Paper ID: 50558
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IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Human Spaceflight Global Technical Session (8-GTS.2)

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HUMAN SPACEFLIGHT PERFORMANCE: BOOTSTRAPPING THE INTERSECTION OF BIOMETRICS AND ARTISTIC EXPRESSION THROUGH PLANETARY MISSION ANALOGUE EVAS

Abstract

Human spaceflight activities often compartmentalize projects by domain, but it is hypothesized that data sets gathered within interdisciplinary frameworks can produce the richest outcomes. This research investigates the intersection of projects native to both hemispheres of the brain - logic from the left, creativity from the right - to bootstrap a new methodology for proposing research projects focused on using planetary mission analogue extravehicular activities (EVA). These simulated, multi-permutation, EVAs are critical for preparing humans for missions to the Moon or Mars. Minimal investment is required to train a crew in an extreme environment compared to actual spaceflight and locations can enlighten and influence our exploration plans ranging from how we design life support equipment, tools, and assess workload to human behaviour, joy, and play, i.e. our culture. Collaboration by the authors has occurred at the Mars Desert Research Station (USA), Lunares Research Station (Poland), and with the Mars Academy USA NEAMAE Project (Nepal). Biometric tracking of astronauts is a well-understood medical discipline, but astronaut workload is being further investigated to understand how the physical parameters of an EVA (terrain slope, duration, and consumables) contribute to long-duration mission planning. Artistic expression in this work is highlighted by "Performing Astronautics", which aims to revive expeditionary artist practice in modern astronautics, exploration, and extreme performance sites. These projects were brought together through the use of common technology including biomedical devices, video and motion recording equipment, and GPS tracking. The qualitative data is maximized through the context of interdependent, layered, and complex interdisciplinary mission scenario simulations, providing higher fidelity insights into the impact and significance of the performance data in question. The simulated EVAs, survival training, and mission scenarios are opportunities to build new technology innovations to solve complex problems through an experimental process under relevant constraints. Support for human spaceflight may wax and wane and vary between nations, but with analogue missions, private or public, the crew becomes the platform themselves: implementing and expanding research data collection and capabilities by innovating within the complexity of a bootstrapped mission environment. This paper will discuss the multidiscipline approach, highlight data results from the investigations, and make recommendations for how this approach can be assimilated into exploration strategies.