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Radiation Fields, Effects and Risks in Human Space Missions (4)

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MEASUREMENTS IN HUMAN PHANTOMS ONBOARD ISS USING THE ESA MATROSHKA
FACILITY

Abstract

From the beginning of manned space flight, ionising radiation had been recognized as a key factor for limiting long-term missions in space by its impacts on crew health and performance. Since in such missions radiation exposures of the crew approach the radiation limits set so far for low earth orbit missions and under worst case condition a certain probability exists, that those limits will be exceeded, detailed measurements of radiation doses and the corresponding estimates of radiobiological effects in man and their impact on performance and life expectancy of space crews have to be performed for each individual mission. One way to receive detailed data on radiation exposure is the use of a human phantom equipped throughout the body with radiation dosimeters. The ESA facility MATROSHKA uses such a phantom. Under the project and scientific lead of DLR four measurement campaigns on the International Space Station (ISS) were performed: the 1st was outside the Russian Svezda module (2004-2005); the 2nd inside the Russian Svezda module (2006); the 3rd inside the Russian PIRS module (2007-2009) and the 4th inside the Japanese KIBO module (2010-2011). Data on absorbed dose rates and linear energy energy spectra for the MATROSHKA KiBO campaign will be compared with measurements of the earlier flight. The main outcome of the experiments will be described and discussed.

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