

Robotic Precursors to Human Exploration (03)  
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## HUMAN MISSIONS TO MARS: NEED FOR ROBOTIC PRECURSORS

**Abstract**

In the era where technological advancements in space activities have reached a pinnacle, the importance of a series of robotic precursor missions prior to any human missions to Mars is being felt. The Task Group on Planetary Protection, the COSPAR decisions and the Space Studies Board, National Research Council (US) have all expressed the desire to have robotic precursors to human missions to Mars. This paper focuses on the essential requirements that must be undertaken prior to a human mission to Mars. Human exploration of Mars has led to threats that involve serious contamination of Mars, contamination or hazards to astronauts and the potential contamination or hazards upon the return to Earth. However, special regions on Mars must be protected from robotic missions let alone human associated terrestrial contamination. During these missions, all activities and operations must protect Mars as a location for future biological exploration. The Apollo Experience and other international reports on the issue must be kept in mind and examined in detail for a lesson learned by the world community that needs to be given due recognition and applied in future human Mars mission. The COSPAR Internal Decisions have highlighted that the suggestions of terraforming or changing the environment of Mars must be restricted until considerably more information is available from in situ robotic missions. Robotic Precursors will play a highly important role in studying Martian dust to determine the extent to which it may be a biohazard. If the dusts are devoid of life or sterile, they may be non-significant as a cross contamination concern. Moreover, in advance of human missions, critical engineering development tasks with planetary implications include a completely contained system which disassociated the human materials from the Martian environment. The system will also enable the full exploitation of the sources of Mars without the contamination of the special regions of Mars which must be protected even from robotic intervention. There is also a substantial need to engineer a system that shall successfully break the contact of the Martian environment for returning human astronauts who have been in contact with the Martian Environment.