The Apollo Moon Landing – 50 Years On

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Is it time to go back? Or should we aim for Mars?

“We choose to go to the Moon in this decade and to do other things, not because they are easy but because they are hard.”
- U.S. President John F. Kennedy in his famous Moon speech at Rice Stadium in Houston, Texas on September 12, 1962
The moon has fascinated us for most of recorded history: a guiding light on dark seas, a sacred disk illuminating the heavens, a symbol of the unattainable, a god. For most of human existence, its stark, cratered surface remained impossibly beyond reach. All that changed 50 years ago, on July 20, 1969. As some 500 million people watched a live televised broadcast (the largest ever TV audience at the time), the commander of the Apollo 11 mission Neil Armstrong emerged from the Lunar Module called the Eagle and – in his NASA spacesuit - became the first man in history to step onto the Moon’s dusty surface.
The words he spoke would become one of the most memorable quotes of the 20th century:
“That's one small step for a man, one giant leap for mankind”.

THE RACE TO THE MOON

Reaching the Moon had been a task of unprecedented proportions: financing and preparation in scientific research called for enormous dedication, ingenuity and progress. Early milestones by the Soviets included the first manmade object in orbit (Sputnik 1 in 1957 which came as a shock to the US), the first man in orbit Major Yuri Gagarin in 1961 and the first female cosmonaut in space, Valentina Tereshkova, in 1963.

The early milestones were not only a feat of scientific success and human bravery but also propaganda coups for the Soviets. Back in 1957, when the first attempt by the US to launch a satellite and the Vanguard rocket failed and fell back to earth from the height of just a few metres and exploded, the Soviet Union's Nikita Khrushchev boasted "America slept under a Soviet moon".

Some argue that although the Americans trailed, they were not as far behind as first appeared.

Milan Halousek is a publicist and well-known populariser of space program history, formerly with the Czech Space Office (CSU):

"The Soviets were fierce at the start and the Americans were slower; but they were also more careful. While the cabin in Project Mercury was ready for its first human test pilot, they still opted to send a chimpanzee (named Ham) instead in January 1961 – in case anything went wrong. Alan Shepard could have flown already at that time but safety won out. Technological advances and success in more complex projects like Gemini and of course Apollo itself would ultimately give the United States the edge and it was there that the Soviet Union would end up floundering… and fall behind."

Back in 1962, Kennedy had stressed in his speech at Rice University how much of a priority getting to the Moon – and getting there first – would be.

"We mean to be a part of it, we mean to lead it," he said.

In the same address, the American president outlined the enormous costs and made clear that anything less than a complete commitment would be unworthy of the task of putting astronauts on the moon.

Publicist **Milan Halousek** again:

"In his speech to Congress in May 1961, Kennedy said the US should land a man on the moon within a decade. It was an important and galvanising moment: to send astronauts there and to return them safely to the Earth. There is no question that solving all the problems successfully - within such a short timeframe - was a huge task: much of the necessary technology did not even exist yet and would have to be invented. Then, Kennedy was assassinated. Maybe that, however, was even more reason to push for success."

SACRIFICE, DEDICATION AND ENORMOUS RISK

The American space program, says **Halousek**, eventually gained the advantage with Program Apollo (which followed Gemini and Mercury). The first crewed flight within the program was Apollo 7 in October 1968. Apollo 8, the first crewed spacecraft to go beyond low Earth orbit and reach the Moon, orbit the moon and return home, was in December the same year.

The space program had also pushed ahead despite earlier setback and tragedy: the deaths of astronauts Gus Grissom, Edward White, and Roger B. Chaffee, the crew of Apollo 1. They died when a flashfire broke out in their capsule in 1967 during a pre-flight test. The tragedy underlined the enormous danger of space flight – a grim reminder that despite the best planning anything could still go wrong at any moment. US President Richard M. Nixon secretly had two versions of a speech prepared for the Apollo 11 mission in the event that Neil Armstrong and Buzz Aldrin ended up stranded on the Moon's surface left to die. There is always danger when it comes to manned space flight, **Milan Halousek** says: risk can be managed or reduced but never 100 percent.

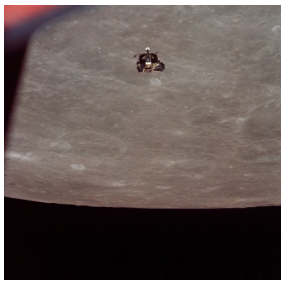
“The Saturn V rocket plus the capsule had some five million parts so even if things are minimised and reduced to the absolute maximum, the chances of something going wrong with fatal results is still fairly high. And of course there were mistakes, there were failures, Apollo 1 and later Apollo 13 (which suffered an explosion in the service module).
“Luckily, at the most important moment, in July of 1969, the Americans avoided catastrophe. But things COULD have gone wrong: had the motor failed on the lift-off from the Moon’s surface when they had no backup engine, Armstrong and Aldrin would have died.”

STEEL NERVES

On July 20th, 1969, a Sunday, at 12:52:00 UTC Armstrong and Aldrin began their descent to the Moon aboard the Eagle; at it landed at 20:17:40 UTC. The descent was not without problems: during landing, 1,800 metres above the Moon’s surface, the LM guidance computer sounded the alarm. The situation was serious; **Milan Halousek** again:
“Several things happened at once: the Eagle had separated from the command module where Michael Collins remained in orbit around the Moon. Armstrong and Aldrin - aboard the Eagle - began their descent and there was a final decision on Go-No Go to decide whether they could land. And that’s when the guidance computer reported a mistake categorised as ‘1206’ which was fairly serious. It meant the computer’s systems were overloaded – and that was a problem.”
Houston reacted quickly and, in effect, experts said later the landing should have been aborted.
“Computers then weren’t what they are today: basically they ran pre-programmed procedures which could not be changed but were basically hardwired or baked in. The computer wasn’t much more than a clever calculator in a way.”
There were only seconds to take a decision and those seconds meant that the lunar module overshot its original landing site. Headed for a deep crater, Armstrong took over manually, with a poor view of the landscape outside through one of two small triangular windows. Fuel was running out quickly and the Eagle landed with less than a minute of fuel left. It touched down some six kilometres away from the original planned site but the crew was unharmed.
“Armstrong had such a soft touch that although the module’s legs were supposed to compress, they didn’t. That meant that the outside ladder was higher off the ground than had been expected. When he came out, Armstrong had a moment when it looked like he was reconsidering continuing, but he was actually gauging the height of the jump to the ground.”

AN INSPIRATION FOR ALL HUMANKIND

The successful mission to the Moon of course “changed everything”. To this day, many remember exactly where they were when the Eagle landed, either watching live on TV or when they heard the news, both in the Free World but also in countries behind the Iron Curtain such as Czechoslovakia.
Both Armstrong and Aldrin spent a little over two hours on the Moon’s surface, taking samples and conducting scientific tests before preparing for the return: to re-join the command module and begin the two-and-a-half day journey back to Earth.
Reaching the Moon was seen by many not as victory for the US (although it effectively ended the space race) but for all humankind, paving the way for innovation and technology we are still benefiting from today. Certainly, Soviet leaders were dismayed their own space program failed to reach the Moon first or at all. The US had succeeded… but everyone benefitted.
Generations since have been inspired by the original footage of Armstrong and Aldrin and what they and fellow crew member Michael Collins accomplished.
It seems incredible that the US reached the Moon in 1969 and would return five more times in the early 1970s but not once since.



WHAT NEXT?

Petr Brož is a Charles University graduate and scientist at the Czech Academy of Sciences' Department of Geophysics. His focus is volcanism across the Solar System with a special emphasis on Mars. At 35, Brož was nevertheless born long after the last Apollo mission ended, but he cites the moon landing in 1969 as a pivotal moment and huge inspiration all the same.

"From my perspective, landing on the Moon is the single greatest achievement of humankind. I believe it was the most complex project we ever set our sights to and it was great and it was very inspiring to read about it or watch documentaries about that time and I am sad I couldn't witness it. I would have loved to have seen it."

Like many fellow scientists, he says even today we are still feeling the benefits of advances that came out of the space program.

"There is no doubt we learned a lot: we made huge technological progress, we learned how to handle projects of enormous complexity, we developed computers and made advances we now use every single day.

"From a scientific point of view, we benefitted enormously from having gotten people to the Moon and their actually having taken samples on the ground and having been there, because it allowed us to verify our theories first-hand. They were able to do scientific work in the short time they were there, to investigate the area, and that is incredibly worthy. Samples from the place make all the difference. Everything else is just theory.

"That is something we can see now when it comes to exploration on Mars or exploration of other bodies in the Solar System. It is much harder when we see things only from orbit and we simply haven't got the necessary samples. While we can send robots there and rovers to investigate and get a lot of information, having people on the ground makes a difference: we are basically missing ways to verify our theories."

Recent years have seen renewed pledges by the US to return astronauts to the Moon or to begin planning for manned missions to Mars, seen by some as a logical steppingstone for colonisation – one day. What is lost on no one, however, are the enormous costs that would be required to reach the Red Planet (no doubt exceeding the cost of the original moon landings) as well the huge technological advances needed.

SHOULD WE RETURN TO THE MOON?

By appearances, the scientific community is divided: should humans return to the Moon first? Or aim directly for Mars? Here's what **Petr Brož** says:

"Some think that we should go the Moon first for a number of reasons. For one, we could test new technologies there and learn much more about surviving in such a harsh environment, it is certainly easier to reach and – in the event of problems, certainly easier to escape from if the need arises. Others think we should aim for Mars straight away, not waste money and go directly to Mars. The more difficult mission, something not done before, would force us to think differently to achieve such a goal. Personally, I am in the camp that thinks we should aim for Mars directly but I totally understand the thinking that says we should return to the Moon."

In his view, going to Mars would be far more inspiring than going back to the Moon, capable of capturing the public's attention and gaining the public's support, a dream that would fuel the imagination today much as going to the Moon did in the 1960s. He places a lot of stock in entrepreneur and visionary Elon Musk and Space X and others in the private sector as being able to play an important role.

One drawback, a project of such proportions cannot work without political will and strong government engagement.

For example, the current American President Donald Trump has at times expressed support for missions to both the Moon and Mars… but tweets last month cast doubt that, at least from his perspective, going to the Moon still made sense. He tweeted on June 7, 2019 that:

“For all of the money we are spending, NASA should NOT be talking about going to the Moon - We did that 50 years ago. They should be focused on the much bigger things we are doing, including Mars (of which the Moon is a part), Defense and Science!”

Which will it be? NASA is said to be currently preparing a mission to the Moon by 2024 under the Artemis Program but some experts see that as optimistic. The CBC and other news sites have reported that the single biggest obstacle may simply be funding, noting that the entire Apollo Program cost 25 billion dollars, which – adjusted for inflation – would be more than 280 billion today.

Scientist **Petr Brož** agrees the biggest problem will be for anyone to agree on covering the costs. Nevertheless, he thinks we should try to achieve reaching Mars, even though it may seem impossible at present.

“Saying that something is impossible because we didn’t try it, it is not the best way forward. At least we need to try and then we can say if something is impossible or not. That was exactly what Kennedy wanted from his engineers and scientists: to try something which seemed impossible at that time.”

LOBSTERS ON TITAN

Another question is whether we should even be aiming for either: after all, there are still plenty of other important missions in various stages of development that also require funding and which too can change how we view life, the universe, and everything in it. Such as unmanned space flights – and above all robotic landers - that can reveal much about our solar system.

Ondřej Čadek is a professor at Charles University’s Department of Geophysics at the Faculty of Mathematics and Physics in Prague who remembers when the Eagle landed (he was nine) and he too cites it as the greatest human achievement. But he is unsure going back to the Moon today makes sense. Not when there are other important discoveries out there to be made, equally deserving of funding and rigorous scientific study and attention.

“Sending humans to space is expensive and because it is expensive you have to take money from other projects. There are great projects now being planned to explore the outer parts of the Solar System – the icy moons of Titan or Europa, which could host very primitive forms of life.

“And I am just afraid that all the money will be pooled to pay for example to return people to the Moon. The thing is, if we return there, I don’t think it will answer new questions.

“By contrast, if we are able to confirm life elsewhere in the solar system, which would tell us that life can exist ‘everywhere’. Of course, my field focuses on finding suitable areas where primitive life could exist – salty oceans under huge layers of ice. I would like to know if there is life elsewhere: could there be microbes in seas under the ice?”

Professor Čadek reveals that a colleague from NASA who was an esteemed guest at Charles University, joked that one reason for the exploration on icy moons is to learn if there might be “tasty moon lobsters” under the ice. Imagine importing those!

Jokes aside, there is simply a fear that there is just not enough funding to go around. Priorities need to be set for either returning to the Moon, going to Mars, and other important research. But no one wants to see other highly important scientific research scrapped as a result.

50 YEARS ON

Fifty years ago, NASA had ambitious plans for the future of manned travel, a space station, a base on the Moon, plans which went unrealised.
The last manned crew to reach the Moon was Apollo 17 in December 1972 and the last man on the moon was Commander Eugene “Gene” Cernan (who had Czechoslovak roots). NASA went on to develop its space shuttle program and we have not been back to the moon since.
Was it a mistake not to continue?

Some are optimistic we will successfully return by 2024 or perhaps by 2028 as was originally planned but **Milan Halousek** points out that even with today’s advances it will not be easy. In his view, although we have the knowledge there is a still a lot that will have be tested and re-learned.
“Manned space flight today still has important scientific results, that’s without question. But in my opinion we NEED to return to the Moon. Today we are capable of sending people 400 kilometres into orbit; 50 years ago, we sent astronauts 380,000 kilometres from Earth.”
To this day only 12 astronauts – all from the US – have ever walked on the Moon. Will that change? Will anyone follow in their footsteps soon?