

After four decades, is America over the moon?

Four decades after the first lunar landing, a series of new missions revives debate over their value

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Nearly 40 years after Neil Armstrong walked on the moon and uttered his famous words, NASA this week will launch the first in a series of missions designed to return astronauts to the moon by 2020.

The unmanned \$504 million Lunar Reconnaissance Orbiter, which launches Wednesday along with another satellite, is designed to take high-resolution photos to find safe future landing sites. Other instruments will examine radiation levels and identify natural resources on the moon, such as ice, for possible use by future human outposts.

But even as the countdown for launch begins, a strenuous debate continues over whether the United States' moon program will yield findings and technology that justify the more than \$100 billion in costs. In May, President Obama's administration ordered a review of NASA's current plan to end the space-shuttle program in 2010 and develop spacecraft to send astronauts to the moon.

Some scientists oppose the new moon program, saying NASA should focus instead on research on Mars and other planets.

Supporters argue that manned moon spaceflights are essential if humans ever hope to travel to Mars and beyond. They say the moon is the best testing ground for how astronauts will handle extended stays in space.

There is no denying NASA has a history of turning moon flights into success stories. The first manned moon landing was on July 20, 1969, and was a scientific and political triumph. The U.S. was widely viewed as winning the space race against the Soviet Union.

Then-President Nixon called the landing "the greatest week in the history of the world since the Creation." Interesting scientific findings also emerged. Analysis of moon rocks and soil, for instance, led to the prevailing theory that the moon formed after the Earth collided with an object the size of Mars or larger.

Astronauts would return to the moon again five times, but the program slowly fell out of favor. The Nixon administration cut NASA's budget, and the last manned U.S. flight to the moon occurred in December 1972. The country began focusing on other efforts such as the Skylab space station.

The case for the moon

So why go back to the moon now, decades later?

It's a question that [Arizona State University Professor](#) Mark Robinson, who's overseeing the Lunar Reconnaissance Orbiter's cameras, hears often.

He answers it with another question.

"Why do we continue to go to Antarctica?" he asked a few weeks before the lunar orbiter was scheduled to launch.

There are, of course, the intangible social and political reasons, he says. If a country wants to be seen as a world leader, it has to lead. The space race once pitted the United States against the Soviet Union, and now China is emerging as the greatest competitor with plans to send humans to the moon.

The moon also is a steppingstone for getting humans to Mars and other planets. Only four days' travel from Earth, the moon is a logical place for astronauts to train and prepare for longer missions.

Then there are the pure- science reasons for returning.

Scientists such as Robinson view the moon as a way to study the early stages of planet evolution.

On Earth, tectonic plates shift and change the planet's appearance, so the oldest rocks found on Earth so far are 4 billion years old. On the moon, with little geological activity, rocks dating back 4.5 billion years lie right on the surface.

Scientists also want to explore the geology on various parts of the moon. Past moon missions collected rocks only around the moon's equator.

"Imagine if you were Martians and you sent six missions to Earth, and they went to six places in Africa," Robinson says. "And when you landed, you could only go 2 miles from where you landed. Do you think you could understand the whole continent of Africa?"

Scientists want to know more about exactly how the moon formed. To do that, they need more samples from various areas. And they need to send manned or robotic spacecraft to collect them.

"This (mission) is helping plan where to go," Robinson said.

Dimmer view of moon

Some space experts doubt whether NASA's plans to return humans to the moon will ever happen.

Alex Roland, a NASA historian from 1973 to 1981 and now a history professor at Duke [University](#), is among the skeptics.

He calls the vision for returning to the moon by 2020 un- realistic because then-President George W. Bush appropriated little money for the venture when he proposed it.

"It was brilliant politically," he said. "In an election year, he looks visionary, and none of the deliveries come until he leaves office. There's no risk in proposing this."

Roland said presidents often grapple with whether to spend billions of dollars on space programs when there are so many other budget demands. Yet the aerospace industry, which employs tens of thousands of people, is a powerful political lobby. Americans have a positive image of NASA, but they care little about space policy.

"The general sentiment is NASA is a pretty good group of people, so give them money and let them do what they do," Roland said.

Even so, President Obama faces difficult choices as the budget deficit widens and he pursues ambitious plans for reforming health care and education.

During his campaign, he proposed delaying NASA's return to the moon by five years and redirecting the money toward education. He later backed off that statement during a speech in electorate-rich Florida, home to much of the space industry.

Still, the future of manned moon spaceflights remains unclear. Earlier this year, the president commissioned an independent review of NASA's manned space program, and the recommendations are expected later this year.

Despite the uncertainty, Roland said, he thinks the lunar orbiter mission still makes "a certain amount of sense." Scientific instruments have advanced considerably since the Apollo days, he said, so it's likely to produce interesting findings.

"But having said that, these two missions were designed to support a manned landing on the moon, and I'm not at all convinced we will end up doing that," he said.

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