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“Historic Preservation at the Edge: Archeology on the Moon, in Space and on other Celestial Bodies”

Abstract:

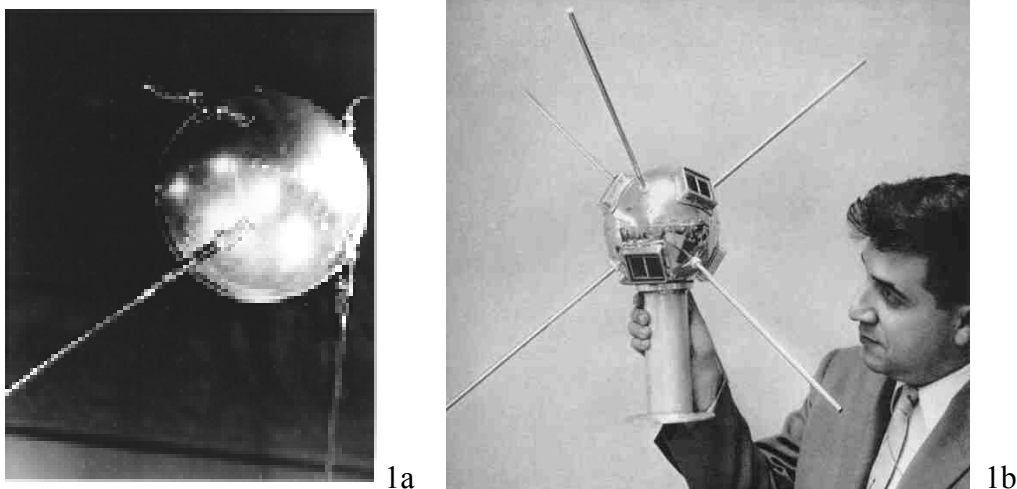
Space Heritage is an evolving field where sites and artefacts do not exist on Earth, but rather in Space or on other celestial bodies. Most were created during the Cold War and are inaccessible and temporarily protected by their remoteness. The complexities and ambiguities of international legal structures to deal with these sites as cultural resources leave them vulnerable to impacts in the near future by many varieties of Space travel. My paper will focus on the Apollo 11 Tranquility Base site on the Moon, the first manned lunar landing site, and explore its historic context and the nature of the archaeological assemblage and its relationship to sites on Earth. I will discuss the current political and legal responsibilities for preservation, the results of the Lunar Legacy Project and argue that without a framework for preservation even these inaccessible sites in Space will become accessible and subject to adverse effects.

Biography: Beth O’Leary is an Anthropology professor at New Mexico State University, USA, specializing in Cultural Resource Management. Since 1999 she has done research in the emerging field of Space Heritage. With a grant from NASA, she has investigated both the archaeological assemblage and the international heritage status of the Apollo 11 Tranquility Base site on the Moon. With the State of New Mexico, she registered the lunar landing as the first Space Heritage site and is documenting the other lunar sites (robotic and manned) as historic cultural properties, evaluating their significance, and the potential effects of the future Space tourism.

The heavens have always been the cultural property of the world's people. Stars and other celestial bodies have been named, used to navigate, track the seasons and tell stories. The Moon, especially, is a presence in the night sky known to all cultures. The Moon and its particular astronomy are in the stories created by cultures from Australia to the Arctic. Every culture from prehistoric times can rightfully claim the Moon as a part of its cultural heritage (O'Leary 2006). But the history of exploration of Space in general and the Moon, in particular, is mostly a Cold War (1946-1989) phenomenon. In 1945, the US and USSR engaged in a race to acquire both German rockets and German rocket scientists (Gorman, & O'Leary 2007, p.73). The V2 rocket, tested in the U.S. at White Sands Missile Range in New Mexico, was developed by Werner von Braun and became the basis for Cold War missile technology; a decade later its descendants launched the first satellites and later propelled the first humans to the Moon. The Cold War was played out through military, political, and social maneuvers, not only on the surface of the Earth, but in space as well. The International Geophysical Year, 1957 – 1958, accentuated the conflict between the USA and the USSR when it announced as one of its objectives to see the launch of a satellite into Earth's orbit (Gorman, & O'Leary 2007, p.73). This provided an arena for the antagonism between the Cold War superpowers.

On October 4, 1957, the Soviets successfully injected Sputnik I, an 83 kg (183 lbs) satellite, into orbit. This great technological achievement was overshadowed by fear of military threats. A month later, the Soviets dramatically launched Sputnik 2 carrying a dog named Laika. The Sputnik launches were followed in 1958 by the launch American Explorer I, which detected the Earth's radiation belt (Van Allen belts). And then after several failures the US launched the 1.6 kg (3.5 lbs) Vanguard I, which established the pear shape of the Earth (Figure 1). Still circling above us today, Vanguard I is projected by NASA to stay aloft for another 600 years. It currently remains the oldest human object in Space. (Gorman & O'Leary 2007, pp. 78-80)

FIGURE 1 Figure 1a. Sputnik 1 and 1.b.Vanguard 1. Courtesy of NASA



The significance of Space exploration is usually understood within a “Space Race” model with strong emphasis on the technological achievements of the USA and its relationship with the USSR during the Cold War. These early satellites provided the basis for robotic and finally manned missions. Later, the primary goal became focused on the nearest celestial body – Earth’s Moon. During the period from 1966-1976, 29 manned and robotic missions placed more than 40 objects into lunar orbit (Johnson 1999) Several missions were intentionally abandoned in orbit and today make up a small population of lunar orbital debris. Several vehicles landed on the Moon and/or returned to Earth or were intentionally sent to their destruction on the lunar surface. They include four US Lunar Orbiters and four Lunar Module ascent stages which contribute to the nearly 50 sites of human presence on the Moon (Table 1). These sites are the result of missions sent out from the both the US and USSR. The Soviets have 14 “Luna” robotic sites, with “Luna 2” successfully landing on the dark side of the Moon. The US robotics include five Ranger, seven Surveyor and one Lunar Prospector. Add to this the well known Apollo Programme which has 20 sites on the Moon with Apollo debris from the six missions which landed there (Johnson 1999).

TABLE 1.

Cold War Lunar Archaeological Sites by Mission Name

<u>USA</u>		<u>USSR</u>	
<u>Mission</u>	<u>Launch Date</u>	<u>Mission</u>	<u>Launch Date</u>
Ranger 4	April 23,1962	Luna 2	Sept 12, 1959
Ranger 6	Jan 30,1964	Luna 5	May 9, 1969
Ranger 7	July 28, 1964	Luna 7	Oct 4, 1965
Ranger 8	Feb 17,1965	Luna 8	Dec 3, 1965
Ranger 9	March 21, 1965	Luna 9	Jan 31, 1966
Surveyor 1	May 30, 1966	Luna 10	March 31, 1966
Surveyor 2	Sept 20,1966	Luna 13	Dec 21, 1966
Surveyor 3	April 17,1967	Luna 15	July 13, 1969
Surveyor 4	July 14, 1967	Luna 16	Sept 12, 1970
Surveyor 5	Sept 8, 1967	Luna 17/Lunokhod 1	Nov 10, 1970
Surveyor 6	Nov 7, 1967	Luna 18	Sept 2, 1971
Surveyor 7	Jan 7, 1968	Luna 20	Feb 14, 1972
Apollo 10	May 18, 1969	Luna 21/Lunokhod 2	Jan 8, 1973
Apollo 11	July 16, 1969	Luna 23	Oct 28, 1974
Apollo 12	Nov 14, 1969	Luna 24	August 9, 1976
Apollo 13 SIVB	April 11, 1970		
Apollo 14	Jan 31, 1971		
Apollo 15	July 26, 1971		
Apollo 16	April 16, 1972		
Apollo 17	Dec 7, 1972		
Lunar Orbiter 1	Aug 10, 1966		
Lunar Orbiter 2	Nov 6, 1966		
Lunar Orbiter 3	Feb 5, 1967		
Lunar Orbiter 4	May 4, 1967		
Lunar Orbiter 5	Aug 1, 1967		
Explorer 35 (IMP-E)	July 19, 1967		
Explorer 49 (RAE-B)	June 10, 1973		

The narrative of these heroic acts of discovery in Space and the human need to explore are firmly linked to nationalistic and colonial aspirations of Space-faring nations. As

Gorman & O'Leary argue (2007, p.74) Space was seen from 1950 through the 1970s and perhaps even today, as an ideological vacuum, as a wild place to be conquered without meeting, so far, any indigenous inhabitants. Going to Space and to other celestial bodies represents one of the highest levels of technological achievement and exploration. Rhetorically, this is the ultimate “high frontier.” But Space exploration has a history in a global landscape tied to conquest. As Apollo astronaut Col. Frank Borman (personal communication, 2001) said “The Apollo programme wasn’t a voyage of exploration or ... expertise in advancing technology. It was a battle in the Cold War.” As such, the Apollo sites on the Moon, in part, are critical heritage components of the Cold War era in the United States. It was because of a question from one of my graduate students, Ralph Gibson, during a Cultural Resource Management seminar that I began my own research in Space Heritage. He asked “Do US federal preservation laws apply on the Moon?” I didn’t know the answer. From 1999 – 2001, with funding from the New Mexico Space Grant Consortium (a part of NASA), we began the “Lunar Legacy Project” to investigate this issue ([http://spacegrant.nmsu.edu/lunarlegacies/.](http://spacegrant.nmsu.edu/lunarlegacies/)) We chose to focus on one site, the Apollo 11 landing site at Tranquility Base, as the most obvious one worthy of preservation. We also chose this lunar site as a test case for the application of US federal law. It is, I believe, the first time anyone had looked at Tranquility Base solely as an historical archaeological site. We initially thought it would be a simple matter of retrieving archival records and maps to document the archaeological assemblage and we selected a basic method to test the application of existing preservation law. Site significance is always evaluated within its historic context. Only two years after the lunar landing of the Soviet Luna 2, US President John F. Kennedy in 1961 vowed to achieve the goal of “...landing a man on the Moon and returning him safely to the Earth” (Chaikin 1994, p. 15)

On July 19, 1969, a Saturn V rocket lifted off on the Apollo 11 mission. It was the first stage of an extraordinary event, when 600 million humans watched and listened as Neil Armstrong set down his left foot on the Moon. US Astronauts Armstrong and Buzz Aldrin were the first to leave human traces on another celestial body. For 21.6 hours these two humans stayed on the Moon while Michael Astronaut Collins circled above. These men were the first to stand on another celestial body; a place no human had ever been before (Figure 2).



Figure 2 Apollo 11 Astronaut Buzz Aldrin’s Boot on the Moon. Courtesy of NASA.

What do we know about Tranquility Base as an archaeological site? What would be the ultimate evidence that humans were on the Moon? From the perspective of an archaeologist what is *in situ* on the Moon? We discovered to our surprise that NASA had neither a complete inventory nor a description of the archaeological assemblage. Sifting through the archives at the Smithsonian Air and Space Museum, the Johnson Space Center, the Lunar Planetary Institute and the NASA Archives, we developed an inventory (which is probably not yet truly complete) of over 106 artefacts and features ranging from the footprints to a solar wind composition staff to emesis bags (Gibson 2001, Appendix 6; <http://spacegrant.nmsu.edu/lunarlegacies/>). Of course, it would be imperative to revisit the site as archaeologists to accurately assess and map the assemblage, but NASA did not provide us with that much funding. Critical components of the assemblage are the tools used to collect samples of lunar material including a “scong” - a combination scoop and a tong. Many of the objects at the site are examples of what was then extraordinary cutting edge technology. In collecting both rocks and the regolith on the Moon, they brought back samples of the 3.7 billion year old material which had never been seen before. The astronauts deployed the laser ranging retro reflector produced many important results it measured for first time the exact distance from the Moon to the earth within 3 cm; it also found that the Moon is receding from the earth at 3.8 cm per year and plotted variations in the rotation of the Moon caused by the distribution of mass inside the Moon, which implies a small lunar core with a radius less than 350 km. It is still returning data from the Moon today (Jet Propulsion Laboratory 2004).

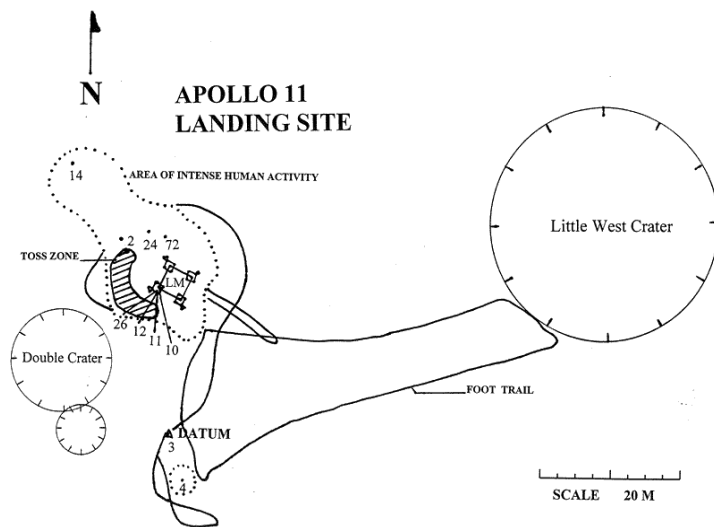
In terms of the cultural activities which evidence the Cold War battle and nationalism involved, one of the first activities the two US astronauts engaged in after landing was to plant the American flag on the lunar surface. Even though they could not own the Moon by International Treaty, the act was symbolic of claiming territory and victory set by historic precedent. Even the names of the spacecraft on the first lunar landing are metaphors for America – the Columbia and the Eagle. To the Soviets, the act of setting the American flag must have signaled a defeat in Space (Gorman & O’Leary 2007, p.84).

Any archaeologist knows one of the most important parts of documenting a site is to create a site map. Since we couldn’t revisit the site to map it, we looked in archives for what most archaeologists would consider a good map, one from the original event or those pieced together from records. This is an event which happened 38 years ago and is documented by copious audio tape, photos, film, engineering drawings, prototypes and a large part of Smithsonian’s Air and Space Museum dedicated to it.

During our project we knew there would be both artefacts and features. The features include the boot prints, rivaling the significance of the 3.6 mya hominid footprints at Laetoli, Tanzania. These tracks are some of the most important features, along with scientific instruments, left *in situ*. We created the only extant quasi- archaeological map based on the Surface Traverses map made just after the event by the US Geological Survey (Figure 3). We revised that map based on a Binfordian toss zone model. Why a toss zone? For approximately 11 minutes The Apollo 11 crew jettisoned numerous artefacts before they left the surface of the Moon, having collected 20 kg of lunar rocks

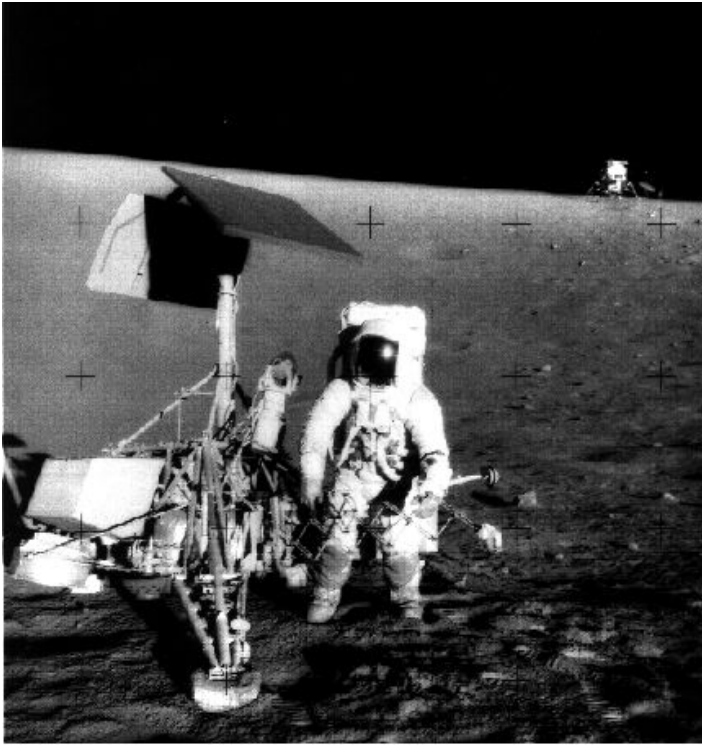
and soil to take back to Earth. They had only one chance to lift off and reconnect for the voyage home and they wanted to make sure that their craft was not too heavy. The astronauts stood on the LM and threw out things in 1/6th the earth's gravity. This map represents predictions of where some of the objects would land, but it is really just a sketch map.

Figure 3. Tranquility Base Site Map (Revised) From Apollo 11 Lunar Traverse Map Prepared by the US Geological Survey and published by the Defense Mapping Agency for NASA. Courtesy of NASA and the Lunar and Planetary Institute.



A kind of archaeological study was done on the Moon, later, in 1969. If I had hoped that the Moon would be the first destination of archaeologists trained to work in Space, and that I might have the distinction of being the first lunar archaeologist, I was disappointed when I learned of the following historic events. On November 19, 1969, the Apollo 12 module made a difficult landing on the Moon's Ocean of Storms just a few hundred feet from where the earlier robotic American Surveyor 3 had landed in 1967. Astronaut Alan Bean is the first real Space archaeologist (Figure 4). He observed that Surveyor 3 had bounced on touchdown. He and Astronaut Pete Conrad photographed the impressions made by its footpads. They observed the condition of the probe, used a cutting tool to remove the television camera, remote sampling arm and a piece of tubing. They bagged and labeled the artefacts from the Surveyor, stowed them on their lunar module and returned them to earth where they were analyzed for changes after two years on the Moon. There was even a kind of forensic archaeological site report on their findings. As such the Apollo 12 mission provides the first example of extraterrestrial archaeology in the emerging field of Space heritage. Also, as PJ Capelloti writes, this was the first example of "formational archaeology and the study of environmental and cultural forces upon the life history of human artefacts in space." (Capelloti 2004:51).

Figure 4. Apollo 12 Astronaut Alan Bean with Surveyor 3 on the Moon. Courtesy of NASA.



If that's the only human visit to an archaeological site on the Moon since 1969 why should we worry about preservation now? Why worry about creating a complete archaeological inventory and accurate map of the Tranquility Base site? Is there any imminent natural or cultural threat to its existence? Is the Apollo 11 Tranquility Base Site, as Kenneth Aitchison (2005) says, one of those places that...“required such a great technological investment for humanity to reach in the first instance they have simply never been returned to?” Sites on the Moon have been largely protected from any adverse impacts by their very inaccessibility and remoteness, but not completely.

If there is complete documentation of lunar sites here on Earth – isn't that redundancy enough? If we have the virtual reality, why worry about the plain old reality? I would argue that it is the location of the objects, structures, and features on the Moon *in situ* which is the most critical part of their significance. Without being on the Moon, without their locational integrity those artefacts lose part of their extraordinary significance and become less than they truly are. The place is as important as the assemblage. As Keith Basso (1996, pp. 7) writes “... what people make of their places is closely connected to what they make of themselves as members of society and inhabitants of earth.” We need to preserve that place on the Moon where humans first stepped. How do we begin to preserve a place even as remote and inaccessible as this one?

I became interested in lunar archaeology because of a question: does US Federal preservation law apply on the Moon? In terms of the legal standing of Apollo 11 site, there were several sources consulted. According to the UN Outer Space Treaty of 1967, no one nation nor individual can own the Moon, but Article VIII of that treaty states that those objects launched into outer space or landed on a celestial body remain under the jurisdiction of those who put them there. In this case, the United States (United Nations 1967). This right of ownership of artefacts on the Moon is strengthened by the minutes of the NASA Artefacts Committee Meeting in 1985 which addressed the issue of transferring title of all the objects that remain at Tranquility base to the Smithsonian's National Air and Space Museum (Gibson 2001, pp.73). Although no such transfer occurred, the document states that NASA maintains title to the property and does not consider the lunar artefacts to be abandoned property. NASA is then the federal agency which owns this historic property. In 1983, NASA actually did transfer to the Smithsonian the ownership of the Viking Lander I. The Viking Lander 1 is still on Mars (Milestones of Flight 2007).

As a federal agency, NASA's actions fall under US federal preservation law, primarily the National Historic Preservation Act, which requires that the agency inventory all its cultural resources and consider the effects of their actions on properties eligible to the National Register of Historic Places or "National Register." The Tranquility Base site meets all four evaluation criteria for being eligible to the National Register and meets two extra requirements. It beats the rule of being less than 50 years old by its "exceptional significance." It also meet the requirement for being declared a U.S. National Historic Landmark (NHL) by "being representative of a great idea of the American people," (National Historic Landmarks Programme 2007). The US Dept of Defense has preserved other sites associated with the Cold War in its Legacy Resource programme. The lunar site meets all its requirements as a Cold War property and should be included as part of the "Man in Space" Theme which includes other NHL's such as the Saturn V Dynamic Test Stand in Alabama and the Apollo 11 Launch pad. This launch pad is part of the NHL site in Cape Canaveral, Florida. The only difference between the Apollo 11 Launch Pad and the Apollo 11 Tranquility Base site is that the archaeological assemblage from the latter is on the Moon. In effect, the Tranquility Base site is the critical component to the cultural landscape of Space exploration on earth.

The Lunar Legacy project wanted to preserve the objects, structures and features left on the Moon's surface at Tranquility Base as a National Historic Landmark and proposed nominating it as such to NASA. Even if the response was not what was desired, one of the best outcomes was bringing the issue of lunar preservation to the relevant US preservation authorities. We first contacted NASA, the primary federal agency responsible and the Keeper of the National Register. The response of NASA's Deputy General Counsel and the Keeper were not favorable (Stephens 2000; Shull 2000). NASA's Deputy General Counsel stated that listing the site as an NHL will be perceived as a US claim of sovereignty over the Moon and the Keeper of the Register doesn't consider the US government to have sufficient jurisdiction, nor as a matter of fairly recent policy consider it appropriate.

The Tranquility Base site is clearly an internationally significant site. And it also qualifies under several criteria for the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage List established for the preservation of sites of “outstanding universal value” (World Heritage 2007). The nations who signed the World Heritage Convention, including the USA, pledge to preserve listed landmarks, but before this can occur the USA, as a state party, must nominate the site. In an ironic turn of events, US astronauts plunk down a flag on the Moon, the UN Space Treaty gives the US rights to the artefacts, America’s Smithsonian has title to objects on another celestial body (Mars) and federal preservation law applies; yet there is, so far, a lack of commitment by the US government to respond to preservation needs.

Who or what will preserve the Tranquility Base site? And when will it happen? Isn’t its remoteness enough to keep it safe for the next 38 years? And can’t we as archaeologists with new cutting edge technology record and map the site as it is now? Missions from Japan and India planned for 2007 are set to map the Moon’s surface for future lunar explorations. Can’t the archaeological data be retrieved on one of those missions and there would be no need to ever go there again? Why worry now about the current lack of political, economic commitment and responsibility for preservation of this site? What about other sites in Space and on other celestial bodies? If these untouchable sites have not been touched in over 38 years, why be concerned now?

I would argue that without a commitment to preservation and the lack of legal structures to deal with Space sites as cultural and historic resources, we leave them vulnerable to impacts in the future by many varieties of Space travel. The ways in which we as scientists could develop methods to survey and record sites in Space would be a waste without a preservation framework in place. And because of the nature of Space heritage it must be international in scope.

The 1967 Treaty on Outer Space did not address historic preservation. Not many people at that time even thought about it, but the treaty did attempt to regulate how the Earth’s people treated territory beyond its bounds. Today, I would argue, what was once inaccessible due to the great technological investment to even get there and to the lack of desire and commitment to return, has changed dramatically within the last five years. The original Space Race culminated with NASA’s Apollo programme with human landings on the Moon from 1969 – 1972. There is a “New Space Race” which has many components of the Cold War nationalism but with many more new players and commercial interests. This may be a scarier scenario for preservation. US President George W. Bush laid out a timeline for a manned lunar landing by 2015; he said that the Moon could be the launching pad for human missions to Mars and worlds beyond. Acts passed by the US Congress promote the development of the emerging human Space flight industry. There are skeptics about the billions in funding needed to achieve this and the ability of NASA to meet the challenge and this may not happen soon, but it will happen – humans will go back to the Moon.

In retrospect, who could have predicted in 1969 that the US would eventually join the Russians on an international Space station? In New Mexico, USA, there is a new Spaceport where Britain's Virgin Galactic reserved a launch pad to transport tourists into suborbital Space by 2009. A successful flight took place (2007) and ascended approximately 384,000 feet with ashes from the Star Trek actor who played Scotty (David, 2007). This new approach to Space exploration has been codified into a recent event and competition called the X- prize. One of its events took place last fall where I live in Las Cruces, New Mexico. Many international commercial Space companies participated. NASA is a willing partner to many commercial Space endeavors. Conferences on Space travel have multiplied exponentially, but not one seems to have a session on lunar preservation and Space heritage. One of the first commercial Space launches and winner of the X prize cup in October 2004 was Space Ship One. It is now alongside Lindberg's plane in the Smithsonian. Besides the US other nations have Space programmes and commercial ventures including the EU, Japan, Russia, India, Canada, and Australia. Even China has a Space programme and its astronauts today are heroes there in the same tradition as the Apollo astronauts.

Astronaut Neil Armstrong has a more famous line about the Moon, but after he got back from the trip he said, "Yeah, we left a few things there." It has been estimated that the lunar landscape is now littered with more than 100 metric tons of man-made debris, the majority of this concentrated near the lunar equator (Johnson, 1999). The lack of lunar atmosphere ensures that each object will strike the surface intact, without the burning and melting associated with Earth atmospheric entries. The lack of atmosphere means that the footprints should still be on the lunar surface now as they appear in the photographs taken at the time. When the Lunar Legacy Project researched the legal issues in protecting the cultural and historical legacy of outer space, we chose the Apollo 11 lunar site for our first attempt. The Tranquility Base Site on the Moon was granted the site number LA 2,000,000 from the State of New Mexico in their Laboratory of Anthropology Data Base (ARMS 2007). LA 2,000,000 has its geographic correlates on Earth at the New Mexico Museum of Space History in Alamogordo NM, a few miles from where Von Braun tested the V-2 rocket. The UTM coordinates for LA 2,000,000 on Earth are thus forever tied to the Apollo 11 coordinates at Tranquility Base on the Moon. This action marks one of the first efforts to preserve cultural heritage on the Moon. It is the first registered Space Heritage site in the world or, literally, out of this world. In the near future, the Lunar Legacy Project plans to nominate the Tranquility Base site to both the New Mexico Register of Cultural Properties and US National Register of Historic Places. But there are other many other Space sites deserving of recognition and preservation. There were five other manned Apollo missions which in total spent a little more than 20 days on the Moon. Although most of the historic lunar locations are well known, surprisingly the location of the Apollo 11's LM Ascent Stage is still unknown. Also there are the earlier significant Russian Luna sites.

Sites on the Moon are not the kind of property that was envisioned when the US National Register or any other Heritage List was created. They are recent past properties for which we don't have a large body of expertise. The artefacts are on another world, at a different scale than we, as archaeologists, are used to dealing with, and they are not within the

national boundaries of anyone's territory, they are not even on Earth. Space exploration is still a functioning, ongoing system. NASA doesn't particularly want to be in the historic preservation business; they want to continue Space engineering. They seem to not want to protect what they have left behind technologically in the dust. Future Space exploration will involve many countries and diverse competitive commercial issues concerning Space. If Space sites are still not claimable or treatable under current agreements we may need to amend the existing Outer Space Treaty to address preservation, or perhaps a UNESCO resolution or changes to the World Heritage Convention that addresses impacts to all historic properties wherever they may be, whatever their origin and whatever celestial bodies they are on. A kind of International Historic Preservation Act is necessary. The future demands international commitment and cooperation.

Many countries from around the world participated in the history of Space exploration and their heritage contributed must be noted. Space exploration is not just the provenance of the superpowers. Some vital components of Space heritage are in small towns like Parkes and Honeysuckle Creek, Australia where they had magnificent radio telescopes to send back the first images of those first steps on the Moon. Parkes is like another small town, Alamogordo NM, where during the Space Race, the High Speed Test Track measured the ability of humans and vehicles to withstand extreme aerodynamic conditions. Of course, there are launch complexes in the former Soviet Union that were critical to the success of the Soviets putting the first man (Yuri Gagarin 1961) and first woman (Valentina Tereshkova 1963) into Space. Some of these historic facilities still continue to function while others like Honeysuckle Creek, Australia and Launch Complex 33 at White Sands NM are no longer used and may have lost all or part of their integrity. Many sites across the globe are linked together by their part in Space exploration during the Cold War. But they are all linked by their relationship to outer Space, and the Moon and other celestial bodies. We need to preserve the off-Earth components as well as the ones we control within our own national boundaries. That is the challenge.

This is the reason for the World Archaeological Congress Space Heritage Task Force. In 2003, in Washington DC, a group of us wrote a resolution adopted by the World Archaeological Congress :

The World Archaeological Congress recognizes that the material culture and places associated with Space exploration are significant at individual, local, organizational, national, and international levels. As Space industries and colonization develop in the 21st century, it is necessary to consider what and how elements of this heritage should be preserved for the benefit of present and future generations. (http://www.worldarchaeologicalcongress.org/site/active_spac.php)

We created a multinational Space Heritage Task Force and had our first official meeting after our symposium at the Society for American Archaeology in Montreal, Canada, in 2004. This is only a start. We need to include more countries, especially from the former

Soviet Union. If the first landing on the Moon was a giant leap for mankind, then today humankind must take a great leap into the preservation of significant Space sites.

It is difficult to know what to preserve in any setting at an historic site and obviously criteria must be developed because not everything may be worthy of preservation. The sites on the Moon are particularly difficult because at present we are unsure of the environmental effects in Space on artefacts. Temperatures on the Moon can be extreme, varying from 121 C (250 F) in the light to -156 C (-250 F) in the dark (Solar System Exploration, 2007). Other natural effects are solar radiation and wind, meteoroid and micrometeorite impacts. We do not know what we will find at the Apollo 11 site after 38 years even without human impacts. For example should every small piece of gold foil which disintegrated from LM on takeoff be an artefact? It is believed that the American flag was probably blown over after takeoff from the Moon by Apollo 11. It may now be a bleached skeleton. Some of the characteristics that make it a significant cultural property may be gone. The challenges as the Task Force sees them are great and one of the greatest is to create an international structure to properly manage the cultural heritage of Space.

Humanity's home is the Earth. The last view of the earth taken from Voyager I, 3.7 billion miles away, showed us as only a small blue dot in an enormous universe. It was the shot the late Carl Sagan wanted taken before Voyager left our solar system. The small blue dot where we sit today is the only home we know. If we, as humans, value and fight to protect the past here on this little blue dot, we must find ways to value and protect the places we have been for the first time in human history. Humanity has unconscionably lost and continues to lose many extraordinary sites on our little blue dot. Let us not lose more sites on the only other world we have yet set our human footprint upon.

References

Aitchison, K. 2005 'The Archaeology of the Inaccessible' *Theoretical Archaeology Group Symposim*, December, Sheffield.

ARMS 2007 Archaeological Records Management Section. New Mexico Office of Cultural Affairs, Historic Preservation Division. <<http://stubbs.arms.state.nm.us/arms>>

Basso, K. 1996, *Wisdom Sits in Places: Landscape and Language among the Western Apache. Tucson*,. University of Arizona Press, Tucson.

Borman, F. 2001, *Interview with Apollo 8 Astronaut, Col. Frank Borman. Jan. 23, 2001*. Videotape and transcript on file New Mexico State University, Rio Grande Archives.

Capelloti, P.J. 2004 'Space: The Final [Archaeological] Frontier,' *Archaeology*, vol 57,no2.pp.48-55.

Chaikin, A. 1994, *A Man on the Moon*. Penguin Group. New York.

- David, L. 2007 'Private Rocket Launches Ashes of Star Trek's Scotty, Astronaut to Suborbital Suborbital'
<http://space.com/missionlaunches/0704/29_opaerospace_sl2lnch.html>
- Gibson, R. 2001, 'Lunar Archaeology: The Application of Federal Historic Preservation Law to the Site where Humans First Set Foot upon the Moon,' M.A. Thesis. New Mexico State University, Las Cruces.
- Gorman, A. & O'Leary, B. 2007, 'An Ideological Vacuum: The Cold War in outer space' in J. Schofield & W. Cocroft (eds), *A Fearsome Heritage*, Left Coast Press, Walnut Creek.
- Jet Propulsion Laboratory, 2004 'Apollo 11 Experiment Still Going Strong After 35 Years.' < <http://www.jpl.nasa.gov/news/features.cfm.feature=605>>.
- Johnson, N.L. 1999, Man-Made Debris in and From Lunar Orbit. *American Institute of Aeronautics and Astronautics*. IAA-99-IAA.7.1.03.
- Lunar Legacy Website. 2007.< <http://spacegrant.nmsu.edu/lunarlegacies/>>
- Milestones of Flight – Viking Lander 2007,< <http://www.hrw.com/science/si-science/physical/motion/milestones/viking.html>>
- National Historic Landmarks Programme. 2007, <http://www.nps.gov/history.html>
- O'Leary, B. 2006, 'The Cultural Heritage of Space, the Moon and other Celestial Bodies' *Antiquity*. March, Vol 80, no 307.
- Shull, C. D. 2000, *Letter dated June 11, 2000 from Keeper of the National Register of Historic Places to Lunar Legacy Project regarding NHL designation of lunar artefacts*. On file, New Mexico State University, Rio Grande Archives, Las Cruces.
- Solar System Exploration, 2007,<<http://solarsystem.nasa.gov/planets/profile.cfm?objects-Moon>>
- Stephens, R.M. 2000, *Letter dated August 18, 2000 from Deputy General Counsel (NASA) to Lunar Legacy Project regarding NHL Designation of lunar artefacts*. On file, New Mexico State University, Rio Grande Archives, Las Cruces
- United Nations. 1967 Treaty on the Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, New York. <<http://www.state.gov/t/ac/trt/5181.htm>>.
- World Archaeological Congress Space Heritage Task Force 2007.
http://ehlt.flinders.au/wac/site/active_spac.php
- World Heritage Convention. 2007,<<http://www.whc.unesco.org/>>