

The Legacy of the Apollo Moon Landings

Written by Roger D. Launius

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ROGER D. LAUNIUS, OCT 26 2012

More than forty years have passed since the last of the Apollo Moon landings took place. Moreover, it has been more than fifty years since President John F. Kennedy made a public commitment on 25 May 1961 to land an American on the Moon by the end of the decade. In 1969 the realization of that commitment began. Kennedy's decision had involved much study and review prior to making it public, and his commitment had captured the American imagination, generating overwhelming support. Project Apollo had originated as an effort to deal with an unsatisfactory situation (world perception of Soviet leadership in space and technology), and it addressed these problems very well. Even though Kennedy's political objectives were essentially achieved with the decision to go to the Moon, Project Apollo took on a life of its own over the years and left an important legacy to both the nation and the proponents of space exploration. Its success was enormously significant, coming at a time when American society was in crisis.

Some Background Information

A unique confluence of political necessity, personal commitment and activism, scientific and technological ability, economic prosperity, and public mood made possible the 1961 decision to carry out an aggressive lunar landing program. It then fell to NASA, other organizations of the federal government, and the aerospace community to accomplish the task set out in a few short paragraphs by the president. By the time that the goal was accomplished in 1969, only a few of the key figures associated with the decision were still in leadership positions in the government. Kennedy fell victim to an assassin's bullet in 1963, and science adviser Jerome B. Wiesner returned to MIT soon afterwards. Lyndon B. Johnson, of course, succeeded Kennedy as president but left office in January 1969 just a few months before the first landing. NASA Administrator James E. Webb resolutely guided NASA through most of the 1960s, but his image was tarnished by, among other things, a 1967 Apollo accident that killed three astronauts. Consequently, he retired from office under something of a cloud in October 1968. Several other early supporters of Apollo in Congress and elsewhere died during the 1960s and never saw the program successfully completed.

The first Apollo mission of public significance was the flight of *Apollo 8*. On 28 December 1968, it took off atop a *Saturn V* booster from the Kennedy Space Center. Three astronauts were aboard—Frank Borman, James A. Lovell, Jr., and William A. Anders—for a historic mission to orbit the Moon. At first that mission had been planned as a flight to test Apollo hardware in the relatively safe confines of low Earth orbit, but senior engineer George M. Low of the Manned Spacecraft Center at Houston, Texas, and Samuel C. Phillips, Apollo Program Manager at NASA headquarters, obtained approval to make it a circumlunar flight. The advantages of this could be important, both in technical and scientific knowledge gained as well as in a public demonstration of what the U.S. could achieve.

After *Apollo 8* made one and a half Earth orbits its third stage began a burn to put the spacecraft on a lunar trajectory. It orbited the Moon on 24-25 December and then fired the boosters for a return flight. It "splashed down" in the Pacific Ocean on 27 December. That flight was such an enormously significant accomplishment because it came at a time when American society was in crisis over Vietnam, race relations, urban problems, and a host of other difficulties. And if only for a few moments the nation united as one to focus on this epochal event. Two more Apollo missions occurred before the climax of the program, testing critical systems and procedures and confirming that the time had come for a lunar landing.

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That landing came during the flight of *Apollo 11*, which lifted off on 16 July 1969 and, after confirmation that the hardware was working well, began the three day trip to the Moon. Then, at 4:18 p.m. EST on 20 July 1969 the Lunar Module—with astronauts Neil A. Armstrong and Edwin E. “Buzz” Aldrin aboard—landed on the lunar surface while Michael Collins orbited overhead in the Apollo command module. After checkout, Armstrong set foot on the surface, telling millions who saw and heard him on Earth that it was “one small step for man—one giant leap for mankind.” Aldrin soon followed him out and the two plodded around the landing site in the 1/6 lunar gravity. They planted an American flag but omitted claiming the land for the U.S. as had been routinely done during European exploration of the Americas, collected soil and rock samples, and set up scientific experiments. The next day they launched back to the Apollo capsule orbiting overhead and began the return trip to Earth, splashing down in the Pacific on 24 July.

This flight rekindled the excitement felt in the early 1960s during the first Mercury flights, and set the stage for later Apollo landing missions. An ecstatic reaction enveloped the globe, as everyone shared in the success of the mission. Ticker tape parades, speaking engagements, public relations events, and a world tour by the astronauts served to create good will both in the U.S. and abroad. Five more landing missions followed at approximately six month intervals through December 1972, each of them increasing the time spent on the Moon. The scientific experiments placed on the Moon and the lunar soil samples returned have provided grist for scientists’ investigations ever since. The scientific return was significant, but the program did not answer conclusively the age-old questions of lunar origins and evolution. Three of the latter Apollo missions used a lunar rover vehicle to travel in the vicinity of the landing site, but none of them equaled the excitement of *Apollo 11*.

Legacies

Project Apollo in general, and the flight of *Apollo 11* in particular, should be viewed as a watershed in the nation’s history. It was an endeavour that demonstrated both the technological and economic virtuosity of the United States and established national pre-eminence over rival nations—the primary goal of the program when first envisioned by the Kennedy administration in 1961. It had been an enormous undertaking, costing \$25.4 billion (about \$95 billion in 1990 dollars), with only the building of the Panama Canal rivalling the Apollo program’s size as the largest non-military technological endeavour ever undertaken by the United States and only the Manhattan Project being comparable in a wartime setting.

There are several important legacies (or conclusions) about Project Apollo that need to be remembered in the current era. First, and probably most important, the Apollo program was successful in accomplishing the political goals for which it had been created. Kennedy had been dealing with a Cold War crisis in 1961 brought on by several separate factors—the Soviet orbiting of Yuri Gagarin and the disastrous Bay of Pigs invasion only two of them—that Apollo was designed to combat. At the time of the *Apollo 11* landing Mission Control in Houston flashed the words of President Kennedy announcing the Apollo commitment on its big screen. Those phrases were followed with these: “TASK ACCOMPLISHED, July 1969.” No greater understatement could probably have been made. Any assessment of Apollo that does not recognize the accomplishment of landing an American on the Moon and safely returning before the end of the 1960s is incomplete and inaccurate, for that was the primary goal of the undertaking.

Second, Project Apollo was a triumph of management in meeting the enormously difficult systems engineering and technological integration requirements. James E. Webb, the NASA Administrator at the height of the program between 1961 and 1968, always contended that Apollo was much more a management exercise than anything else, and that the technological challenge, while sophisticated and impressive, was also within grasp. More difficult was ensuring that those technological skills were properly managed and used. Webb’s contention was confirmed in spades by the success of Apollo. NASA leaders had to acquire and organize unprecedented resources to accomplish the task at hand. From both a political and technological perspective, management was critical. For seven years after Kennedy’s Apollo decision, through October 1968, James Webb politicked, coaxed, cajoled, and manoeuvred for NASA in Washington. In the process he acquired for the agency sufficient resources to meet its Apollo requirements.

More to the point, NASA personnel employed a “program management” concept that centralized authority over design, engineering, procurement, testing, construction, manufacturing, spare parts, logistics, training, and

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operations. The management of the program was recognized as critical to Apollo's success in November 1968, when *Science* magazine, the publication of the American Association for the Advancement of Science, observed:

In terms of numbers of dollars or of men, NASA has not been our largest national undertaking, but in terms of complexity, rate of growth, and technological sophistication it has been unique....It may turn out that [the space program's] most valuable spin-off of all will be human rather than technological: better knowledge of how to plan, coordinate, and monitor the multitudinous and varied activities of the organizations required to accomplish great social undertakings.[1]

Understanding the management of complex structures for the successful completion of a multifarious task was a critical outgrowth of the Apollo effort.

Third, Project Apollo forced the people of the world to view the planet Earth in a new way. *Apollo 8* was critical to this sea change, for on its outward voyage, the crew focused a portable television camera on Earth and for the first time humanity saw its home from afar, a tiny, lovely, and fragile "blue marble" hanging in the blackness of space.

When the *Apollo 8* spacecraft arrived at the Moon on Christmas Eve of 1968 the image of Earth was even more strongly reinforced when the crew sent images of the planet back while reading the first part of the Bible—"God created the heavens and the Earth, and the Earth was without form and void"—before sending holiday greetings to humanity. Writer Archibald MacLeish summed up the feelings of many people when he wrote at the time of Apollo that "To see the Earth as it truly is, small and beautiful in that eternal silence where it floats, is to see ourselves as riders on the Earth together, brothers on that bright loveliness in the eternal cold—brothers who know now that they are truly brothers." [2] The modern environmental movement was galvanized in part by this new perception of the planet and the need to protect it and the life that it supports.

Finally, the Apollo program, while an enormous achievement, left a divided legacy for NASA and the aerospace community. The perceived "golden age" of Apollo created for the agency an expectation that the direction of any major space goal from the president would always bring NASA a broad consensus of support and provide it with the resources and license to dispense them as it saw fit. Something most NASA officials did not understand at the time of the Moon landing in 1969, however, was that Apollo had not been a normal situation and would not be repeated. The Apollo decision was, therefore, an anomaly in the national decision-making process. The dilemma of the "golden age" of Apollo has been difficult to overcome, but moving beyond the Apollo program to embrace future opportunities has been an important goal of the agency's leadership in the recent past. Exploration of the Solar System and the universe remains as enticing a goal and as important an objective for humanity as it ever has been. Project Apollo was an important early step in that ongoing process of exploration.

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Roger D. Launius graduated from Graceland College in Lamoni, Iowa and received his Ph.D. from Louisiana State University, Baton Rouge, in 1982. He then worked as a civilian historian with the United States Air Force until 1990, when he became chief historian of the National Aeronautics and Space Administration from 1990 to 2002. He is currently the senior curator in the Division of Space History at the Smithsonian Institution's National Air and Space Museum in Washington, D.C. He regularly blogs at <http://launiusr.wordpress.com> and his most recent book 'Coming Home' is available as a free PDF download from NASA at http://www.nasa.gov/connect/ebooks/coming_home_detail.html.

[1] Dael Wolfe, Executive Officer, American Association for the Advancement of Science, editorial for *Science*, 15 November 1968.

[2] See 'Earthstruck' in *The New York Times*, 23 December 2008. Available online at http://www.nytimes.com/2008/12/24/opinion/24wed4.html?_r=0 (accessed 25 October 2012).

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