

## **Promoting Space Sustainability**

**Sustainability Case Study**

**For All Moonkind**

**06.10. 2021**

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### **Implementation of the Guidelines for the Long-term Sustainability (LTS) of Outer Space Activities of the Committee on the Peaceful Uses of Outer Space**

#### **Operational Case Studies**

#### **I. Description of Outer Space Activity**

For All Moonkind is an international nongovernmental not-for-profit organization. Our mission is to ensure historic lunar landing and similar sites in outer space are recognized for their outstanding value to humanity and consequently preserved and protected for posterity by the international community as part of our common human heritage. In supporting this mission, we have created an interactive registry of all the human-made items on the Moon - a registry we hope to soon broaden to record human-made items throughout space. The overarching purpose of the For All Moonkind Moon Registry is to encourage international collaboration and cooperation. The Registry also serves as a first small step towards the accomplishment of our mission to recognize, memorialize, protect and ultimately preserve human cultural heritage in space. Finally, the For All Moonkind Moon Registry is offered as a model to enhance the safety of space operations and mitigate risks associated with the conduct of activities in space, and specifically on others celestial bodies

In 1958, at the 992<sup>nd</sup> Meeting of the 1<sup>st</sup> Committee of the United Nations General Assembly, the delegate from El Salvadore, Mr. Vega Gomez reflected upon the expansion of humanity into space. Though at the time the development of space capabilities seemed unique to only two States, the United States and the Soviet Union, Mr. Gomez recognized that the technological triumphs of reaching space were "not the triumph of a handful of quiet" individuals, but "the result of culture accumulated through centuries, with the contributions brought by the sufferings of [humans]; it is the triumph of [human] intellect - the human that is part of us all."

Too often we forget to celebrate milestones of space exploration as human achievements; yet we would do well to remember that international collaboration and cooperation is the cornerstone of sustainable space exploration. The United States Apollo missions, the Soviet Union's Luna missions and all the missions that followed could not have succeeded without the contributions of scientists, philosophers, engineers and dreamers throughout our human history that dared to be curious, and to innovate. It is this human history that we work very hard to protect here on Earth.

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It is inarguable that recognizing and protecting human heritage builds kinship amongst all people. This is well-recognized with respect to human cultural heritage artifacts and sites located here on Earth. Indeed, the World Heritage Convention, ratified by more than 190 States, embodies the truism that world heritage sites belong to all the peoples of the world, irrespective of the territory on which they are located. Humanity has a common responsibility to the past - to protect it so that we may move forward to the future in unity. Preservation is not antithetical to progress. It is a sign of progress. We must manage the preservation all our heritage in outer space, not only for history, but also for the future generations, and because they will likely yield scientific information valuable to humanity's future moon, Mars and deep space missions.

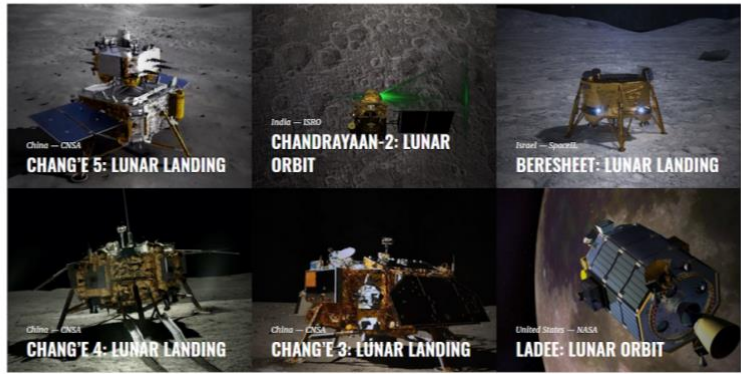
Unfortunately, the international path to preservation is complicated. The World Heritage Convention relies on the concept of sovereignty when considering additions to the World Heritage List - a concept that is anathema in space.

But the Outer Space Treaty and its progeny are silent with respect to preservation. As such, our entirely volunteer team of space lawyers and policymakers are working to develop reasonable and practical protocols that will balance development and preservation and include systems to select, manage and study relevant sites.

Chief among our successes is the enactment of the One Small Step to Protect Human Heritage in Space Act in the United States. For All Moonkind made significant contributions to the development and drafting of this legislation. The Act requires any US entity working with the National Aeronautics and Space Administration on lunar missions to agree to be bound by certain recommendations and guidelines related to the protection and preservation of certain lunar sites. It is truly one very small step, but it is the first national legislation of its kind.

At an international level, our legal research involves developing strategies to formally identify and designate heritage sites in Outer Space and on celestial bodies. Members of our Legal Council are using the rich history of the United Nations and the model of our most successful multilateral treaties and conventions to design and test possible heritage preservation solutions.

In 2018, we embarked on an ambitious project to create a registry of all of the human-made items on the Moon. From Luna to Apollo to Chang'e and everything in between, the Moon Registry provides overviews of every mission that has impacted the Moon, including details on the objects related to those missions that remain on the lunar surface - from commemorative medallions and flags to rovers and scientific experiments. Initially, this Moon Registry was intended to serve as a resource for archaeologists, scientists, engineers and other professionals. Then we realized that this history belongs to all humanity. So, we made this Moon Registry available to everyone, for free. Human history in space is being created every day, so we made this Moon Registry dynamic. Finally, because countless individuals made contributions to this history that may not have yet been recorded, we added crowd sourcing capability and individuals to add their story. Our history is precious, that is why this Moon Registry will ultimately be preserved using blockchain technology to protect the integrity of the data gathering process.



A dynamic work-in-progress, the For All Moonkind Moon Registry displays facts about past lunar missions and seeks crowdsourcing assistance to correct any mistakes, contribute technical details, share personal stories and provide information regarding future missions. Currently, the information we are recording with respect to each site includes mission details, mission type, the operator, the launching state, the location, including latitude and longitude, the launch date, the landing date and a list of objects on or related to the site. We will continue to add additional information to the structure as necessary.



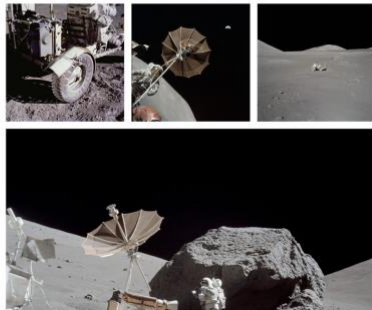
DESCRIPTION

The mission of the Apollo program was to perform a crewed lunar landing. The first four flights, including Apollo 10, tested the equipment used to ultimately place humans on the lunar surface. The first Apollo flight happened in 1968. The first Moon landing took place in 1969. The last Moon landing was in 1972. A total of twelve humans walked on the Moon as a result of the Apollo program. The astronauts conducted scientific research, studied the lunar surface and collected Moon rocks to bring back to Earth.

Per NASA: Scientific objectives of the Apollo 17 mission included, geological surveying and sampling of materials and surface features in a preselected area of the Taurus-Littrow region; deploying and activating surface experiments; and conducting in-flight experiments and photographic tasks during lunar orbit and transearth coast. These objectives included deployed experiments, such as the Apollo Lunar Surface Experiments Package, or ALSEP, with a heat flow experiment; lunar seismic profiling, or LSP; lunar surface gravimeter, or LSG; lunar atmospheric composition experiment, or LACE; and lunar ejecta and meteorites, or LEAM. The mission also included lunar sampling and lunar orbital experiments. Biomedical experiments included the Biostack II experiment and the BIOCORE experiment.

MISSION DETAILS

Mission Name: Apollo 17
Mission Type: Crewed Lunar Lander
Operator: NASA (National Aeronautics and Space Administration)
Launching State: United States
Location: Taurus-Littrow
Latitude: 20.1923
Longitude: 30.7655
Launch Date: 7 December 1972, 05:33:00 UT
Landing Date: 11 December 1972, 19:54:57 UT
Crew: Eugene A. Cernan, commander; Harrison H. Schmitt, lunar module pilot; Ronald E. Evans, command module pilot
Objects on or Related to Site: N/A



CHANDRAYAAN-2: LUNAR ORBIT



DESCRIPTION

Chandrayaan-2 orbiter is a highly complex satellite, which represents a significant technological leap compared to the previous missions of ISRO, which brought together an orbiter, lander and rover with the goal of exploring south pole of the Moon. This is a unique mission which aims at studying not just one area of the Moon but all the areas including the craters, the surface as well as the sub-surface of the Moon in a single mission.



MISSION DETAILS

Mission Name: Chandrayaan-2
Mission Type: Lunar Orbiter
Operator: ISRO (Indian Space Research Organisation)
Launching State: India
Location: Poochi Crater (coordinates: 10.810000, 76.400000)
Latitude: 10.81



II. Connection with the LTS Guidelines

The ability to maintain the conduct of space activities indefinitely into the future in a manner that realizes the objectives of equitable access to the benefits of the exploration and use of outer space for peaceful purposes, in order to meet the needs of present generations while preserving the outer space environment for future generations requires one foundational element: international cooperation.

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The LTS Guidelines tell us that international cooperation is required to implement the guidelines effectively and monitor their impact and effectiveness over time, while also providing the opportunity for adaptive growth. Per this construct, it is clear that protecting our history is also required to assure the sustainability of outer space activities.

The For All Moonkind Moon Registry is offered as a model to enhance the safety of space operations and mitigate risks associated with the conduct of activities in space, and specifically on others celestial bodies. Sharing information and data regarding material that is already on the lunar surface is a first step to sharing information about new projects and missions. The For All Moonkind Moon Registry can act as a public notice board, reminding spacecraft operators of our shared human history – after all, none of them would be there but for these earlier missions – and offering the neutral opportunity to deconflict future activities. At the very least, the sharing of our history in the digital catalog will build kinship, and perhaps provoke a future habit of contribution.

The For All Moonkind Moon Registry also serves as a reminder that there is more to the space environment than a vacuum. In order to explore sustainably, humans must be prepared to explore responsibly.

With respect to the specific LTS Guidelines, we take specific notice of the preambular language four guidelines in particular: C.2, C.4, D.1, and D.4. The For All Moonkind Moon Registry fulfills three functions to promote the sustainable exploration of space. First, in its outreach, and awareness raising capacity, it makes the details of the amazing history of human exploration of the Moon accessible to all for free. Second, in its information-sharing capacity, it provides important data regarding location and heritage considerations for historic missions and allows for the opportunity to share such data regarding future missions. And finally, it will inspire, enhance and support international cooperation and collaboration.

Moreover, For All Moonkind encourages collaborative research and development efforts of sustainable space technologies by States and international intergovernmental organizations in the interest of all countries. These developments and the evolution of technology will allow the space sector to move forward in a sustainable manner, in which humanity's cultural heritage could be preserved while promoting the exploration and use of outer space.

### **III. Lessons learned**

It is important to remember that every State, region and culture that has existed throughout human history likely contributed in some way to the ability of humanity to break the bonds of Earth and soar into the heavens.

Archaeologists sketch human evolution as a sequence of key psychological and technological developments, there are critical stages: overcoming the fear of fire, and eventually controlling fire, conquering the fear of open water and building boats to explore beyond foreseeable horizons; learning communicate and write so that the lessons of history and experience could be preserved and passed down through generations; and learning to control nature, rather than be controlled by it. Reaching the Moon is one of those critical stages. And one that could not have happened without the centuries of human history and innovation that came before it.

Thus, human history on the Moon really began about 3.5 million years ago, when our human ancestor decided to stand up. Freeing two limbs to do other things, like grow food, carry tools, draw, paint, write mathematical formulas and support invention and innovation.

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We do not reach space without overcoming fear of fire. We do not reach space without learning math, the first demonstrations of which were found in the Congo. We do not reach space without astronomers from all corners of the globe. And so on.

In order to successfully implement the LTS Guidelines, information and knowledge must be shared, and human history must be embraced - as universal.

For All Moonkind encourages States to publicly share information and data about past and future missions in a public database like the For All Moonkind Moon Registry. Doing so will promote the deconfliction of future activities and allow all humans to take pride in the great achievements past and to come. We also encourage States to follow the lead of the United States and recognize the existence of cultural heritage in space, and, as part of their obligation under Article VI of the Outer Space Treaty, include measures protective of cultural heritage in their licensing regulations.

Finally, For All Moonkind urges the international community to commence formal discussions with respect to the identification, memorialization, protection and even preservation of cultural heritage in space. We must achieve common understanding as we have here on Earth. The long-term sustainability of outer space activities depends upon international cooperation and collaboration. Starting our future by agreement to something that we already embrace on Earth is the first step on our path to sustainable success.

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