

IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)
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EXPERIENCE FROM A FOUR CREW MARS SIMULATION MISSION:A POSSIBLE
INVESTIGATION FOR FUTURE SPACEFLIGHT MISSION

Abstract

Human Space exploration has always been a challenging task. In recent years several plans have been evolved from exploration towards colonization. With the strong desire to expand human civilization in solar system and beyond; evaluating the crew performance has also become a renewed interest for the researchers. With this vision, the space agencies (i.e. NASA, ESA) along with their commercial partners and academia from across globe are investigating the potential to execute Analogue Missions on ground.

Several events recorded during various analogue missions have drawn attention to re-evaluate the critical human factors on interdisciplinary aspects. Considering those factors, we believe, an analogue simulation operated under isolation can possibly provide significant information and insight of critical human factors associated with the long term exploration of extreme environments in future. Mars Analogue site, Utah is a perfect location to execute such experiment as it is a hub of enthusiast and passionate individuals for future Mars exploration.

A two weeks simulation had been carried out at Mars Desert Research Station (MDRS) in Utah, USA by the Crew 204. This interdisciplinary paper reports the selected crew activities and experiences in terms of mission preparation, pre-training session, psychological aspects, challenges and future recommendation to maintain a balance between Safety, Simulation and Science.

The key areas demonstrated in this paper,

1.Simulation:

- a.Team building strategies while enriching the bond between the crew members.
- b.Challenges associated with limited amount of water and techniques to use water efficiently.
- c.Benefits and efficiency of consuming either packed or prepared meal.
- d.Advantages and Disadvantages associated with 4 members and the solutions to overcome the various critical situations.

2.Science, Technology Outreach:

- a.Prepare and develop a GreenHab with gardening perspective to maintain healthy growth of plants.
- b.Develop projects under interdisciplinary aspect, i.e. deploying a rover remotely controlled from 13,000 km (from India), 3D printing with mars regolith etc.
- c.Role of audience and their involvement in terms of outreach.

3.Safety:

- a.How EVA can be more efficient by evaluating the intake of liquid and food pre and post EVA.

4.Future Proposals:

a. Propose the basic model of a machine learning algorithm that can evaluate the quality of the decision making through various stages of the mission (pre, during post), to analyse the effect of isolation for future research.