

HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)

Human Exploration of Mars (2)

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IAA STUDY GROUP 3.16: COSMIC STUDY ON GLOBAL HUMAN MARS SYSTEM MISSIONS EXPLORATION

Abstract

The International Academy of Astronautics has set up a Study Group (SG 3.16) to produce a Cosmic Study dealing with human Mars missions. The first results of this work were summarized in a White Cosmic Study presented at the Heads of Space Agencies meeting in Washington D.C. (USA) in January 2014. In that occasion a number of recommendations were stated.

- The first recommendation regarded the development of a technological scenario and the identification of a number of enabling technologies to be brought to a sufficient TRL. Among them can be mentioned:
 - Nuclear thermal and nuclear electric propulsion, although their use for the early missions is still debatable.
 - Zero-boil off technology for cryogenic propellant storage.
 - Nuclear power generator systems for both space and on-planet usage.
 - Passive or active radiation shielding technology.
 - Artificial gravity in space.
 - Effects of Mars gravity using large centrifuges or tethered spacecraft in orbit.
 - Aerocapture technologies for large payloads.
 - Life support systems, in particular regenerative ones.
 - In Situ Resources Utilization (ISRU) systems.
 - Exploration technologies, in particular astronaut robotic assistants, rovers, drillers, etc.

This list must be regarded as an indication, since it is bound to be completed with other possible technologies which will be found to be required in subsequent studies.

- A second recommendation is the setting up of a joint working group, IAA(SG3.16)/ISECG, to identify the possible Mars mission scenario and the possible roadmaps, to reduce the risk and cost of the global mission to Mars. Demonstration projects, to be carried out by a variable group of countries will be defined to this end.
- A third point regards the global involvement of countries, in particular of the emerging and developing countries, through existing bodies like ISECG, UNOOSA-HSTI, IAA, etc.
- The fourth recommendation regards a better understanding of the impact of human factors, considered as one of the most critical issues for human Mars missions.
- The final recommendation regards the setting-up of a Human Spaceflight Virtual Institute, by IAA and with the participation of Space Agencies/Industries, to foster the exploitation of existing technologies, facilities and know-how available world-wide.

The study group is now proceeding to prepare the final Cosmic Study, which is due for 2015. Together with this activity, the study group is also analyzing in greater detail the above mentioned recommendations, with the aim of starting their implementation.