé and Goode 2009; Karalidi et al. 2012). The diversity of the **surface**-**weatherphase** combination is beneficial to improving the quality of global energy budget data and to the study of regional energy redistribution and its multi-layer coupling effects. The Moon-based data will also provide a direct connection between the data from space technology and the data from ground-based earthshine measurement series, which span almost one hundred years. The system design can consult the DSCOVR satellite, a radiometer measuring irradiance of the Earth phase and an imaging camera taking images of the Earth phase for various Earth sciences purposes. In order to take into account the needs of observing the Earth’s environmental elements, 1 km spatial resolution and 20–30 channels of the camera are suggested. 4.3. Earth’s environmental elements Vegetation is an important part of the global carbon pool and a key element of global carbon cycle. Most vegetation is distributed in middle- and low-latitude regions. A Moon-based optical camera can image global **vegetation** almost every day. SAR maps not only the horizontal distribution of vegetation, but also extracts forest morphological structure through tomography. The Moon provides multi-baseline **accessibility** within a single pass to eliminate the tomographic temporal decorrelation, but the imaging temporal decorrelation within a long synthetic aperture time hampers the focusing of forest. Therefore, to validate the feasibility of Moon-based **3D** **mapping** of forest, more imaging methods for unstable scatterer, for example, the time reversal imaging method (Jin and Moura 2007), need to be tested and new methods are also expected. Glaciers are sensitive variables of climate change. The monitoring of glacier area, surface velocity and mass balance plays an important role in understanding the status of glaciers and their response to global change. Remote sensing techniques, such as optical sensors, SAR and altimeter data, provide regular observations of key glacial parameters. A lunar platform would provide continuous three- or four-day temporal coverage per month at the polar regions, but the observation incidence angle would typically be larger than 40° (see Figure 5) due to the relatively small inclination angle of the lunar orbit. For the High Asia area, the average coverage is about 4 h per day with proper incidence angle. The challenges may be the cost of high-resolution mapping for the optical sensor, and the layover problem (Tilley and Bonwit 1989) in heavy gradient area for SAR. Moon-based altimetry faces the same problems as LiDAR mentioned before, and is not recommended. An **atmospheric** **observatory** on the Moon can be used to evaluate the cloud fraction in an unambiguous manner, **determine** the **composition** in terms **of** the major **trace** **gas** and aerosols (Hamill 2016), and shed light on the relationship between lunar phases and **cloudiness** or **precipitation**. Particularly, the Moon offers a good place for **occultation** observation, which means observing the light or microwave changes emitted by stars or satellites when they are obstructed by atmosphere around the Earth. The Global Ozone Monitoring by Occultation of Stars (GOMOS) instrument on board the Envisat satellite is a typical system using the stellar occultation measurement principle in monitoring ozone and other trace gases in Earth’s stratosphere (Kyrola et al. 2004). Moon-based occultation was proposed in Link (1969), and was considered promising in Moon-based Earth atmosphere monitoring (Hamill 2007, 2016; Guo et al. 2014). The advantage of Moon-based occultation is that a star descends several times slower through the atmosphere than when viewed from a LEO satellite. This helps by increasing the SNR and resolution to some extent, but the practical performance also relies on the system design and the probability of finding an appropriate occultation geometry. 4.4. Earth-space environment Observing the environment of outer space surrounding Earth requires much larger FOV than only observing the solid Earth. The Moon is an ideal place to monitor the interaction between the solar wind and the magnetosphere. Moon-based observation combined with high near-polar Earth orbit or Molniya orbit observations can help us construct the three-dimensional structure of the magnetosphere by X-ray and EUV remote imaging. Images in all meridian planes of the whole plasma layer have already been captured by the EUV camera on the Chang’e 3 lander. Some initial results reflect the basic features of the plasmasphere, and also verified the accessibility of high-quality data of magnetosphere from the Moon (Feng et al. 2014). 5. Conclusion In this paper, we propose the Moon as a platform for Earth observation with long-term, dynamic capabilities, mainly focusing on large-scale geoscience phenomena. The characteristics of a lunar platform, the sensors and the scientific objectives of Moon-based Earth observation are discussed in detail. A lunar platform could observe Earth in quite a different way, and give a long-lasting disk view, a stable baseline and a unique perspective. The proposed sensors include some optical sensors and SAR. LiDAR, altimeters and scatterometers may not be functional on the lunar surface mainly because of the long viewing distance, and Moon-based radiometers may not be necessary if spaceborne radiometers are effective enough. Though the cost is not discussed in this paper, a Moon-based SAR would be extremely expensive and face too many specific technical difficulties to be implemented at the present time. On the contrary, passive optical sensors, such as spectrographs and panchromatic cameras, are much easier to realize. The scientific objectives of Moon-based Earth observation include measuring solid Earth dynamics and the global energy budget, and monitoring Earth’s environment and the surrounding environment of outer space. Moon-based Earth observation will be effective in measuring solid Earth tides, detecting outgoing radiation, and monitoring the magnetosphere and some of Earth’s environmental elements. Finally, we suggest that numerical simulations are indispensable to validate the proposals and to address specific problems.

#### Moon Base is the only option and outweighs Satellites.

Ding et al. 17 (, Y., Liu, G. and Guo, H., 2017. Moon-based Earth observation: scientific concept and potential applications. [online] Volume 11, 2018. Available at: <https://www.tandfonline.com/doi/full/10.1080/17538947.2017.1356879> [Accessed 22 January 2022] Yixing Ding - Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing, People’s Republic of China Guang Liu - Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing, People’s Republic of China Huadong Guo - Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing, People’s Republic of China.)

There are several characteristics of Moon-based Earth observation as listed below. (1) Longevity The life cycle of artificial satellites is generally several years, while the Moon has already existed for billions of years, and will not go extinct in the foreseeable future. It is a longstanding, essentially permanent platform. The revisit cycle is quite different from LEO satellite. Except for the polar regions, the revisit period is one day, the same as Earth’s rotation period. The revisit period in the same geometric condition is one month, the same as the moon’s revolution period. The temporal sampling of the lunar platform is not systematically biased. It covers all local times in a month and all seasons in a year. This will be very useful for long-term time series analysis in climate change research. Furthermore, the lunar platform can also provide time series data to calibrate the remote sensing data from other platforms. (2) Integrity The whole Earth disk facing the Moon, both the sunlit portion and dark portion, is always observable from the near side of the Moon, with a field angle of only about 2°. This allows an observer on the Moon to view the whole Earth disk at any given time and Earth’s entire surface in a day, both in dark and sunlit conditions. (3) Stability Studies show that the lunar crust lacks plate tectonics; so the quantity and degree of moonquake activities are much less than earthquakes (Jaumann et al. 2012). Compared to satellite platforms, the Moon has vast spaces on which to install a set of sensors to form a long, stable baseline of large observational networks for precise measurement. Moon also moves stably, which enables repeat-pass interferometry. (4) Uniqueness Moon exerts influences on precipitation, ice nuclei concentrations, diurnal pressure changes, hurricanes, cloudiness, thunderstorm and surface temperature (Balling and Cerveny 1995). The tidal force of the Moon is also considered as a trigger of earthquakes (Cochran et al. 2004) and a resource generating internal waves (Simmons et al. 2004). For those Moon-related terrestrial phenomena, the lunar platform provides such a unique perspective that any place on the Earth can be continuously monitored at different Moon–Earth phase angles each day. A Moon-based sensor can dynamically trace the whole process covering their occurrence, development and dissipation. It will help the understanding of the relationship between the tidal phases and the evolution of the phenomena. 3. Sensors for moon-based earth observation For most of the history of lunar exploration, the United States, China and Japan have been taking a few pictures of Earth with cameras both on the lunar surface and in lunar orbit. This proved that it is possible to observe Earth utilizing Moon-based optical sensors. However, except for observing Earth’s magnetosphere, these photos had no specific scientific objective. Few works about the sensors for Moon-based Earth observation have been published by previous missions. So, in this section we discuss the feasibility and the key parameters of various traditional remote sensors, including both the optical sensors and the microwave sensors. 3.1. Optical sensors for moon-based earth observation One important parameter of most remote sensing systems is the spatial resolution. The detection range of Moon-based optical sensors is much further than spaceborne sensors. The diffraction limited resolution of optical sensors r is given by = 1.22lR/d, (1) where l is the wavelength, d the telescopic aperture and R the distance from the sensor to the target. In the visible band, the limiting resolution is 0.17–0.36 km, when d is 1 m. In short, if the telescopic aperture is 0.5 m, the spatial resolution can be less than 1 km in the visible band and several kilometres in the near-infrared and thermal infrared bands, which satisfies the needs of climatologic models and global mapping for oceans, clouds and land use (Ding, Guo and Liu 2014). LiDAR is an example of an active sensor. To place a LiDAR on the Moon, many technological challenges must be taken into consideration, such as the echo power, the size of the laser beam on earth’s surface and the coverage performance. If the scattering solid angle of a homogeneous scatterer is p, the received power of this system falls within the square of the distance from LiDAR to scatterer R (Wagner et al. 2006): Pr = PtrD2 r 4R2 , (2) where the received power and transmitted power is Pr and Pt, Dr the receiving aperture and r the reflectivity. The power needed for Moon-based LiDAR would be a hundred thousand times greater than that of satellite-based LiDAR, which is at the megawatt level. The footprint of the laser beam on Earth’s surface is proportional to the laser divergence angle. Under a divergence of 0.1 m/rad, the beam of Moon-based LiDAR would be 36–40 km, two orders of magnitude larger than the beam width of spaceborne LiDAR. Such a large beam would stretch the length of the echo signal and complicate its waveform, and will lead to a difficulty to determine the exact echo position of the target in measuring the altitude of sea surface and the thickness of vegetation.

#### Adaptation is a silver bullet.

Rood and Gibbons 21 Richard B. Rood and Elizabeth Gibbons 9-11-2021 "After a summer of weather horrors, adapting to climate change is an imperative" <https://archive.is/VKac8#selection-391.0-413.1> (Richard B. (Ricky) Rood is a professor of climate and space sciences and engineering at the University of Michigan. Elizabeth (Beth) Gibbons is executive director of the American Society of Adaptation Professionals.)//Elmer

This summer, the extraordinary heat in the Pacific Northwest, floods across the Northern Hemisphere and Hurricane Ida’s swath across the country have awakened more people to the dangers of climate change. As professionals working on climate change, we receive many requests for comments and interviews. More telling, perhaps, have been panic-tinged personal letters from family and friends as well as colleagues working in the field awakening to the real-world consequences of our warming climate. Public messaging on climate change is dominated by the discussion of reducing carbon dioxide emissions to limit the warming and to stop the “worst effects” of climate change. This is the mitigation of global warming. Headlines range from declarations of climate despair to the measured voices of those who insist that there is still the time and wherewithal to limit warming to the goals aspired to by the United Nations. Amid this cacophony of mitigation panic and sought-after patience is another discussion that has been going on for more than a decade. Namely, that we are not likely to meet emission-reduction goals such as those of the Paris agreement. This is complemented by the fact that we live in a rapidly changing climate, rapid change will continue, and we are not going back to the climate of our childhoods. When we consider how we will address our climate future, it is worth considering our past behavior and choices. We have had the ability and the roadmap to make major strides in reducing carbon dioxide emissions and mitigating climate change for many years. In many cases, these mitigation tactics are “no regrets,” with very quick monetary payback for expenditures — the insulation of houses and choosing fuel-efficient vehicles, for example. Yet we have not taken these steps at the scales that are required for effective intervention. Mitigation is one response, but adaptation can be framed as the other response. Adaptation is responding to the effects of warming or perhaps coping with the consequences of the warming Earth. With the public conversation focusing overwhelmingly on mitigation, adaptation has been a neglected topic. Compared with mitigation, adaptation is relatively easy. Effective mitigation requires changing human behavior, ingrained geopolitical and economic power structures, and built infrastructure on a global scale. It requires convincing people to invest for the common good of other people, often decades into the future. At its simplest, adaptation can be carried out by an individual. You can sell the house next to the ocean and move to northern Michigan. You can reinforce your roof and put your oceanside house on stilts. There is a concrete value proposition. Although adaptation can be carried out by individuals, it is better and certainly more equitable to plan on the larger scales of a community, a city or a region. As the geographical scale increases and more individuals, organizations and local governments are involved, it does get more difficult. However, the threats to life, property and the local environment often serve as motivation to challenge the barriers of cooperation and shared beneficial outcomes. For example, a region threatened by rising seas is motivated to come together to find solution strategies. Indeed such efforts are underway, for example, in the Southeast Florida climate compact, the Puget Sound climate collaborative, and efforts across Southeast Virginia’s Hampton Roads region. When a region successfully implements adaptation plans, communities are likely to have wins when the next storm is not as destructive and costly. These wins help people cope with global warming and realize some ability to take control of what has been often stated as an existential threat. There have been those calling for adaptation policy for many years. However, it has been difficult to get adaptation on the policy agenda. This is ascribed to many reasons, including the persistent, spurious argument that if we talk of adaptation, then we will decide that we do not need to mitigate our emissions. However, we are at the point that, even if we were to meet all of the emission reduction goals of the United Nations’ Paris agreement, adaptation will still be required. In the end, the most important aspect of adaptation is fundamentally human. If individuals and communities can see adaptation as a way of sustaining their well-being in the face of rapidly changing weather, then it is a step of moving past the narrative that we must, between now and 2030, solve an existential threat to our survival. We can see successful adaptation strategies spreading, scaling, and bringing planetary warming into the mind-set and the behavior of more and more people. We must entrain dealing with the weather of a warming Earth into all that we do. And that, we assert, will make the need for mitigation more real and urgent.

#### Prevents extinction.

Sears 21 (, N., 2021. Great Powers, Polarity, and Existential Threats to Humanity: An Analysis of the Distribution of the Forces of Total Destruction in International Security. [online] ResearchGate. Available at: <https://www.researchgate.net/publication/350500094> [Accessed 22 November 2021] Nathan Alexander Sears is a PhD Candidate in Political Science at The University of Toronto. Before beginning his PhD, he was a Professor of International Relations at the Universidad de Las Américas, Quito. His research focuses on international security and the existential threats to humanity posed by nuclear weapons, climate change, biotechnology, and artificial intelligence. His PhD dissertation is entitled, “International Politics in the Age of Existential Threats”)-re-cut rahulpenu

Climate Change Humanity faces existential risks from the large-scale destruction of Earth’s natural environment making the planet less hospitable for humankind (Wallace-Wells 2019). The decline of some of Earth’s natural systems may already exceed the “planetary boundaries” that represent a “safe operating space for humanity” (Rockstrom et al. 2009). Humanity has become one of the driving forces behind Earth’s climate system (Crutzen 2002). The major anthropogenic drivers of climate change are the burning of fossil fuels (e.g., coal, oil, and gas), combined with the degradation of Earth’s natural systems for absorbing carbon dioxide, such as deforestation for agriculture (e.g., livestock and monocultures) and resource extraction (e.g., mining and oil), and the warming of the oceans (Kump et al. 2003). While humanity has influenced Earth’s climate since at least the Industrial Revolution, the dramatic increase in greenhouse gas emissions since the mid-twentieth century—the “Great Acceleration” (Steffen et al. 2007; 2015; McNeill & Engelke 2016)— is responsible for contemporary climate change, which has reached approximately 1°C above preindustrial levels (IPCC 2018). Climate change could become an existential threat to humanity if the planet’s climate reaches a “Hothouse Earth” state (Ripple et al. 2020). What are the dangers? There are two mechanisms of climate change that threaten humankind. The direct threat is extreme heat. While human societies possesses some capacity for adaptation and resilience to climate change, the physiological response of humans to heat stress imposes physical limits—with a hard limit at roughly 35°C wet-bulb temperature (Sherwood et al. 2010). A rise in global average temperatures by 3–4°C would increase the risk of heat stress, while 7°C could render some regions uninhabitable, and 11–12°C would leave much of the planet too hot for human habitation (Sherwood et al. 2010). The indirect effects of climate change could include, inter alia, rising sea levels affecting coastal regions (e.g., Miami and Shanghai), or even swallowing entire countries (e.g., Bangladesh and the Maldives); extreme and unpredictable weather and natural disasters (e.g., hurricanes and forest fires); environmental pressures on water and food scarcity (e.g., droughts from less-dispersed rainfall, and lower wheat-yields at higher temperatures); the possible inception of new bacteria and viruses; and, of course, large-scale human migration (World Bank 2012; Wallace-Well 2019; Richards, Lupton & Allywood 2001). While it is difficult to determine the existential implications of extreme environmental conditions, there are historic precedents for the collapse of human societies under environmental pressures (Diamond 2005). Earth’s “big five” mass extinction events have been linked to dramatic shifts in Earth’s climate (Ward 2008; Payne & Clapham 2012; Kolbert 2014; Brannen 2017), and a Hothouse Earth climate would represent terra incognita for humanity. Thus, the assumption here is that a Hothouse Earth climate could pose an existential threat to the habitability of the planet for humanity (Steffen et al. 2018., 5). At what point could climate change cross the threshold of an existential threat to humankind? The complexity of Earth’s natural systems makes it extremely difficult to give a precise figure (Rockstrom et al. 2009; ). However, much of the concern about climate change is over the danger of crossing “tipping points,” whereby positive feedback loops in Earth’s climate system could lead to potentially irreversible and self-reinforcing “runaway” climate change. For example, the melting of Arctic “permafrost” could produce additional warming, as glacial retreat reduces the refractory effect of the ice and releases huge quantities of methane currently trapped beneath it. A recent study suggests that a “planetary threshold” could exist at global average temperature of 2°C above preindustrial levels (Steffen et al. 2018; also IPCC 2018). Therefore, the analysis here takes the 2°C rise in global average temperatures as representing the lower-boundary of an existential threat to humanity, with higher temperatures increasing the risk of runaway climate change leading to a Hothouse Earth. The Paris Agreement on Climate Change set the goal of limiting the increase in global average temperatures to “well below” 2°C and to pursue efforts to limit the increase to 1.5°C. If the Paris Agreement goals are met, then nations would likely keep climate change below the threshold of an existential threat to humanity. According to Climate Action Tracker (2020), however, current policies of states are expected to produce global average temperatures of 2.9°C above preindustrial levels by 2100 (range between +2.1 and +3.9°C), while if states succeed in meeting their pledges and targets, global average temperatures are still projected to increase by 2.6°C (range between +2.1 and +3.3°C). Thus, while the Paris Agreements sets a goal 6 that would reduce the existential risk of climate change, the actual policies of states could easily cross the threshold that would constitute an existential threat to humanity (CAT 2020).

#### Scenario 2---Super Volcanos

#### Lunar Basing solves Earth Observation is key to Atmospheric Science, specifically super volcanos

Hamill 16, Patrick. "Atmospheric observations from the moon: A lunar earth-observatory." 2016 Ieee International Geoscience and Remote Sensing Symposium (Igarss). IEEE, 2016. (Department of Physics and Astronomy at San Jose State University)//Elmer

ABSTRACT A telescope placed on the Moon would be valuable tool for studies of the atmosphere and climate. In this paper, we consider an observatory placed on the Moon to make observations of the Earth’s atmosphere. We discuss the properties of such a telescope, the types of observations to be made, the benefits of having a telescope on the lunar surface and difficulties that may be encountered. Index Terms— Lunar Telescope, Atmospheric Science, Climate Studies, Earth Observatory 1. INTRODUCTION Measurements made by a telescope looking at Earth from the surface of the Moon would be beneficial to atmospheric scientists studying weather, atmospheric composition and the climate. Due to the geometry of the system, the entire disk of Earth is always visible from most locations on the Earth-facing side of the Moon. During the 28 day orbital period of the Moon, both the daylight and dark sides of Earth are visible. This allows one to observe the entire disk of the Earth (half of the surface) at any given time, and during one orbital period of the Moon, to observe both the day and night sides. Since the Earth’s rotation rate is much faster than the Moon’s orbital motion, nearly every point on the surface of Earth is in sight during each 24 hour period. It should be noted that a telescope has already been placed on the surface of the Moon, namely, the 15- centimeter UV telescope on Chang’e 3, the Chinese lander that touched down on the lunar surface on December 14, 2013. (See Figure 1.) The telescope was still operational by early 2016. This telescope was designed to monitor bright variable stars in the near UV for periods of up to 12 days and to carry out a near UV sky survey at low Galactic latitude [1]. Figure 1. Photograph of the lander of Chang’e-3 taken from the Yutu rover. The DSCOVR satellite (previously known as TRIANA) was placed at the Lagrange L1 point and observes the entire disk of Earth with a 30.5 cm telescope. The primary objective of the DSCOVR mission is to study “space weather,” i.e., the properties of the solar wind and the interplanetary magnetic fields. A secondary objective is to generate data for atmospheric science and climate studies. To accomplish these goals it not only has an optical telescope, but also a cavity radiometer to measure the irradiance reflected and emitted from the face of the Earth. Due to its location in space, between the Sun and Earth, DSCOVR at all times observes the illuminated face of Earth. In 2007 NASA considered sending astronauts to the Moon to establish a moon base and requested that the scientific community suggest scientifically valuable activities. A meeting of the NASA Advisory Council (NAC) in February 2007 considered a variety of suggestions, including proposals for a lunar telescope. However, the idea of manned flights to the Moon and the establishment of a lunar base were later abandoned. Many of the ideas described in this paper are based on concepts described at the NAC meeting [2]. As mentioned, a telescope placed on the near side of the Moon can observe the entire disk of Earth. No satellite in low Earth orbit can do this. A satellite in geosynchronous orbit observes one third of the total area, but is limited to the same view at all times. A satellite at the unstable Lagrange point between Earth and Sun (L1) only sees the sunlit side of Earth and cannot be permanent because of the need for continuous orbital corrections leading to the eventual depletion of fuel. L1 is about a million miles from Earth. The Earth-Moon distance is somewhat less than one fourth of this value. From the Moon, over the course of a day as the Earth rotates, all sublunar points are visible. During the course of a month, due to the tilt of the Moon’s orbit by about 5 degrees relative to Earth’s equator, the two poles alternately point towards the Moon, giving excellent coverage of these important regions every 14 days. (As seen from the Moon, Earth exhibits phases, from “new Earth” through “full Earth” to “waning Earth” until it presents its dark side to the Moon. For example, in late spring, an observatory on the Moon would be looking “up” at the Antarctic region during “new” Earth; at “full Earth” it would be over the equator, and as the Earth wanes, the observatory would be looking “down” on the Arctic region.) An interesting feature of the observations of Earth’s night side will be the quantification of artificial illumination related to population growth and industrialization. Over the course of a year, the view of Earth varies in an interesting way as the Sun illuminates the Earth from different angles, due to the 23.5 degree tilt of Earth’s axis of rotation relative to the ecliptic. The varying views of Earth, the visibility of the entire disk, the relatively rapid rotation of Earth and the stability of the lunar surface make the Moon an ideal location for longterm monitoring of the Earth. In Section 2 we consider the expected characteristics of the lunar telescope and the associated sensors, in Section 3 we discuss the benefits that are expected from placing an Earth Observing telescope on the Moon and in Section 4 we consider some difficulties and problems associated with this proposed project. 2. THE INSTRUMENT The Lunar Earth-Observatory is essentially a telescope placed somewhere on the surface of the Moon and focused on the Earth. The observatory would consist of a telescope and a number of standard instruments such as a diffraction grating with an associated CCD array, a CCD camera, a radiometer, and the associated telemetry. The telescope diameter should be between 0.5 and 0.75 meters, this being a compromise between the desire for a small instrument and the desire of high resolution. For the sake of comparison, a telescope with a diameter of only 0.25 meters has a theoretical resolution of about 1km X 1km on the Earth’s surface. The Ozone Measurement Instrument [3] (OMI on AURA) has a nadir pixel of 13km X 24km and it scans the entire Earth once per day. If the Lunar telescope had a resolution of 100km X 100km, and the CCD array were integrated over 1 sec, the entire disk of Earth, could be scanned in about 3.5 hours. The telescope would scan the disk of the Earth and the light from different points on the Earth would be sent through a diffraction grating onto the CCD array. This allows one to determine the column amounts of various atmospheric gases, such as ozone, CO2, SO2, NO2, as well as aerosols. When the opportunity arises, the telescope could be used to track the image of a bright star as it is occulted by Earth [4]. Such scans are best carried out as the star descends onto the dark limb of Earth to avoid “earthshine” and to obtain maximum contrast. From the vantage point of a satellite in a 500 km orbit, a star descends through the atmosphere at a speed of about 8 km/sec. From the vantage point of the Moon, a star descends at about 1 km/sec, that is, eight times slower. Thus since stellar occultation is possible from artificial satellites (the GOMOS instrument on ENVISAT [5], for example), it will be even easier from the surface of the Moon. Note that a star is always a point source, so scanning is not required, as in most solar occultation measurements. (One cannot carry out solar occultation from the Moon because it only occurs during “Earth eclipses.”) Infrared measurements usually require cooling instruments with cryogens, but on the lunar surface extremely low temperatures are obtainable by simply shading the instrument during the day. Furthermore, the side of the Moon facing Earth is dark for half of the month, so cycling between extreme cold and extreme heat allows one to consider the possibility of some sort of heat engine operating in (perhaps) a Stirling cycle to power various components. The surface of the Moon is a highly stable platform, so the observatory should be built to operate for a very long time (decades rather than years). This is reasonable when one considers that many satellite observing systems have lasted much longer than their expected lifetimes. (For example, the SAM II system lasted 15 years before it was turned off due to orbit degradation. The instrument was still operational.) Therefore, the instrumentation of the observatory should be standard and well developed rather than innovative. Although the surface of the Moon is certainly a difficult environment, it is perhaps more benign that the environment of an artificial satellite. The Moon is a stable platform not requiring corrections for drift nor subject to the vibrations of satellites. The temperature extremes on the Moon have a periodicity of a month rather than several hours. There are many reasons for placing an Earth atmospheric observatory on the Moon. Perhaps the most obvious reason is that from the Moon one can observe a single location on Earth for a relatively long period of time (hours, rather than seconds for a satellite in LEO). During a 24 hour period, nearly every point on the surface of Earth can be monitored, and during one month, both the sunlit and night sides of the Earth will have been observed. Further, there will have been excellent views of the polar regions. The visible images of the entire illuminated surface of Earth will allow one to evaluate in an unambiguous manner the total cloud fraction of Earth’s atmosphere. The scans will allow one to determine the composition of the Earth’s atmosphere in terms of the major trace gases and aerosols. The polarization of the scattered light will also yield information on the aerosol type. Stellar occultation allows one to determine profiles of extinction from aerosol particles, and the altitude dependence of concentrations of gas species such as O3, CO2, etc. Profiles of stratospheric particle extinctions are of particular interest following energetic volcanic eruptions that inject large amounts of SO2 into the stratosphere. Profiles of O3 allow one to determine the vertical structure of the Antarctic ozone hole and “mini ozone holes” in the Arctic. Stellar occultation is a valuable technique for studying the formation and structure of polar stratospheric clouds. The GOMOS instrument on ENVISAT was operational from 2002 to 2012 and during that time it observed well over 10,000 stellar occultations. Perot et al. [6] present a polar mesospheric climatology based on these measurements. The formation of dust clouds, particularly from regions such as the deserts in Northern Africa and Central Asia, and their atmospheric dispersion is an important scientific and environmental problem. The lunar observations could shed light on the relationship between the presence of dust and the formation of hurricanes in the Atlantic Ocean. The fact that the entire disk of the Earth is visible from the Moon make it an excellent location to measure the radiation balance of the Earth. Consequently, a component of the observatory would be an ERBE/CERES type of radiometer to measure short and longwave radiation [7]. The goal would be to monitor, on a continuous basis, the global energy balance, planetary brightness, regional forcings and the net radiative effect of clouds [8]. The fact that during the course of a month Earth presents both day and night faces to the Moon allows one to determine emitted and reflected radiation under a variety of solar illuminations. Volcanic plumes are a well-known danger to aircraft. Some regions of Earth that are not well monitored, such as the Arctic regions between North America and Asia, are locations of frequently occurring volcanic eruptions. Monitoring of the Earth from the Moon would offer an early warning system for volcanic plumes reaching aircraft altitudes. The atmosphere above a low earth orbit satellite is tenuous but not entirely negligible. The fact that the Moon has essentially no atmosphere, means there is no interference of measurements of the radiation emitted from the surface of Earth.

#### Volcano explosions cause Civilizational Collapse – Extinction – predicting and mitigating are key.

Pamlin and Armstrong 15, Dennis, and Stuart Armstrong. "Global challenges: 12 risks that threaten human civilization." Global Challenges Foundation, Stockholm (2015). (Entrepreneur and Founder of 21st Century Frontiers, Senior Associate at Chinese Academy of Social Sciences, Visiting Research Fellow at the Research Center of Journalism and Social Development at Renmin University)//Elmer

3.2.2.1 Expected impact disaggregation 3.2.2.2 Probability The eruption which formed the Siberian Traps was one of the largest in history. It was immediately followed by the most severe wave of extinction in the planet’s history, 374 the Permian– Triassic extinction event, 375 where 96% of all marine species and 70% of terrestrial vertebrate species died out. Recent research has provided evidence of a causal link: that the eruption caused the mass extinction.376 There have been many other super-volcanic eruptions throughout history.377 The return period for the largest supervolcanoes (those with a Volcanic Explosivity Index378 of 8 or above) has been estimated from 30,000 years379 at the low end, to 45,000 or even 700,000 years380 at the high end. Many aspects of super-volcanic activity are not well understood as there have been no historical precedents, and such eruptions must be reconstructed from their deposits.381 The danger from super-volcanoes is the amount of aerosols and dust projected into the upper atmosphere. This dust would absorb the Sun’s rays and cause a global volcanic winter. The Mt Pinatubo eruption of 1991 caused an average global cooling of surface temperatures by 0.5°C over three years, while the Toba eruption around 70,000 years ago is thought by some to have cooled global temperatures for over two centuries.382 The effect of these eruptions could be best compared with that of a nuclear war. The eruption would be more violent than the nuclear explosions,383 but would be less likely to ignite firestorms and other secondary effects. Unlike nuclear weapons, a super-volcano would not be targeted, leaving most of the world’s infrastructure intact. The extent of the impact would thus depend on the severity of the eruption - which might or might not be foreseen, depending on improvements in volcanic predictions384 - and the subsequent policy response. Another Siberian Trap-like eruption is extremely unlikely on human timescales, but the damage from even a smaller eruption could affect the climate, damage the biosphere, affect food supplies and create political instability. A report by a Geological Society of London working group notes: “Although at present there is no technical fix for averting supereruptions, improved monitoring, awareness-raising and research-based planning would reduce the suffering of many millions of people.” 385 Though humanity currently produces enough food to feed everyone,386 this supply is distributed extremely unevenly, and starvation still exists. Therefore a disruption that is small in an absolute sense could still cause mass starvation. Mass starvation, mass migration, political instability and wars could be triggered, possibly leading to a civilisation collapse. Unless the eruption is at the extreme end of the damage scale and makes the planet unviable, human extinction is possible only as a consequence of civilisation collapse and subsequent shocks.387

#### Improved Atmospheric Science solves Natural Disasters.

Fox et Al 18 H. Steptoe, S. Jones, and H. Fox 2-28-2018 "Can Atmospheric Science Improve Global Disaster Resilience?" <https://eos.org/editors-vox/can-atmospheric-science-improve-global-disaster-resilience> (Science Writer at EOS)//Elmer

Many of the natural disasters that make the news headlines are related to extreme or unusual weather events. In an open-access article recently published in Reviews in Geophysics, Steptoe et al. [2018] examine extreme atmospheric hazards effecting different countries and regions around the world, and their connections with the global climate system. The editor asked the authors to explain more about these hazards and describe how scientific insights can be used by governments, communities and corporations involved in disaster risk reduction. What do you mean by “extreme atmospheric hazards”? Extreme atmospheric hazards are high impact weather events, typically judged by human or financial losses, caused by processes occurring in the Earth’s atmosphere. The atmospheric processes responsible for extreme events are themselves often influenced by some other large-scale component of the Earth’s atmosphere-ocean system, such as ocean-wide changes to sea-surface temperatures. Why is it important to understand regional extreme atmospheric events in the wider context of large scale atmosphere-ocean processes? In atmospheric science, the links that connect large scale changes in the atmosphere or ocean (such as widespread changes in temperature or humidity in an ocean basin) with localized hazards relating to regional weather conditions (such as extremes of rainfall or temperature) are collectively referred to as teleconnections. Most local extreme events may be related to temporal changes in the large scale dynamics of the climate system. Large scale changes are predicted by weather and climate models more skillfully than local extremes so understanding the link is vital to understanding impacts. There are many different kinds of teleconnection, typically named after the geographic location in which they are observed. Because any one teleconnection may influence weather conditions in multiple remote locations, understanding the interplay between regional extremes and teleconnections helps us to understand how different extreme hazards occurring in widely separate locations can have a common origin. In our review, we examined 16 different regional hazards and their interplay with eight different teleconnections. Can you give a specific example of a regional atmospheric hazard and its connection to global teleconnections? In our review, we find that rainfall over China shares the most connections with global drivers. We summarized academic papers that have identified links to six teleconnections including large scale atmosphere-ocean processes in both Northern and Southern Hemispheres. The regional hazard with the strongest single linkage to a teleconnection are windstorms over Europe, and their connection to the North Atlantic Oscillation (NAO). The NAO describes a varying pattern in surface pressure across the North Atlantic. For European windstorms, the NAO pattern has a strong steering effect on winds high in the atmosphere, which in turn influences the path stormy weather takes as it approaches Europe. Which is the most significant process that influences multiple hazards across different regions at the same time. Our investigation finds that El Niño–Southern Oscillation (ENSO) influence 15 regional hazards. ENSO describes variations in sea-surface temperatures in the equatorial Pacific. In some cases, this connection is relatively well understood (for example, the way it influences rainfall over South Africa) and in other cases work is still being carried out to better understand the connection (such as its influence on Mexican rainfall). How does a scientific understanding of these teleconnections help to understand the risks and prepare for extreme events? Extreme events are the occasions that pose the greatest risk to communities and livelihoods. Hence, understanding the sorts of climatic situations where extremes events are more likely to happen represents one important facet of disaster risk management. By understanding the teleconnections and their associated hazards, it becomes possible to develop mitigation methods tailored to, and in advance of, potential risks. For example, the relationship between rainfall in South and Southeast Asia is driven by connections with the Indian Ocean Dipole (IOD) and ENSO. Understanding this complex relationship may offer a predictive insight into rainfall and potential hazards, such as flood or drought, for the coming season. This predictive insight in one aspect the scientific community can contribute to in order to enable advanced planning to mitigate against potential risks. How may these insights influence organizations to better plan for, and respond to, multi-hazard risks? International policies reflect the growing understanding of atmospheric hazards and their interconnectivity. Throughout the UN Sendai Framework for Disaster Risk Reduction 2015 – 2030, multi-hazard resilience is a consistent theme, reflected in guidance towards “inclusive and risk-informed” decision making and in the context of managing disaster risk effectively. In practice, these insights have contributed to multi-hazard approaches being adopted in early warning systems across the globe. The Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES) provides monitoring and data services to local tsunami centers and national meteorological services, as well partnering with research organizations on projects implementing early warning systems in-country, such as early flood warning in Bangladesh. For private sector groups, such as the insurance industry, knowledge of the relationship between teleconnections and hazards can be vitally important when underwriting exposure, as it may increase their risk of multi-hazard losses across different regions.

#### Natural Disasters are an Existential Event – outweighs Nuclear War.

Wright 18 Pam Wright 1-19-2018 "Extreme Weather Events Have Greatest Likelihood of Threatening Human Existence, Experts Say" <https://weather.com/science/environment/news/2018-01-19-extreme-weather-threatens-human-existence> (M.S. in Meteorology, editor for The Weather Channel)//Elmer

Extreme weather events are the most likely threat to humanity in the next 10 years, experts say. Each year, nearly 1,000 scientists and decision-makers from around the world take a survey to identify and analyze the most pressing risks facing the planet. This year and for the second year in a row, the results of the 2018 Global Risks Report, released Wednesday at the World Economic Forms, revealed extreme weather as the most likely threat to the world over a 10-year period, topping weapons of mass destruction. These were followed by cyber attacks, data fraud or theft and failure of climate change mitigation and adaptation. “Extreme weather events were ranked again as a top global risk by likelihood and impact. Environmental risks, together with a growing vulnerability to other risks, are now seriously threatening the foundation of most of our commons," Alison Martin, group chief risk officer for the Zurich Insurance Group, said in a press release. The survey looked at five environmental risk categories this year: extreme weather events and temperatures; accelerating biodiversity loss; pollution of air, soil and water; failures of climate change mitigation and adaptation; and risks linked to the transition to low carbon. All ranked high in terms of impact and likelihood. "This follows a year characterized by high-impact hurricanes, extreme temperatures and the first rise in CO2 emissions for four years," the authors wrote in the report. "We have been pushing our planet to the brink and the damage is becoming increasingly clear." The report noted that the 2017 hurricane season, which included hurricanes Harvey, Irma and Maria, was the most expensive hurricane season on record. The authors noted that extreme rainfall "can be particularly damaging." "Of the 10 natural disasters that caused the most deaths in the first half of 2017, eight involved floods or landslides," the authors added. "Storms and other weather-related hazards are also a leading cause of displacement, with the latest data showing that 76 percent of the 31.1 million people displaced during 2016 were forced from their homes as a result of weather-related events." The report said extreme heat in California, Chile and Portugal resulted in some of the most extensive wildfires ever recorded in those areas. More than 100 deaths were attributed to wildfires in Portugal, according to the report. Extreme weather will also affect agriculture around the world, which may lead to a food crisis, the report said, adding that the Food and Agriculture Organization of the United Nations says more than 75 percent of the world’s food comes from just 12 plants and five animal species. "It is estimated that there is now a one-in-twenty chance per decade that heat, drought, and flood events will cause a simultaneous failure of maize production in the world’s two main growers, China and the United States," the authors wrote. In addition, fears of “ecological Armageddon” are "being raised by a collapse in populations of insects that are critical to food systems." In terms of the potential in having the greatest impact on humanity over the next 10 years, weapons of mass destruction ranked just above extreme weather, followed by natural disasters, failure of climate change mitigation and adaptation and water crisis. The authors noted that the use of weapons of mass destruction would have catastrophic effects but is a relatively unlikely scenario. Martin said in a World Economic Forum release that she fears the world "may squander the opportunity to move towards a more sustainable, equitable and inclusive future." "Unfortunately we currently observe a 'too-little-too-late' response by governments and organizations to key trends such as climate change," she added. "It’s not yet too late to shape a more resilient tomorrow, but we need to act with a stronger sense of urgency in order to avoid potential system collapse."

**1AC---Framework**

#### The standard is maximizing expected well-being. (Act Hedonistic Util)

#### Prefer –

#### Pleasure is an intrinsic good.

Moen ’16 – (Ole Martin, PhD, Research Fellow in Philosophy @ University of Oslo, "An Argument for Hedonism." Journal of Value Inquiry 50.2 (2016): 267). Modified for glang

Let us start by observing, empirically, that a widely shared judgment about intrinsic value and disvalue is that pleasure is intrinsically valuable and pain is intrinsically disvaluable. On virtually any proposed list of intrinsic values and disvalues (we will look at some of them below), pleasure is included among the intrinsic values and pain among the intrinsic disvalues. This inclusion makes intuitive sense, moreover, for there is something undeniably good about the way pleasure feels and something undeniably bad about the way pain feels, and neither the goodness of pleasure nor the badness of pain seems to be exhausted by the further effects that these experiences might have. “Pleasure” and “pain” are here understood inclusively, as encompassing anything hedonically positive and anything hedonically negative. 2 The special value statuses of pleasure and pain are manifested in how we treat these experiences in our everyday reasoning about values. If you tell me that you are heading for the convenience store, I might ask: “What for?” This is a reasonable question, for when you go to the convenience store you usually do so, not merely for the sake of going to the convenience store, but for the sake of achieving something further that you deem to be valuable. You might answer, for example: “To buy soda.” This answer makes sense, for soda is a nice thing and you can get it at the convenience store. I might further inquire, however: “What is buying the soda good for?” This further question can also be a reasonable one, for it need not be obvious why you want the soda. You might answer: “Well, I want it for the pleasure of drinking it.” If I then proceed by asking “But what is the pleasure of drinking the soda good for?” the discussion is likely to reach an awkward end. The reason is that the pleasure is not good for anything further; it is simply that for which going to the convenience store and buying the soda is good. 3 As Aristotle observes: “We never ask what her~~is~~ end is in being pleased, because we assume that pleasure is choice worthy in itself.”4 Presumably, a similar story can be told in the case of pains, for if someone says “This is painful!” we never respond by asking: “And why is that a problem?” We take for granted that if something is painful, we have a sufficient explanation of why it is bad. If we are onto something in our everyday reasoning about values, it seems that pleasure and pain are both places where we reach the end of the line in matters of value. Although pleasure and pain thus seem to be good candidates for intrinsic value and disvalue, several objections have been raised against this suggestion: (1) that pleasure and pain have instrumental but not intrinsic value/disvalue; (2) that pleasure and pain gain their value/disvalue derivatively, in virtue of satisfying/frustrating our desires; (3) that there is a subset of pleasures that are not intrinsically valuable (so-called “evil pleasures”) and a subset of pains that are not intrinsically disvaluable (so-called “noble pains”), and (4) that pain asymbolia, masochism, and practices such as wiggling a loose tooth render it implausible that pain is intrinsically disvaluable. I shall argue that these objections fail.

### 1AC---Underview

#### **1AR theory is legit – anything else means infinite abuse – drop the debater – 1AR are too short to make up for the time trade-off – no RVIs – 6 min 2NR means they can brute force me every time – competing interps – otherwise the 2NR could drown the aff in arguments while playing defense.**

#### Affirming is harder – A] empirics

**Shah 20** [Sachin Shah, (Sachin Shah debated for Lake Highland Preparatory School and graduated in 2019. He received numerous bids to the Tournament of Champions and reached double-octafinals his senior year (2019). Outside of debate, he participates in robotics and lab research. He often enjoys solving Rubik’s cubes and programming challenges in his spare time, and is an avid side skew stastician.) "A Statistical Analysis of Side-Bias on the 2020 January-February Lincoln Douglas Debate Topic by Sachin Shah" NSD Update, 2/13/20, http://nsdupdate.com/2020/a-statistical-analysis-of-side-bias-on-the-2020-january-february-lincoln-douglas-debate-topic-by-sachin-shah/?fbclid=IwAR0IP66d4U9axk\_2JiWqXPRY5wlJZE366BRXxoNEE5qaCJWvY5t9psKbIE0 DOA:2-13-2020 // WHSRS]

Over the course of the 2018-2019 season, a pattern of negative side-bias was statistically observed across that year’s topics. The 2020 January-February topic provides an opportunity to ascertain if the negative side-bias continues to exist in debate. 2020 January-February Data Set Affirmative and negative ballots were gathered from the 18 Tournament of Champions bid-distributing tournaments on the January-February topic with results posted on [tabroom.com](http://tabroom.com/) as of writing this article: Blake, College Prep, Strake Jesuit, Newark, Peninsula, University of Houston, University of Puget Sound, Arizona State University, Sunvitational, Winston Churchill, Harvard-Westlake, Lexington, Durham Academy, Lewis & Clark, Emory, Columbia, Golden Desert, and Colleyville Heritage. Theswe qualifier tournaments range from octo-final to final bid level. This data set has a sample size of 4,900 ballots representing fairly diverse debating and judging styles. One-Proportion z-test When all posted ballots on the January-February topic are analyzed, **the negative won 52.37% of ballots**. Now the question is whether the difference between the actual (52.37%) and what would be expected (50%) is statistically significant, or due to chance. In order to calculate a p-value to determine the answer, a one-proportion z-test was used. **The null hypothesis was set to p = 0.5 (where p is the proportion of negative wins) since it is expected, barring any bias, that the affirmative and the negative would win the same number of times**. The alternative hypothesis was p > .5. The alpha is set at 0.05 [1]. **The z-test rejects the null hypothesis (p-value < 0.001, 95% confidence interval [51.0%, 53.8%]).** This implies there is less than a 0.1% chance that the proportion of negative wins observed could occur if the rounds are unbiased. This implies **there is a negative side-bias.** Adjusting for Skill Differentials **We can further characterize the side bias by taking into account the difference in the skill of each debater.** The previous analysis assumes that each debater has an equal chance of winning; the following analysis develops a more robust model that estimates the probability that each debater wins based on their respective skill level; rounds in which the affirmative debater is stronger are more likely to result in affirmative than negative wins. For a more robust account of debater skill differences, **this study implemented an Elo rating system**. This system rewards debaters more for defeating higher skilled debaters than when defeating less skilled debaters. Each debater starts with a rating of 1500, then as they win or lose rounds, their rating changes depending on the round difficulty. For example, if a 1500 rated debater loses to a 2000 rated debater, their rating would drop 2 points, while if they won their rating would rise 28 points. Each debater’s Elo modulates over the rounds they have. For the purposes of calculating Elo ratings for every debater, **rounds were gathered from 142 TOC bid-distributing tournaments from 2017-2020** (YTD) with round results posted on [tabroom.com](http://tabroom.com/). To further quantify the 2020 January-February side-bias, the proportion of negative wins when the affirmative was favored (p1) can be compared with the proportion of affirmative wins when the negative is favored (p2). These proportions demonstrate a particular side’s ability to beat a higher ranked debater. The larger proportion would demonstrate a skew because a debater overcomes the disadvantage generated by debating a better debater at a higher rate on one side versus the other. Ideally, **the difference between the proportions would be 0 indicating no bias; however, p1 = 33.39% while p2 = 29.19%: a 4.2% difference.** In order to determine whether this difference is statistically significant, a two-proportion z-test was used. The null hypothesis is p1 – p2 = 0, because that means both sides are able to overcome the debating level skew equally. The alternative hypothesis is then p1 – p2 > 0, meaning the negative is able to overcome the skew more than the affirmative, demonstrating a side-bias. **This two-proportion z-test rejected the null hypothesis (p-value < 0.01).** This implies there is less than a 1% chance that the negative and the affirmative are equally able to overcome the skew produced by debating level differences if the rounds are unbiased. There is sufficient evidence that **the negative is able to overcome this skew more often than the affirmative. This further indicates negative side bias.** Conclusion **This analysis is statistically rigorous and relevant** in several aspects: (A) The **p-value is less than the alpha**. (B) The **data is on the current January-February topic**, meaning it’s relevant to rounds these months [2]. (C) The **data represents a diversity of debating and judging** styles across the country. (D) **This analysis accounts for disparities** in debating skill level. (E) **Multiple tests validate the results**. It is also interesting to look at the trend **over multiple topics**. In the rounds from 142 TOC bid-distributing tournaments (September 2017 – 2020 YTD), the **negative won 52.75% of ballots (p-value < 0.0001**, 95% confidence interval [52.3%, 53.2%]). This suggests the **bias might be structural, and not topic specific, as this data spans nine different topics** [3]. Given a structural advantage for the negative, the affirmative may be justified in being granted a substantive advantage to compensate for the structural skew. This could take various forms such as granting the affirmative presumption ground, tiny plans, or framework choice. Whatever form chosen should be tested to ensure the skew is not unintentionally reversed. Therefore, this analysis confirms that **affirming is in fact harder again on the 2020 January-February topic**. So, once again, don’t lose the flip!

#### Outweighs – empirics account for all factors – that’s why we trust experiments over analytics.

#### B] Neg is reactive – they tailor the 1NC before the round to exploit the aff’s weakness. Not reciprocal – affs enter the round unaware.

#### C] Reciprocity – aff defends their framework, method, advantages but neg can contest any of those to win – outweighs since it’s structural.

#### Comparative worlds over truth testing

#### A] Topic Education – truth testing allows debaters to recycle generic arguments that say everything is true/false like which ruins the incentive to do topical research which o/w because we only have a limited time to debate the topic

#### B] Irresolvable- The debate becomes irresolvable when you have two aprioris on either side which o/w since it constraints the judges ability to make a decision

#### Reject evidence written by Kant – their theory is colonialist and justifies colonialism

Flikschuh and YPI 14

8.42 Khurana-Flikschuh, 2014, "Kant and Colonialism: Historical and Critical Perspectives," Oxford University Press, Notre Dame Philosophical Reviews, <https://ndpr.nd.edu/reviews/kant-and-colonialism-historical-and-critical-perspectives/> CHO

Although colonialism is only a marginal topic in Kant's writings, his remarks on the legitimacy or illegitimacy of colonial practices have naturally attracted much attention. As Kant is a main representative of enlightenment thinking and a herald of emancipatory theory, any putative endorsement or critique of colonialism on his part would seem to have far reaching implications: Kant's stance, whatever it turns out to be, could be understood as representative of the ways in which Western Enlightenment might be complicit with or, on the contrary, offer a resource for overcoming colonial oppression. This volume does not address the broader question of the general relation of enlightenment and colonialism directly but rather turns to the more limited task of getting clear about Kant's actual position regarding colonialism. It focuses on four issues. (1) The first issue concerns Kant's shifting position on colonialism. Most readers will probably take Kant's critical remarks on colonial practices from The Metaphysics of Morals and Toward Perpetual Peace as his considered views. As the introduction and the contributions by Pauline Kleingeld and Lea Ypi make clear, however, Kant had not always held such critical views. Earlier in his critical period his remarks on colonial practices and slavery were at best neutral and often suggested that he regarded these practices as tolerable, maybe even necessary moments of the process of cultural and historical progress. In Idea for a Universal History with a Cosmopolitan Aim (1784) Kant states, without any critical distancing, that "our" part of the world would probably eventually give laws to all other parts of the world.[1] In a number of other passages he refers to practices of colonial rule and slavery without offering any explicit criticism.[2] It obviously seems puzzling that Kant, the great proponent of autonomy, should find colonial subjugation and slavery even tolerable. Kleingeld and Ypi both make the case that in order to account for this we have to take into consideration Kant's hierarchical account of the human races. In a number of essays on race and in various Lectures on Anthropology, Kant suggests that the human races differ with regard to their natural incentives and talents. They thus have different capacities to acquire culture and varying tendencies to perfect themselves. Consider, for example, the Anthropology lecture notes from 1781-82: Kant here holds that only the white race "contains all incentives and talents in itself"; the American indigenous people, by contrast, are said to be indifferent and lazy and to acquire no culture; the "Negro race . . . acquire[s] culture, but only a culture of slaves; that is, they allow themselves to be trained"; the "Hindus" finally "acquire culture in the highest degree, but only in the arts and not in the sciences. They never raise it up to abstract concepts" (AA 25:1187). Against the background of such a racial hierarchy, Kant seems to attribute to the white race a privileged role in actualizing humanity's full potential. Non-white races, conversely, seem predisposed, on his account, to assume subservient and dependent roles. It appears that it was this hierarchical account of the different human races that led to Kant's uncritical attitude towards colonial rule and slavery. Yet his attitude contrasts starkly with the way in which, in his last works, Kant describes colonial rule as an unambiguous violation of right and accuses states in the Western European world of the horrifying "injustice they show in visiting foreign lands and peoples (which with them is tantamount to conquering them)."[3] With these practices, the "European savages" (AA 8:354), as Kant calls them, do not advance the progress of civilization, as they pretend to do, but rather display a barbarism that goes beyond the alleged "savagery" of the "foreign peoples". Kleingeld and Ypi both argue that Kant's changed position is connected to a changed understanding of the relevance of racial differences. As Kleingeld points out, Kant omits any characterization of the races from his 1798 Anthropology from a Pragmatic Point of View as he comes to realize that race cannot have any pragmatic relevance. Racial differences are the object of physiological knowledge of the human being, which is concerned with "what nature makes of the human being;" such knowledge has no direct bearing on our pragmatic knowledge of the human being, which is concerned with what man "as a free-acting being makes of himself, or can and should make of himself" (AA 7:119). Ypi suggests that Kant's shifting views in this regard might be connected to his changed understanding of biological predispositions: Kant's shift from a preformationst to an epigenetic account of living organization transforms his understanding of the role of natural predispositions in the actualization of a living being's potential. Against this background, he drops the reference to preformed germs that separate human races and that lay at the basis of the respective racial hierarchy in his earlier writings. (2) The second main theme concerns the way in which the critical perspective on colonial practices that Kant arrived at in his last writings is rooted in his philosophy of right. As Arthur Ripstein points out, Kant distinguishes three distinct wrongs of colonialism: (i) the wrongfulness of colonial conquest, (ii) the wrongfulness of the status of a colony and (iii) the wrongfulness of the ways in which colonial rule is typically carried out. The first wrong (i) is based on the fact that colonial conquest amounts to a "way of acquiring territory through the use of force" (148) and is hence continuous with forms of aggressive war, which Kant considers illegitimate. Colonial wars are especially problematic, as they are inconsistent with the continued existence of both belligerents, a requirement to be respected by any rightful type of warfare. (ii) Even in cases where colonial rule might come about as a consequence of a defensive and hence legitimate war, colonial rule is still objectionable as a post bellum mode of governance. Colonial rule entails that one nation continually rules over another and is thus at odds with the right of the inhabitants of the colony to govern themselves through their own institutions. In this regard, even annexation would seem to be a better solution as this at least allows the inhabitants of the colony to enjoy full membership in the newly extended state, a status whereby they are able to rule themselves. The inhabitants of the colony by contrast remain merely passive citizens. (iii) Finally, the third wrong in colonialism concerns the specific way in which colonial rule is exerted. Granted that colonial rule as such is wrong, it still allows for an internal normative standard: if we hold colonial rule to what it itself claims to be doing, we should require that proper colonial rule should operate on behalf of the inhabitants of the colony and should not work to realize the private purposes of the colonizers. According to Kant's characterization, European colonial practices are guilty of all three wrongs of colonialism. Given these wrongs, it might seem natural to expect Kant to articulate a specific right to resist colonial rule and an immediate obligation to compensate colonies for the wrongs they have endured. As Ripstein, Anthony Pagden and Peter Niesen make clear, however, Kant's position on these issues is more complicated. On Kant's account, illicit means of acquisition can still give rise to good title. Even though a state might have extended its territory by means of an aggressive war and therefore through illegitimate means, we must respect the integrity of the new territory once peace has been established. The obvious danger in this regard is that Kant thereby opens the possibility of an ex post facto justification of war and colonial rule (Ripstein: 153) and seems to block the right to "any kind of struggle for independence" (Pagden: 41). Regarding the possibility of restorative justice, Kant is "on record as opposing the rectification of historical wrongs" (Niesen: 183) as he demands that historical grievances be laid to rest in order to allow for a true peace. As Niesen tries to argue, there is, however, still room to formulate principles of restorative justice regarding colonial practices on the level of international and cosmopolitan law that Kant could endorse (see also Pagden: 40). These complications all point to a feature of Kant's philosophy of right that puts restrictions on his critique of colonialism: Kant's entire philosophy of right rests on our fundamental duty to enter into a civil state and sustain it, once such a civil state has been established, no matter how it came about and how imperfect its current state might be.[4] It is against this background that Kant seems hesitant to accord a colonized people the right to resist the colonial rule once it has been established. And it would not be wholly surprising if Kant would therefore also regard it as legitimate for European people to force members of non-state people into a civil union with them. If the formation of a just civil constitution is indeed the highest task nature has set for humankind[5], could it not be legitimate to use the force of colonial practices to bring this end about? As Anna Stilz points out, it is quite remarkable that, in his last writings, Kant strongly resists such an idea and explicitly denies European colonizers the right to force non-state people into a civil union with them (see AA 6:266). However, it is up for debate why exactly Kant thinks this is. Stilz considers two options. Either Kant thinks that the non-state people have already entered a civil state of their own that ought to be respected; or he thinks that the European's encounter with them is not inevitable and that their duty to enter into a civil state is a duty they have only amongst themselves, not with the colonizers. After all, the duty to enter a civil state only holds where "you cannot help associating with others" (AA 6:237) and "cannot avoid living side by side with all others" (AA 6:307). (3) The third issue is the distinction between the criticized forms of colonial practices on the one hand and legitimate forms of international commerce and settlement on the other. As a number of contributors suggest (e.g. Muthu and Ypi), the fact that colonial practices occur in the world is not a mere accident on Kant's account, but intimately related to a certain elementary disposition of human beings: their "unsocial sociability" that leads to expansive commerce and communication, to competition and conflict. As Sankar Muthu especially argues, this predisposition to unsocial sociability has to be understood in such a way that it can both give rise to the criticized practices of European colonialism and lead to forms of fair international trade and legitimate settlement. In order to separate the two cases, Muthu distinguishes two types of "resistance" rooted in our unsocial sociability: a justifiable and productive form -- resistance for equal worth -- and an unjustifiable and domineering one -- resistance for greater worth. Where the latter lies at the foundation of colonial practices of domination and subjugation, the "resistance for equal worth" provides a source for forms of commerce and interaction that require and involve equality. This productive form of resistance can also manifest itself in the rejection of communication and interaction. Where confronted with potential colonizers, we are entitled to exclude them from community with us. In this regard, Kant has explicitly granted peoples the right to deny foreigners full entry into their communities. In Toward Perpetual Peace Kant refers to China and Japan in this regard and praises them for the restrictions under which they have put their visitors (AA 8:359). Cosmopolitan right therefore does not entitle us to force others into a permanent community with us but only obliges others to give us the opportunity and space to make communicative offers to them. As Liesbet Vanhaute argues, the legitimate forms of trade and settlement that might spring from such communicative offers and visits are, according to Kant, dependent on contracts. This holds true for both the legitimate forms of settlement (AA 6:353) as well as for commercial transactions. Where the criticized colonial practices are marked by violence and exploitation on the part of the colonizers and a disregard of the right of the visited people to reject the offers, legitimate forms of international commerce and interaction depend on the agreement of the visited people as manifested in contractual relations. Contracts are declarations of two wills united in agreement and imply a formal equality of the contracting parties. This way of distinguishing legitimate forms of commerce and settlement, however, might give rise to another worry: Given that Kant thinks that the binding force of contracts depends "on a third party that has the power to coerce" (Vanhaute: 138; cf. AA 6:284), it might seem that because members of different nations lack an institution that is equally binding for both parties, contracts between such parties are precarious and prone to be exploited or broken by the stronger party. In order to avoid this, it seems necessary that the two contracting partners become part of an encompassing civil unity and thus subject to a power that rules both. But does this not mean that even the legitimate forms of settlement and commerce give rise to a colonial dynamic whereby the visitors drive non-state people into civil union with them? Thus, we might worry whether contracts that are supposed to avoid the unilateral violence of colonial practices might have a colonizing effect of a different sort (involving the imposition of forms of legal and political regulation by the stronger party on peoples that may have up until now institutionalized freedom and justice quite differently). (4) The volume closes with Martin Ajei and Katrin Flikschuh raising the important question whether a Kantian position more generally contains resources for a critical stance towards the present post- or neo-colonial condition. They warn us against trying to exonerate ourselves by pointing fingers at historical authors such as Kant for remarks that might seem apologetic of colonialism. Instead, they argue, we should develop the critical resources of Kant's philosophy in order to criticize the continued impact of colonial practices on our contemporary discourses and forms of life. They think that the formalism of the Kantian position makes him an especially powerful resource for the critical analysis of the "colonial mentality" still present in global justice discourses of today. As should be clear by now, this volume is highly instructive and the right starting point for anyone who wants to understand Kant's position on colonialism. It is only natural that such an instructive volume should point to further questions it cannot deal with directly. In two regards, however, additional material could have significantly improved the volume. First, it seems unfortunate that the editors have not included any contributions along the lines of a stronger criticism of Kant's position, discussing the possibility of a deeper and lasting allegiance of his philosophy with colonialism. Although the contributions are very nuanced and balanced, the way the editors introduce the volume and dismiss such stronger criticism with a sleight of hand and without giving any representative the chance to make her case gives rise to the worry that it has a fundamentally apologetic agenda and is designed to defend Kant against these attacks. This seems, as I said, unfortunate, since the volume's intention seems not to be protecting Kant or Kantianism from criticism but rather to evaluate and develop resources for a critical stance towards colonial and post-colonial forms of domination and exploitation. Secondly, it might have been helpful to include contributions that do not circle around the few passages in which Kant explicitly comments on colonialism, as most contributions do, but widen the perspective. Apart from the question whether Kant was apologetic or critical of colonialism, we might ask whether Kant's philosophy has the resources necessary to fully grasp the problem and dynamic of colonialism in the first place. If we assume that colonialism is in some deeper sense connected to global commerce and capitalism, as some post-Kantian authors have argued, does Kant indeed provide the resources to understand and criticize the full scope of colonialist practices? And could it not also be the case that while critical of the colonial practices of his time, Kant retained underlying commitments that tie him to the age of colonialism, even if unwillingly? Two such commitments that are touched upon in this volume and that deserve further investigation are Kant's understanding of the process of civilization and the fundamental link he draws between property and right. Regarding the process of civilization, Kant seems to embrace at various points that the desire to own and to master are irreducible vehicles for the unfolding of humanity's potential. Against this background, competitive commerce and even war seem to be necessary elements in nature's hidden plan for us. Would such a view not give rise to the idea that certain colonial practices are somehow justified by the contribution they make to the civilizing process? And does Kant's conception of this civilizing progress not imply that, even if certain colonial means are problematic, it is in general a good thing to involve "savages" in this civilizing process?[6] The fact that Kant distinguishes mere civilization from moralization and criticizes our age for being excessively civilized but not moral yet[7] gives him the resources for a critical stance towards the idea of civilization. Yet, it might still be true that Kant for the most part presents civilization as a necessary condition of moralization, so that the civilization and its vices might appear as if necessary and ultimately justified. The second fundamental commitment that might imply a deeper affinity between Kant's position and the age of colonialism is the fact that right, according to Kant, emerges out of a unilateral act of occupation. We enter the normative sphere of right first by claiming a provisional right with regard to the things we appropriate and thereby withdraw from the use of others, and secondly by entering into a civil union with others in order to secure those provisional rights. Does this account of right not tie the very idea of right to an original scene of colonial violence: of claiming as mine what belongs to all of us and of forcing the other under a rule of law to secure my property? I don't want to suggest that Kant could not be defended against such a reading, but it would seem fruitful to me to at least consider such worries. These are of course more speculative questions than the ones this volume wants to answer. However, it seems to me that to pursue questions of this sort would help us see the issues the volume does deal with in their broader context. The question of what Kant specifically held at this or that point in his intellectual career with regard to colonialism gains its relevance precisely insofar as it can tell us something about the intricate relation of enlightenment rationalism and colonialism. To realize that the resources of a Kantian position might be limited, be it with regard to delegitimating the colonial practices of his own time or the cultural and economic imperialism of capitalism today, is not to disqualify his philosophy in order to exonerate ourselves. Quite the contrary, it is to raise the question whether our continued adherence to a certain idea of civilization and a certain conception of right as grounded in property might still implicate us in a broader form of post-colonial regime.