HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)
Human Exploration of Mars (2)

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TECHNICAL SAFETY ANALYSIS OF A ONE-WAY HUMAN TO MARS MISSION

Abstract

Recently there has been an increasing amount of discussion regarding the concept of a One-way Human Mars mission. The lack of a return journey could lead to lower mass at launch and reduced initial costs. However, it could also lead to a higher risk to the crew as well as additional complexities during the mission, particularly in the habitat modules.

The large amount of discussion both within the public and the space community, led to the creation of a specific working group dedicated to this topic by the Space Safety and Sustainability Project Group of the Space Generation Advisory Council. This team was tasked with investigating the existing hazards associated with such missions, and identifying possible procedures and technologies that might reduce the risk associate with them. The overall goal was to provide an assessment, from a safety perspective, of whether humans should be sent on a one way mission to Mars or not.

Three different mission phases are considered in this paper: Earth vicinity, journey from Earth to Mars and the Mars surface phase. Specific hazards are identified for each mission phase and a detailed safety analysis is performed for each of them. Finally, an overview of the achieved results and the overall feasibility of such a mission from a safety perspective is provided.