

By Carmen Felix

Five Hundred Days in Isolation

Mars500 is an international space analog study that simulated for the first time a full duration round trip to Mars. Based in Moscow, the study was conducted by ESA and Russia's Institute of Biomedical Problems. The project started back in 2007 with a short simulation to test the facilities and operational procedures. The first long term study was conducted successfully in 2009, with a crew of six members spending a total of 105 days isolated. The goal was to prepare for the 520 day isolation study, which was ultimately conducted June 2010 to November 2011.

During the mission, two Europeans, one Chinese, and three Russians were hermetically isolated in a spaceship mockup. They were monitored and their psychological, medical, and physical signs were recorded. We met Diego Urbina, a 28 years old Italian-Colombian electronics engineer and space science specialist who took part in the experiment, to discuss how this experience will help the scientific community to prepare for a real mission to Mars.

"The human factor is one of the keys that needs to be fully understood before undertaking a human mission to Mars," Diego told us. Prolonged isolation in a

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confined environment far away from Earth is a condition that has never been experienced: Mars500 tried to recreate it on Earth. "To deal with isolation, we kept busy as much as we could," says Diego, "we tried to balance time alone and with the crew, exploiting the scarce communication channels with the exterior to their full extent."

The crew had a daily routine to perform, just like astronauts and cosmonauts on the International Space Stations, but no real-time communication: "We had to be more autonomous and make decisions that are usually made by Mission Control," says Diego. Emergency response was part of the training: "two of the members were doctors who could take care of almost any medical problem in case of a health emergency," Diego explains. "They had telemedicine equipment, but in case of life threatening conditions of one crewmember, the mission would have been over for him,

and for the rest of the crew he would have 'died' for the purpose of the simulation."

On one occasion the Mars500 crew experienced what they thought to be a real emergency: the complete loss of electrical power. "We weren't expecting it, so the psychologists registered the real reactions of the crew to such an emergency," says Diego. "Even if we weren't directly trained for this specific situation, we had a checklist of tasks to be performed immediately," he recalls. "This, together with pre-mission teamwork training and respect for chain of command helped us to quickly do what had to be done." After the situation was under control, Diego and the crew found it hard to believe that the emergency was part of a simulation: "Hiding 'bad news' to avoid stressing the crew is not something unheard of," he adds, recommending, on the contrary, a policy of complete transparency. "It is crucial that the crew does not get divided and that they can have a quick reaction even in an emergency that can suddenly happen in the middle of the most monotonous situation imaginable," he concludes.

On November 4, 2011, the Mars500 crew finally went back home, leaving a legacy of medical data on how the crew bodies and minds dealt with isolation. "Mars500 gave us a lot of empirical insight in how to deal with such an extreme situation, and helped us to formulate guidelines for prolonged manned deep space missions," says Diego. How far into the future is an actual mission to Mars? "Our current technological capabilities are adequate for a mission beyond low Earth orbit in the next few years," says Diego, "it could happen soon if international collaboration consolidates." What could be improved in a Mars500 follow-up? "I'd make it happen in space".



The Mars500 crew. From left to right, back row: Wang Yue (China), Alexandr Smoleevskiy (Russia), and Diego Urbina (ESA). Front row: Sukhrob Kamolov (Russia), Alexey Sitev (Russia), and Romain Charles (ESA).