



HISTORY OF SCIENCE

REACHING FOR THE MOON: A Short History of the Space Race by Roger D. Launius. New Haven, CT: Yale University Press, 2019. 256 pages. Hardcover; \$30.00. ISBN: 9780300230468.

Reaching for the Moon: A Short History of the Space Race joins a small swarm of recent books riding the surge of interest in the early space program, thanks to the fiftieth anniversary of Apollo 11. Given this spate of recent works, and the vast trove of related works already in existence, it is hard to imagine what new insights might be provided. On this count, the book is a pleasant surprise. Roger Launius concentrates on geopolitics, domestic politics, and bureaucratic structures, in the US and USSR, in the years leading up to the first moon landing in 1969. The juxtaposition of the American and Soviet programs throughout the first half of the book is a novel approach that makes for fresh insights. As for the technical information, there is just enough to provide important context for the primary political-history story (with a few regrettable misstatements along the way).

The book starts with the Soviet space program of the 1960s in parallel with the US program. Especially interesting is the oft-neglected Soviet program to land men on the moon. Although the Soviets denied the existence of this effort at the time in order to save face, the Russians have since owned up to its existence. Placing it in parallel with the American program provides instructive lessons. This is especially appropriate here since it is the geopolitical cold-war rivalry of the 1960s that drove both space programs. A major lesson to be drawn from the comparison relates to the devastating internal fighting in the Soviet program. This jockeying for political influence and resources is very relevant to the Soviet failure to land men on the moon before NASA.

The text also discusses the 1957–1958 International Geophysical Year (IGY) of planned international research projects, and the fact that each nation knew that the other was working on an Earth satellite well before Sputnik “took us by surprise” in 1957. This is frequently overlooked. The political and public reaction in the US—which led to the space race—is explained in some detail.

The material on Wernher von Braun, the most famous of the German rocket scientists brought to the US after WWII to help with rocket development, is not new but is frequently overlooked. His work for Hitler always haunted his reputation, but was largely washed away in his charisma and excellent

work for the American program. However, it never completely disappeared and is discussed fairly here.

James Webb, NASA’s administrator during the initial phases of Apollo, comes across as one of the heroes of the story, and rightly so. Although President John F. Kennedy (JFK) was not that much into space, and expressed the desire to only spend the minimum necessary to get to the moon, Webb held out and was able to get the resources to build a multifaceted infrastructure for space exploration, for which we continue to reap the rewards (Launch Complex 39 at Kennedy Space Center was used for the Apollo lunar launches, repurposed for Space Shuttle launches, and is now used by SpaceX). It is for good reason that the next great space telescope is named after him, even though his most obvious success was in shepherding the flights of Apollo.

The background of the actual decision by JFK to put the nation on the path to landing a man on the moon “in this decade” is perhaps the most compelling, along with the penultimate chapter on reflections about the meaning of the accomplishment. The comparison of the responses of Eisenhower (president at the time of Sputnik) and Kennedy (president when Gagarin made the first human spaceflight) is instructive. Along the same lines as his warning about the rise of the military-industrial complex, Eisenhower put the “surprise” Sputnik launch into perspective and warned against the rush to an overreaction. This was turned into a political liability by the ambitious Lyndon Johnson, who used it as a way to convey the Eisenhower administration as underestimating the existential threat to the US presented by the new domain of spaceflight. Kennedy capitalized on this and, along with unfounded claims of a “missile gap” between the two countries, made America’s relative lack of prominence in space a major political issue. This led to inspirational rhetoric and resonated with the image of the young and vibrant new president. The embrace of a moon-landing program as a way to recapture America’s preeminence was a natural decision. A lunar-landing mission had already been under study by the Space Task Group (the predecessor of the Johnson Space Center, led by Robert Gilruth), but it was always seen as part of a larger and more methodical program that included orbital flights and space stations. Apollo was a detour from this larger and more coherent vision. NASA and the US have lived with this dichotomy ever since: the impressive space spectacular contrasted with the methodical long-term development of spaceflight capabilities.

One theme throughout the book is that a major goal—if not *the* major goal—of Apollo was to demonstrate

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the superiority of the American system in marshaling resources for great accomplishments. This was not just for pride and prestige, but to sway nonaligned nations which were choosing which nation-system to follow. As Kennedy said in his speech to Congress announcing the lunar-landing goal:

Finally, if we are to win the battle that is now going on around the world between freedom and tyranny, the dramatic achievements in space which occurred in recent weeks should have made clear to us all, as did the Sputnik in 1957, the impact of this adventure on the minds of men everywhere, who are attempting to make a determination of which road they should take.

The goal is geopolitical persuasion, not science or exploration or heroism. That much is clear and undisputed. However, what is lacking is an objective assessment of the international impact on the “minds of men everywhere.” Some anecdotes are provided as to the outpouring of international goodwill for the US after Apollo 11, but nowhere—in this book or otherwise—have I seen a popular account of the impact on unaligned nations.

By using human spaceflight as a tool for political ends, enormous resources were made available, but the public came to see space exploration as a series of spectacles. Anything less spectacular than Apollo was perceived to be an unfortunate loss of direction and lack of leadership by NASA—a sentiment that prevails even today. But Apollo is a hard act to follow. As the author points out, Apollo was a product of the times, and NASA did not seem to understand that; this left a “divided legacy as to the true meaning of the accomplishment and what it meant for the future of space exploration.” It was astoundingly successful in the context of the time, and then the context changed.

Enthusiasm for space peaked when it was novel and heroic and geopolitically crucial. It is a mistake to think that there ever was a time that the American public overwhelmingly supported huge strides in human spaceflight in and of themselves. That is a sobering conclusion. It says much about us as a nation and makes one question just how bold and adventurous we are, as opposed to willing to take risks for pragmatic ends.

Apollo was a clear demonstration of technological prowess, which fed America’s self-image as a great nation and contributed to a long sense of technological progress as inherent to American greatness and uniqueness. The technical virtuosity of Apollo was truly impressive, which also gave the impression that large government technology programs

could solve any problem no matter how challenging. NASA reaped the rewards of this, and continues to benefit from this image, but NASA is also trapped by it since its resources do not match these expectations. Apollo was successful because it was constrained and bounded, the basic technology was understood and defined from the start, and no great conceptual leaps were needed for its fulfillment. The problems of world hunger and poverty are not so easily formulated.

That the Apollo moon landings still hold a fascination for us tells us something about ourselves, but what? To some extent, there is something for everyone, since the program was so wide ranging. Begun with purely political motivations, it touches on something much more fundamental, as explored in the final chapter. It has often been noted that seeing Earth in its wholeness from deep space was the start of the environmental movement. As T. S. Eliot stated, “We shall not cease from exploration, and the end of all our exploring will be to arrive where we started and know the place for the first time.”

On a more regrettable note, some of the fascination with Apollo, in some quarters, is nostalgia for a time when America seemed to have a clear manifest destiny that was largely promulgated by white males. Also mentioned is the desire of many people to frame Apollo as a form of religious experience—humans touching the cosmos, reaching beyond physical limitations, and the like. This journal has previously published two of my reviews of books that attempted to make this religious connection, with little success. Apollo remains a major technical accomplishment, one of the most significant of the twentieth century, which was conceived under geopolitical necessity but continues to inspire and beg for more noble interpretations.

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THE CREATIVITY CODE: Art and Innovation in the Age of AI by Marcus du Sautoy. Cambridge, MA: Harvard University Press, 2019. 295 pages plus preface and acknowledgments. Hardcover; \$30.00. ISBN: 9780674988132.

Following his international bestseller *The Music of the Primes*, mathematician and science popularizer Marcus du Sautoy, Simonyi Professor for the Public Understanding of Science at Oxford University, takes lay readers on a vibrant tour of the world of creativity and the history of attempts at automating the creative process. In so doing, he touches on deep questions of what it means to be human.