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Mars500 - eighteen months in isolation

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DLR scientists investigate group dynamics and the physical constitution of the candidates

Isolation container for Mars500

It resembles a cross between a Finnish sauna and an enlarged roof structure from the seventies - but this wood-panelled container with its dormer-style roof, in which six men are going to be living from 3 June in voluntary isolation for 17 months, is not intended to provide much by way of luxury. In the Mars500 experiment conducted by the European Space Agency (ESA), nothing less than the journey to Mars, a landing and subsequent return to Earth are being simulated.

"These 520 days will be an arduous psychological ordeal." Oliver Knickel knows what he is talking about, since last year he was Germany's test candidate for the 105-day preliminary experiment conducted at the test centre in the Moscow Institute for Biomedical Problems (IBMP). "The biggest enemy is monotony."

Virtual 'journey' to the simulated surface of Mars

Trying on a space suit

Each candidate has a single bedroom with an area of barely three square metres, each with bed, table and chair. "Sure, they're small, but at least you can close the door behind you," says Knickel, reminiscing about his own experience. Then there is a common room, a kitchen, the control room and a toilet. Another module contains the sports area and the provisions store and there is yet another module for medical emergencies. The virtual journey to Mars lasts for 250 days, then 30 days are set aside for 'getting out' into the Mars Lander and travelling around on a simulated Martian surface, followed by 240 days for the return flight to Earth.

No fewer than 300 people applied to ESA, keen to experience this 'space adventure' on terra firma. Four of them made it through to the short list, and two to final selection, with the Frenchman Romain Charles and the Italian-Colombian Diego Urbina now about to spend the next eighteen months in this isolation unit with three Russians and one Chinese. As the advisor to the forthcoming Mars500 Study, Knickel has already got to know the candidates. "Diego is an exuberant individual, and is always good-natured, while Romain is very calm and reflective." In other words, very different characters indeed. "The same was true of my own crew, but we complemented one another well."

Onions and tomatoes out of their own greenhouse

Oliver Knickel during the first experiment

The daily routine is strictly organised in all respects. Getting up, working times – everything is precisely defined. Even though weightlessness is a missing factor, the days of this simulated 'journey' through space, the longest yet attempted, are going to be filled in the same way as a real mission, with experiments, health tests and maintenance work on the technical systems. Meals are pre-prepared items, as they are on the International Space Station. However, from time to time the candidates can harvest herbs, tomatoes and onions to 'pep up' their food. A highlight for Knickel: "Harvesting from real earth always gave you a good feeling."

During Knickel's study, scheduled leisure time always started at 18:30. Instead of withdrawing to their rooms, the six crew members then often engaged in group games, or shared a computer game. The main thing this previous inhabitant of the isolation container missed was the close-knit community environment. Even contacts with the outside world only existed in the form of a simulated control centre with a 20-minute time lag. After all, in any real trip to Mars, radio traffic with Earth would not function without a time lag.

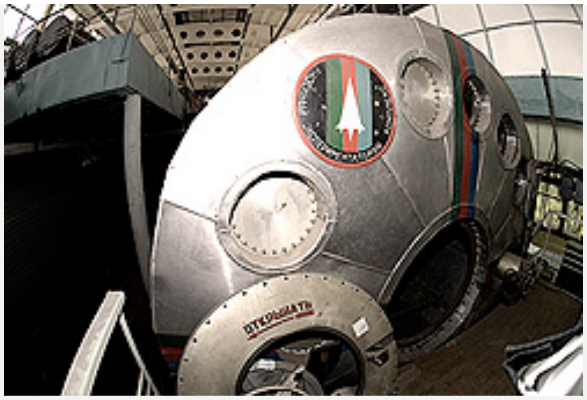
Study to gather insights into group dynamics

Rooms for the Mars500 candidates

People in a confined space, virtually no contact with the outside world, various nations under one roof - for DLR scientist Dr Bernd Johannes from the Institute of Aerospace Medicine, these are all exciting ingredients for his studies. "A truly international crew with pretty much all the multi-cultural issues on the spectrum." Using a new, wireless measuring system first tested during the 105-day study, Johannes will be investigating group dynamics during these 520 days of isolation. "The candidates carry a 'satellite', a sensor which detects which other satellites of the same kind are close by." This device records who was near whom and for how long. "People who sit beside one another frequently, logically can't dislike one another, whereas people who seldom meet are clearly staying out of one another's way."

Twice a week, the candidates wear this equipment. At night, when the sensors are recharging in their docking stations, their data are called up and converted into a sociogram, which provides a graphic display of contact intensity levels. "We hope to have discovered a method that does not impact on the natural matrix of relationships." Until now, the relationships within a group were investigated by giving candidates questionnaires to fill in, and through role-play events. However: "These scenarios gave those involved time to reflect about the relationship matrix, and that often had a knock-on impact on the way they interacted thereafter." A comparison of these classical methods and the measuring data obtained by Dr Johannes should provide more accurate insights into group dynamics. After all, on an extended-duration mission into space, all crewmembers are totally dependent upon one another to a unique extent: "You can always instruct a submarine with its crew to return to base, but you can’t do that with a spaceship.

"In most cases, likes and dislikes tend to become entrenched"



Entrance to the isolation module

In 1999, this DLR scientist spent 110 days in the isolation station at the Moscow Institute of Biomedical Problems. At that time, interaction between the crew on the International Space Station, on which construction work had just commenced, was being simulated. The main lesson learned, he says, was tolerance. To this day, he remains on friendly terms with his crew colleagues. "Mind you, that's by no means a given," he explains. "It's very much like a marriage – many people fall in love and get married, but no-one can ever tell whether the marriage will last." On a long journey to Mars, the lack of incentives and resources could lead to the group no longer harmonising. "In most cases, likes and dislikes tend to become entrenched."

Other experiments that the DLR scientists will be conducting during the Mars500 isolation study will provide some insight, in the course of the 520 days, into the impact on a crew of a long-term mission of this kind. The researchers are looking into various things, including bone metabolism, blood pressure regulation and the strengthening of the immune system through nutritional supplements. Oliver Knickel will be following this study with a trace of longing: "There is always a bit of nostalgia in the air when I see how these experiments develop and progress." Back then, he was delighted when the sealed container reopened after 105 days, on 14 July 2009, but at the same time he could well have imagined being able to stay inside it for longer. "That is very much its own small world."

Related Contacts

Manuela Braun
Deutsches Zentrum für Luft- und Raumfahrt (DLR) - German Aerospace Center
Corporate Communications
Tel: +49 2203 601-3882
Fax: +49 2203 601-3249
E-Mail: manuela.braun@dlr.de

Dr. Peter Preu
German Aerospace Center
Space Administration, Microgravtiy Research and Life Sciences
Tel: +49 228 447-319
Fax: +49 228 447-735
E-Mail: Peter.Preu@dlr.de

Dr. Bernd Johannes
German Aerospace Center
Institute of Aerospace Medicine
Tel: +49 40 513096 36
E-Mail: bernd.johannes@dlr.de
