

SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Behaviour, Performance and Psychosocial Issues in Space (1)

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THE ROLE OF COMMUNICATION FOR PSYCHOLOGICAL CREW SUPPORT DURING HUMAN  
EXPLORATION MISSION SIMULATION MARS-500

**Abstract**

ESA together with its space agency partners is presently operating astronaut missions to the ISS and, at the same time, preparing for future Human Exploration missions beyond Low Earth Orbit. The Mars-500 project, undertaken jointly with the Institute for Biomedical Problems (IBMP) in Moscow, was part of ESA's effort to prepare for human space missions beyond Low Earth Orbit. The full 520-day Mars mission simulation with an international crew of 3 Russians, 1 Chinese, 2 Europeans (French, Italian) from ESA was implemented in a simulation facility at IBMP between June 2010 and November 2011. It included the simulation of a 245-day journey to Mars, 30 days of "Mars surface activities" with 3 EVAs and a 245-day return transfer to Earth. The crew was faced with an environment and constraints as close to a realistic Mars mission as possible, such as limited volume and privacy, no real-time communication with mission control, limited resources and the need for full crew autonomy. Some of the main psychological challenges in such a mission scenario are physical, communicative and emotional isolation from the outside world, sensory deprivation and limited social contacts, cultural differences and potential incompatibilities of crew members from different countries, permanent awareness about the need for full crew autonomy also in emergency situations and continuous exposure to a hazardous environment. The maintenance of mental crew health can only be achieved through a comprehensive psychological support programme consisting of measures to efficiently counteract the negative effects of the constraining mission environment. In the absence of real-time communication capabilities due to signal delay, communication with the crew members represents a real challenge and its role for psychological crew support becomes vital especially when compared to the present ISS mission scenario. This paper will provide an overview of the constraints which potentially will impact psychological crew health in future interplanetary missions in general and the Mars-500 mission in particular. The psychological support programme implemented during the Mars-500 mission will be described and the final results of a detailed analysis of private crew communication with the "outside world" will be presented with some basic indication in terms of private crew communication

requirements for future human exploration missions. These results will also be assessed from an ISS astronaut's perspective based on practical experience of a 6-months ISS Increment mission executed by ESA astronaut André Kuipers in 2011-2012.