

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
Overview Session (Present and Near-Term Human Space Flight Programs) (1)

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ANALOGUE ACTIVITIES IN THE FRAME OF ESA'S HUMAN SPACEFLIGHT PROGRAMME

Abstract

In 2001, when ESA received the mandate to prepare for future human space exploration missions beyond the ISS, it immediately became clear that ground based analogues and simulations were essential in fulfilling this objective. During these missions, astronauts will have to cope with long duration in a 0g environment (e.g. the 6 months cruise phase to Mars) and to withstand challenging conditions ranging from living in a isolated and confined environment to operating on a planetary surface. To enable these future missions and reduce risks, we need to improve our knowledge of the impacts on the astronauts' health of these harsh conditions, to identify appropriate countermeasures to mitigate all possible negative effects and to prepare adequately the astronauts through specific training in analogue environments.

Consequently, e.g. bed rest studies, were restructured to take into account this new driver by implementing a stronger focus on countermeasure evaluation and by developing a more strategic approach for the organisation of such studies. For parabolic flights, recently the certification of the airplane used has been expanded to include also partial-g parabolas.

Further, new cooperations were put in place. The Antarctic station Concordia is a unique analogue for space exploration missions. ESA has been cooperating with the operators of Concordia on issues like operational validation of technologies, medical monitoring as well as physiological and psychological research. ESA also became a partner in the Mars500 programme at the IBMP in Moscow. A 105-day pilot study was successfully completed in 2009, and the full 520-day Mars mission simulation is expected to start mid-2010, incl. 2 European crewmembers and 14 ESA experiments. In addition, ESA continues to investigate advanced concepts like a Facility for Integrated Planetary Exploration Simulation (FIPES). For the crucial topic of space radiation protection, a programme focussing on Investigations into Biological Effects of Radiation (IBER) was initiated through a cooperation with the accelerator facility of the "Gesellschaft für Schwerionenforschung" in Darmstadt, Germany. The first heavy-ion irradiation sessions took place in summer 2009 and will be continued in 2010.

A dedicated working group has also been put in place to analyse the activities and studies carried out so far and to identify objectives and requirements to elaborate future plans. Such plans will be reported, as well as recommendations from a workshop recently organised by ESA in the frame of the International Space Life Science Working Group on "human behaviour and performance in analogue environments and simulations".