

Despite hurdles, human missions to Mars are in the works

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Rovers setting the stage

While all the excitement on Mars focuses on the amazing durability and discoveries of two robotic rovers, Spirit and Opportunity, two Mars Exploration Rover (MER) scientists remind Mars aficionados that the rovers are part of a coordinated plan to put humans on the Red Planet some day.

Image: Mars Exploration Rover mission scientists remind us that the amazing success of the rovers Spirit and Opportunity is a harbinger for the day when humans inhabit the Red Planet.

The major drawback to a human mission to Mars is preparing for the one to two years of radiation and microgravity exposure that astronauts must endure. While that is a large hurdle, enabling technologies are emerging that should be able to make this goal a reality over the next couple of decades, and America should go for it.

That's the theme of a report from NASA's 2002 Astrobiology Academy appearing soon as a paper in *Acta Astronautica*. Bethany Ehlmann, MER scientist, 2004 graduate of Washington University in St. Louis and current Rhodes scholar, is the lead author of the paper, which features ten other authors who were undergraduate and graduate students at universities nationwide.

Ehlmann, advised by Raymond E. Arvidson, Ph.D., James S. McDonnell Distinguished University Professor and chair of Washington University's earth and planetary sciences department in Arts & Sciences, worked with Arvidson on the rovers Spirit and Opportunity in the winter and spring of 2004 at NASA's Jet Propulsion Laboratory.

"President Bush has announced a long-term vision for space exploration, one focused on exploring our solar system and universe and understanding if life started and evolved elsewhere," said Arvidson. "A central theme is whether or not Mars has or had life, using robotic exploration first, followed by detailed study using humans and robotic systems in coordinated ways. Bethany's NASA Astrobiology Academy study is very nicely aligned with the President's vision and forms a basis for thinking about how to implement an exciting exploration strategy over the next several decades."

Ehlmann and her co-authors state that a decision to explore Mars with humans will be a political one, driven by three factors: economics, education and exploration.

"A human mission to Mars would bring back immense amounts of scientific data, and serve as inspiration for the next generation of space scientists to enter critically needed science and engineering disciplines," the authors write. But, "Exploration alone cannot justify the increased risk."

The present human Moon-Mars initiative needs to be very careful about not draining funding from basic astronomical research and earth observation systems, Ehlmann said.

"We need to strike the right balance between human and robotic, and I'm worried that the right one is not being struck," Ehlmann said. "My co-authors and I weren't arguing for a zero sum game (sacrifice basic science for human spaceflight) but rather additional funding for human Mars mission planning. We were arguing this should be added to the list of society's priorities — behind AIDS research and poverty eradication, of course.

"Working on MER, I was continually blown away by what those little robots could do. They're amazing pieces of engineering, a testament to human ingenuity, and have a lot of discoveries left to go. But they have limitations. It took 56 days to explore a 20-meter crater (Opportunity), a year to travel 4 kilometers (Spirit) — something you can leisurely run in a half hour. It always left you itching to go a little further, wondering what's over the horizon, what the rovers might not reach."

Ehlmann said that the human touch to space exploration is a driving force of discovery.

"Would the underwater world have been so appealing without the visionary human touch of Jacques Cousteau?" she asks. "Exploration and curiosity are in our blood. In my lifetime, I hope we take the leap to Mars and really see what's out there."

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