NASA feels a 'sense of urgency' to get to Mars: Idaho scientists could help us get there

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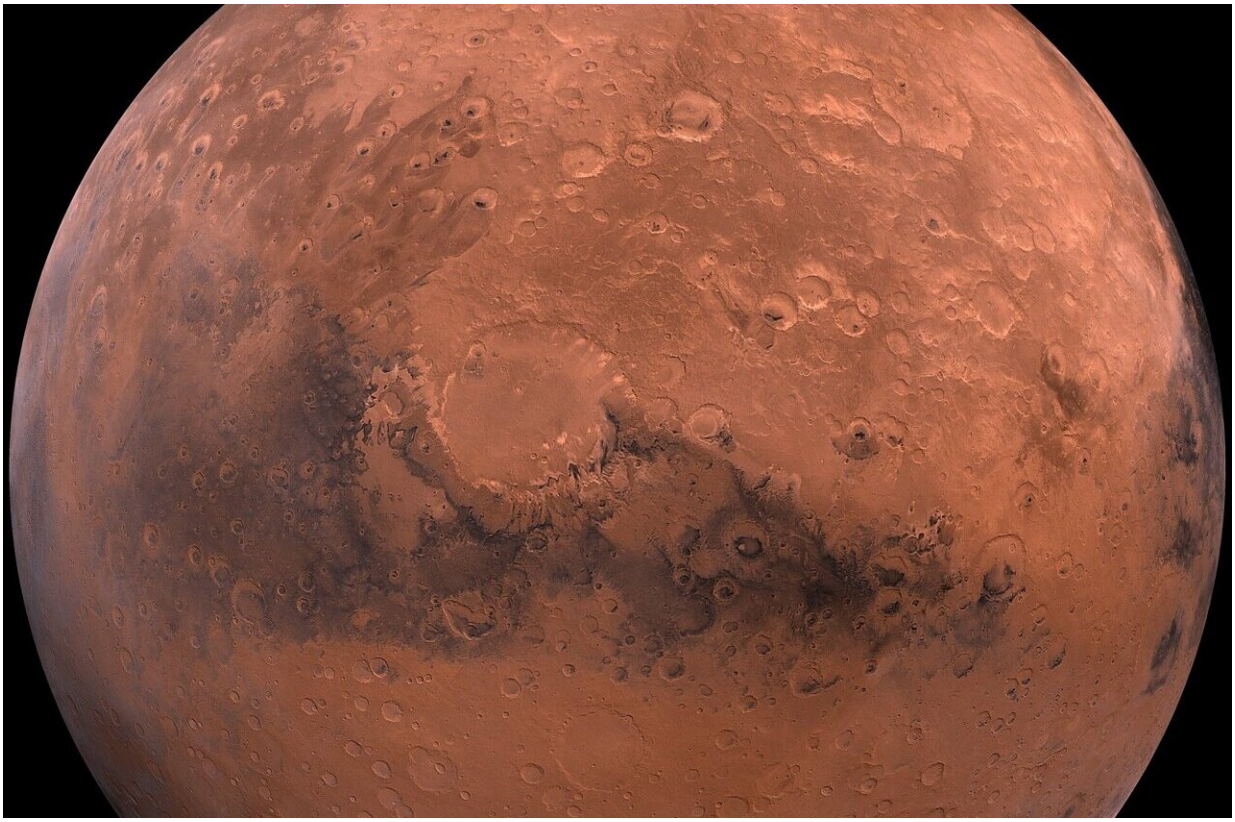

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China has repeatedly stunned the U.S. intelligence community in the last five years with rapid progress in its space exploration program, landing a rover on the far side of the moon and completing its very own space

station orbiting Earth.

Their advances have established that a new space race is on between Washington and Beijing—this time with the ultimate goal of sending a crewed mission to Mars, each vying to be the first to land humans on another planet.

America's success may come down to a team of scientists based out of Idaho Falls.

Engineers at the Energy Department's Idaho National Laboratory are leading a nationwide team of scientists to enhance the capabilities of nuclear thermal propulsion, a technology that NASA hopes will cut the travel time to Mars by half.

It is an ambitious project that could transform the future of human space travel.

"What NASA ultimately is looking for is a nuclear thermal solution to get to Mars," Sebastian Corbisiero, senior technical advisor for advanced concepts at the Idaho National Laboratory, told McClatchy in an interview. "There's additional technology that needs to be developed to have the higher capability that you need for the Mars mission."

NASA aims to reach Mars by 2040 and is working on entirely new technologies for the mission, NASA Administrator Bill Nelson told McClatchy in an interview.

With conventional technology, launch opportunities to Mars come along just once every 26 months, Nelson told McClatchy. Missing a launch window could mean a delay of several years, and if something goes wrong midflight, the crew will be on its own in deep space.

"I don't think it's practical to go to Mars with conventional technology—conventional propulsion—because it takes us seven to nine months to get there. Once you get there, you're going to have to stay on the surface maybe a year, maybe two, until the planets realign so you can get back," Nelson told McClatchy. "So I think one of the essentials is we're going to have to get nuclear electric or nuclear thermal propulsion that will get us there faster."

The sheer length of the journey means a crew will need more food, equipment, and physical and mental stamina than any previous mission ever tested, Nelson said. A heavy launch vehicle will be necessary to carry an unprecedented payload off the Earth. The longer the journey into deep space, the longer astronauts will be exposed to dangerous levels of microgravity and high doses of radiation. They will steer their final approach to Mars with their vestibular systems out of whack, muscles atrophied, immune systems degraded, eyesight impaired.

Then they will have to land through an atmosphere that is thick enough to kill them but too thin to be used as a break to slow their descent to the surface. Should they succeed, they will be on the other side of the sun with no one there to help them.

Today's rockets are fueled by conventional combustion engines that require substantial amounts of fuel onboard to power a journey. While a chemical engine could get a spacecraft to Mars, an engine fueled by a nuclear reactor would be far more fuel efficient—heating up freezing hydrogen to high temperatures and using the exhaust as a thruster—and could continue accelerating the vehicle on its long trip to Mars, cutting the travel time.

The Idaho National Laboratory is working to enhance control over the velocity of the engine, increase its efficiency and control its heat generation, Corbisiero said.

Cutting their travel time could reduce many of the logistical hurdles and risks currently burdening the mission, Nelson said. NASA is also working on radiation shielding that avoids the use of a heavy metal such as steel, and the generation of a centrifugal force in the spacecraft that would create artificial gravity for the crew.

'A very powerful sense of urgency'

At the Defense Advanced Research Projects Agency, or DARPA, in Arlington, Virginia, Tabitha Dodson is working to resurrect a thermal nuclear engine project that began in the Apollo era, but sat on a shelf after the United States abandoned manned spaceflight in the 1970s.

In an interview, Dodson compared Washington's decision to let the technology languish to a directive from Beijing in 1525 to gather China's world-class fleet of ships and destroy them, relinquishing naval power for generations to come.

"I feel a very powerful sense of urgency," said Dodson, program manager for the nuclear thermal rocket engine program at DARPA. "There's just this perfect storm of support, all up and down the various government agencies nationwide—in Congress and at the presidential level—to the point where I feel like we have to get this done, right now, because we might miss our chance."

Dodson said she has "high confidence" that DARPA and its main private industry partner, Texas-based Lockheed Martin, will successfully demonstrate their rocket, known as DRACO, in 2027.

But DRACO would only be an initial spaceflight test of nuclear propulsion technology in near-Earth orbit. Corbisiero explained that his team is working to build on DRACO's anticipated success, increasing the efficiency of the propellant and velocity scale of nuclear thermal

propulsion in preparation for longer missions.

Dodson and Corbisiero both acknowledged working toward an internal deadline of reaching Mars by 2040 and expressed confidence it could be reached.

"From a technology standpoint, it's certainly within our grasp," Corbisiero said. "This isn't something where you need to invent new physics or some magical breakthrough."

A senior official in President Joe Biden's administration told McClatchy that it is indeed a priority of the White House to advance this technology with haste.

"Some of this foundational technology is very important for us to get toward a crewed Mars mission," the senior official said. "We know it's going to take significant time for us to be able to develop that technology early on, because these are long-lead needs."

Jim Bridenstine, NASA administrator under former President Donald Trump, told McClatchy that traveling to Mars makes a trip to the moon look easy.

"Humanity is going to eventually walk on the surface of Mars, and I think that is going to be an exceptional moment," Bridenstine added. "Who will be there first? I don't know."

China works to develop nuclear propulsion

Chinese officials, too, appear to be working on a nuclear propulsion project of their own.

In November 2022 on Hainan Island, where China has built a launch site

for its heaviest rockets, Wu Weiren, an architect of China's lunar program, made a presentation that previewed China's plans for future missions that included spaceship designs to accommodate nuclear electric engines, according to slides of the proposal obtained by McClatchy.

"This comes with real technological repercussions, including the command of different environments in space," said Chris Carberry, CEO and co-founder of Explore Mars, Inc. "And if they're beating us to Mars, they're probably doing very well closer to Earth, as well."

Chinese officials have remained quiet on their plans for a manned mission to Mars. But in 2021, at a conference on space exploration in Russia, a senior executive at China's main space launch vehicle manufacturer said that Beijing had a roadmap to send humans and establish a base there in the mid-2030s.

U.S. intelligence and national security officials told McClatchy that China's space program is advancing with remarkable speed, and could inhibit the United States' freedom of movement in space by the end of the decade.

"Mars is the horizon goal," said Scott Pace, executive secretary of the National Space Council under Trump. "Landing on Mars—if they're able to do it—would play into China's narrative as the great power of the 21st century."

"But having that goal and doing it are two different things," he added.

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