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NASA's mission: Can we live on the moon?

The agency is set to launch spacecraft that will update topographical maps of the surface and will probe deep into a crater to search for water.

By John Johnson Jr.
June 13, 2009

Nearly four decades after astronaut Neil Armstrong planted his boot on the surface of the moon, the U.S. is about to take the first small step toward colonizing Earth's tag-along satellite.

On Wednesday, NASA is scheduled to launch a robotic mission aimed at finding the best site for Earth's first off-world colony, the centuries-old dream of science fiction writers and utopians.



Hunting for water on the moon

This time, we're not just going for a walkabout or to hit golf balls and cruise around in a \$10-million moon buggy, as the Apollo astronauts did. Ultimately, we hope to pack up the kids and the dog and move in.

"We're going to provide NASA with what is needed to get human beings back to the moon and to stay there for an extended duration," said Craig Tooley, project manager for the **Lunar Reconnaissance Orbiter**, one part of the two-pronged mission.

The orbiter itself is expected to produce the most detailed topographic maps of the moon ever made, as well as first-ever glimpses inside perpetually shadowed craters at the north and south poles. Inside those craters, scientists hope to find caches of frozen water that have been hidden away for billions of years.

The mission won't stop there. Using a second spacecraft -- the **Lunar Crater Observation and Sensing Satellite** -- NASA is planning to punch a hole in one to see what comes out.

Both of the spacecraft will be launched together with a two-stage rocket, and nearly four months from now, the agency will use the spent second stage of the rocket as a battering ram to create a crater 66 feet wide by 13 feet deep and send a 6-mile-high plume wafting into space that should provide a show for hobbyists on Earth with decent-sized telescopes.

"This should be spectacular," said Tony Colaprete, the satellite's project scientist. "It should be a very visible impact from Earth."

The biggest uncertainty hanging over the \$579-million mission as it prepares for launch at Cape Canaveral in Florida is the question of whether the lunar outpost will ever be built.

The plan for a lunar colony was developed as a consequence of **President George W. Bush's 2004 Vision for Space Exploration**, which proposed putting human beings back on the moon by 2020. That plan also called for using the moon as a jumping-off point for a still more ambitious plan to put astronauts on Mars.

But President Obama has not endorsed the Bush vision.

The administration's recent decision ordering a review of the future of human spaceflight stirred anxieties in the passionate space community. Some observers wonder whether Obama is setting the stage for a pullback from Bush's grand vision

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to a much more limited one -- similar to the one that led NASA to abandon the moon in the '70s in favor of the much-derided space shuttle program.

In his May 19 [testimony](#) to a Senate science subcommittee, Christopher Scolese, acting NASA administrator, indicated that he was well aware the long-term plan for humans to colonize other worlds could be in danger. He took note of the fact that "the administration will provide an updated request for exploration activities, as necessary."

"In the meantime," he said, "NASA is proceeding as planned with current exploration activities, including . . . lunar systems."

An hour after launch on Wednesday, the 4,000-pound reconnaissance orbiter will separate from the crater-sensing satellite and rocket portions of the spacecraft. After a nearly five-day cruise, it will use a dozen guidance thrusters to settle into orbit about 30 miles above the lunar surface, which is much more of a mystery than many might think.

Other than the equatorial area explored by the Apollo missions, "images of the rest of the moon are pretty poor," Tooley said. "We have much better images of Mars than the moon."

The problem is particularly acute at the poles, where the current maps can be off as much as 10 miles, even though the current NASA plan calls for establishing the outpost at one of the poles.

The poles have areas of perpetual sunlight and perpetual shade. The sunlight would be useful as a source of solar power for colonists. The shaded areas may feature deposits of ice that have been locked up for billions of years.

Such ice could be used not just as a source of water. Through electrolysis, it could be broken down into hydrogen and oxygen. The oxygen could be used both for respiration and to make rocket fuel for trips back and forth to Earth. But there's no definitive proof ice is there. The possible presence of water on the moon "is a hotly and passionately debated topic," Tooley said.

Tantalizing clues point in both directions. One of the most persuasive came from the 1998 [Lunar Prospector mission](#), which detected large stores of hydrogen in sunken craters, where the temperature never rises above minus 270 degrees. Yet, recent efforts to find water with other international satellites orbiting the moon have failed.

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