



Mission to Mars: Interplanetary Space Weather and the Scientific Issues

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Along with the continuous galactic cosmic ray background, solar proton events (SPEs) constitute the main hazard for interplanetary missions, especially those that will involve humans onboard. Here, we address the Human Mars Mission (HMM). Up to now, prediction of SPE events is not possible. Very high doses during the transit phase of a mission can result in radiation sickness or even death. This is equally true for extended visits to surfaces of other planets (for example to Mars) and moons lacking a strong magnetic field capable of deflecting solar particles. Future interplanetary manned missions will need to monitor the solar activity very carefully and new space weather forecasting procedures will need to be implemented.

ESA and the present authors recently completed a one-year study on “Radiation Exposure and Mission Strategies for Interplanetary Manned Missions (REMSIM)”. Here we present the results from the work package on “Radiation Hazard and Space Weather Warning System” that dealt with space science and warning issues. The work package was divided into two parts: Part I. “Interplanetary Space Weather Review” and “Interplanetary Space Weather Requirement Analysis”. Part I dealt with the science of solar precursors and with existing monitoring and warning systems, including a review of appropriate radiation monitor technology. The second part integrated models, data systems and management methods from current mission science and then proposes the particular measures required to manage space weather issues and radiation detection issues in the HMM. Some specific recommendations are made for warning systems.