

Is exploring Mars worth the investment?

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Saturn has its famous rings and Jupiter is the granddaddy of the solar system, but no planet has entranced earthlings quite like Mars.

Humans have launched 40 spacecraft to the Red Planet, lured by the prospect that life might once have existed in what is now dry rocks and sand. The latest machine to make the journey is NASA's Mars Science Laboratory, a hulking, souped-up lab-on-wheels that will plunge toward the [Martian surface](#) next week.

But even as excitement builds, some wonder: Is [Mars exploration](#) a good investment?

It certainly doesn't come cheap. It's hard to calculate a total price tag, but over the 48 years that NASA has been launching missions to Mars,

Americans have spent a significant sum. The Viking missions alone cost nearly \$1 billion - in 1970s dollars. The twin rovers Spirit and Opportunity cost a total of about \$1 billion to build and operate as well.

Curiosity, as the Mars [Science Laboratory](#) rover is known, is over budget at \$2.5 billion.

Some in the federal government have suggested it's time to roll back the spending. President [Barack Obama](#)'s fiscal plan for 2013 would cut NASA's funds for Mars exploration from \$587 million to \$360 million.

Proponents insist Mars science is vital for the U.S. More visits to our next-door neighbor could answer lingering questions about Earth's history, reinforce U.S. prestige and get more children interested in science.

It also could bring humanity closer to answering the ultimate question: Are we alone in the universe?

"It's the search for the meaning of life," said Alden Munson, a senior fellow at the Potomac Institute for Policy Studies, a science and technology think tank based in Arlington, Va.

America's love affair with Mars can be traced to astronomer Percival Lowell, who turned his telescope to the Red Planet in the 1890s and thought he saw an intricate system of canals that must have been built by intelligent beings. He never found them, of course, but Martians became a science fiction mainstay.

Earthlings got their first up-close view of Mars' rocky surface in 1965, when Mariner 4 flew by and photographed a surface that appeared as dead as the moon's - lacking water or active geology, two prerequisites for life.

But later missions, from the Mariner 9 orbiter to Spirit and Opportunity, helped establish Mars as a useful comparative laboratory for studying climate and geophysics on Earth. They demonstrated that the planet was once warmer and wetter than it is now. Long ago, it may have been a hospitable cradle for life.

When planetary scientists assembled recently at the behest of the National Academies to set research priorities for the next decade, the search for conditions that would allow life to emerge on Mars topped the list.

"If there's life or past life on Mars, it means the chances that life exists somewhere else are much higher," said David Paige, who studies the moon and terrestrial planets at UCLA. If Mars is barren, "it might make Earth more unique than we thought."

Some experts question the wisdom of focusing so intently on a single planet. Jupiter's moon Europa, which is covered with an ice-encrusted ocean, could have the potential to harbor life; Saturn's moon Titan, rich in organic chemistry, might as well.

"It's like the person who loses their keys and only looks for them below the streetlight," said David Jewitt, a planetary scientist at UCLA who studies comets.

But funds for planetary science are limited - and even those who favor a broader search admit that Mars remains the most practical site to explore.

A mission to Europa, for example, would take about six years to reach its destination. Curiosity's trip to Mars takes about eight months.

Europa has other drawbacks too: For one, particles flung into space by

Jupiter's magnetic field would likely fry a spacecraft's electronics in a matter of weeks, said Richard Greenberg, who studies the frozen moon at the University of Arizona.

"Personally, I love Europa," he said. "But objectively, both it and Mars are great places to look for life."

Regardless of whether life can be found beyond Earth, Mars exploration boosts U.S. prestige.

"A lot of the warmest feelings people have had around the world have had to do with the space program," Munson said. "It's hard to put a value on that."

Space exploration is the ultimate status symbol. China and India have signaled their technological aspirations by establishing space programs. So have Iran, Pakistan, Venezuela, Israel, Mexico and dozens of other countries.

"I'm afraid if we step back, it will be decades before we get back to Mars," said Rep. Adam B. Schiff, D-Calif., whose district includes NASA's Jet Propulsion Laboratory in La Canada Flintridge, where Mars missions are based. "We have the expertise now. No other countries have been able to do this."

NASA has outperformed other space agencies by a wide margin, completing 13 successful missions (against five failures) since 1964. The Russians have had particularly bad luck, with 15 failed missions and only four partial successes.

The amount of money Americans devote to Mars is tiny compared to annual expenditures on other NASA projects, said Munson, who noted that in 2011 alone, the agency spent more than \$4 billion on the

International Space Station and the fleet of space shuttles.

The James Webb Space Telescope, the successor to the Hubble Space Telescope that is designed to help scientists study the very early universe, is costing NASA \$8.8 billion.

Even that price tag is dwarfed by the more than \$600 billion the Defense Department will spend in 2012.

Jewitt put it like this: Americans spend more than \$7 billion a year on potato chips.

"We're talking about a small amount of money in the grand scheme of things," Paige said.

Still, in the heat of an election season, some find it hard to justify Mars spending as long as the deficit remains high and the basic needs of many citizens aren't met.

This time around, in the run-up to Curiosity's high-profile landing, it's hard to find people willing to criticize Mars science in public. But back in 2004, when President George W. Bush was pushing an ambitious plan that included manned missions to the [Red Planet](#), Sen. Joe Lieberman of Connecticut (then a Democrat) said the billions of dollars NASA would require would be better spent "right here on Earth" on health care, education and domestic security.

Even those who've caught the Mars bug and are excited about Curiosity worry that with the new rover, NASA has "put all the eggs in one basket," said Robert Zubrin, an aerospace engineer and founder of the Mars Society, which advocates for manned missions to the planet.

When NASA's Mars Climate Orbiter and [Mars](#) Polar Lander both failed

in 1999, work was already under way on several other missions that turned out to be successful, Zubrin said. But there's not much waiting in the wings this time around.

Plans to send a lander to scoop up Martian soil and return it to Earth, as well as to visit Europa, have been postponed to save money.

After Curiosity, NASA's planetary scientists have only one major mission lined up: an orbiter called MAVEN, which will explore the Martian atmosphere and climate. It is scheduled for launch in 2013.

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