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NewScientist

First humans set to land on Mars, sort of

- 03 February 2011 by **David Shiga**
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Time for a Mars walk (Image: SSRF/IBMP RAS/Mars 500/Pano360.ru)

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Update on 14 February: *Two crew members made their first "Mars walk" on the 10-metre-long by 6-metre-wide simulated Martian surface at 1300 Moscow time. It lasted for one hour and 12 minutes. The next Mars walk will occur on 18 February.*

Take an interactive 3D tour of the facility

YOU could say it's the biggest "small step for mankind" ever made. Three people are poised to make the first mock landing on Mars.

In the most realistic simulation of a mission to the Red Planet yet, six "astronauts" have been isolated for eight months in a facility here on Earth. The experiment will ultimately last twice as long - 520 days in total - similar to the length of a real Mars mission. The hope is that the experience will hold useful lessons for a future journey to Mars.

The Mars500 experiment began on 3 June, when crew members were closed inside a mock spaceship at Russia's Institute for Biomedical Problems in Moscow, which is leading the project (see diagram). Three of the crew are Russian, one is Italian, one French and one Chinese. All six are men, though women were not deliberately excluded, says Jennifer Ngo-Anh, the European Space Agency's Mars500 project manager. "It just so happened that we didn't find suitable female candidates," she says.

The mission is approaching its biggest milestone: the landing itself. The "spacecraft" entered orbit around Mars on 1 February. On 12 February, a "landing craft" containing three of the crew will touch down. Over the course of the next 10 days, they will leave the craft in pairs for three sorties to explore the planet's surface - in reality a room with a high, domed ceiling and a floor covered in reddish sand and rocks. They will wear space suits and will also deploy a remote-controlled rover.

The next day, the explorers will "rocket" back to Mars orbit to rejoin the three astronauts who stayed behind. They will then spend eight months or so travelling back to Earth, with the mission ending on 5 November 2011 (see timeline).

So will this pretend mission produce any useful data? After all, the participants will not experience reduced gravity or the dangers of rocket launches and space radiation. If the going gets rough, the crew members can walk out of the experiment at any time.

David Dinges of the University of Pennsylvania in Philadelphia, who is studying the crew's psychological responses to isolation, says the experiment shares enough similarities with a real Mars mission to provide helpful insights.

The experiment also provides an opportunity to obtain psychological information all the way through a mission. Records from actual space missions are much more piecemeal. "What we have is largely post-hoc anecdote," Dinges says. "We don't have this kind of objective measurement of neuro-behavioural function across a mission, and that's what we're after."

Crew members answer questionnaires about feelings of tension and conflict, and detectors strapped to their wrists record their movements to show, for example, when they are sleeping. Their faces are videotaped while they are working on the computers so their expressions can be analysed for signs of fatigue, stress and depression.

Dinges says the observing researchers have already recorded plenty of interesting data. "We're more convinced than ever that this is going to be very useful," he says. The results are being kept under wraps until the experiment is over to prevent any information leaks from influencing the crew's behaviour. The crew communicates with the outside world by exchanging messages with mission control.

As part of the simulation, a delay of up to 20 minutes has been added to simulate the time it takes for light to travel to Mars. By contrast, astronauts on the International Space Station (ISS) are close enough to Earth to communicate in real time with family and friends on the ground.

If diary entries and tweets (see "Twitter from 'space'") from crew members are anything to go by, boredom is the biggest problem. On Halloween, for example, they made a great show of decorating the craft and dressing up. "Some of us kept the costumes on

all day, even while we worked on our usual science and housekeeping tasks," writes crew member Diego Urbina. "Wang Yue, unfamiliar with this western celebration, asks if we are always this excited about Halloween, we tell him not usually: but in here, it is just a great excuse to change the routine - even for just one day."

The next step in preparing for a Mars mission would be a simulation that involves going into space, says Nick Kanas of the University of California in San Francisco, who is not involved in the experiment. "Mars500 is a wonderful first step, but it's not a perfect simulator," he says.

He suggests sending astronauts on a long-duration mission to the moon, with lengthy stays aboard the ISS to simulate the transit time to and from Mars. That would overcome some of Mars500's limitations, such as the lack of microgravity, he says.

Such a project is likely to be a long way off, however. In the meantime, Mars500 should help us learn how to plan a mission to Mars, Ngo-Anh says. "We can prepare and improve the technology, but at the end it will be the human factor - the crew - who decide whether the mission will be a success," she says.

Tweets from 'space'

European Space Agency crew member Diego Urbina, a 27-year-old engineer from Italy, has been tweeting about his experiences before and during the Mars500 experiment, which began on 3 June.

What would you do if you had only 3 days left on earth? 31 May 2010

Hello world! This is my first relay-tweet from the Mars500 facility in Moscow, Russia, simulating a full trip to Mars and back 16 June 2010

You know a camera just turned to you when it makes the soft sound of a drill that is very far away. Hi whoever is looking at me 22 June 2010

I think I need a haircut. We have to cut hair using a vacuum cleaner next to the cutter, not to contaminate the env with tiny hairs 22 June 2010

Had a fun discussion on whether we really do feel in space or not. Some of us do, some of us don't 16 July 2010

Last night was the most feared night of the month: sleeping with the italian electrode cap 26 July 2010

Remember when your parents punished you by not letting you do any phone calls? it's the same but for 1 year 26 July 2010

Man it's freezing in here. Waiting for the commander to be back from an experiment so he can authorize a temperature change 2 August 2010

Today I miss the Earth, and I calculated that by now, it would look as big as a €2 coin at a distance of 50 meters 14 September 2010

What I've been wanting to do since some months ago is ride a rollercoaster 31 January 2011