

SPACECRAFT FOX HUNT AND TELESCOPE EVAs AT THE LUNAR MARTIAN ANALOG HABITAT.

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Introduction: Before migrating as a species permanently into outer space, we must first study how the human body and mind interact with machines, tasks, and challenging environments. We also must continue to improve quality in space mission design and operations. Jerry Jon Sellers says that space mission operations, control, and management teams account for one third of the total cost of the mission. One way to reduce this cost is to be able to streamline operations [1].

And that was the number one goal of this experiment, among others:

Goals:

1. Increase effective *autonomy* for space crewmembers while performing extra-vehicular activity (EVA).
2. Analyze space suits' ability to work with delicate instruments.
3. Improve EVA task and operations design

Study: In October of 2018, a crew of three completed a 14-day closed space habitat simulation, the sixth one done at the Inflatable Lunar Martian Analog Habitat (ILMAH) in Grand Forks, ND. Two novel-to-ILMAH EVAs were performed in the North Dakota Explorer 1 (NDX-1) and North Dakota Explorer 2 (NDX-2) space suits designed at UND.

Telescope Mission VI's crew's first EVA was to assemble a delicate instrument in the form of a telescope. Here, the crewmembers were challenged in 1) dealing with the pressure of working with fragile, intricate equipment while seeing which types of human locomotion could be done while using a space suit, gloves, boots and backpack.

Spacecraft Fox Hunt After, the crew was given the task to look, without GPS coordinates, for a "fallen spacecraft" in the form of a hidden foxhole radio transmitter. They were challenged to do so solely by following the direction and signal strength of received transmissions.

The crew was given information in a few different sorts, along with training to be able to mitigate the interaction between the mission control element, increasing autonomy. The crew reported back on the suits' ability and limits of working with small, tools, equipment, and instruments and the EVA training, informational flow, and operations.

References:

- [1] Sellers J. J. *Understanding Space: An Introduction to Astronautics*, New York: McGraw Hill, 2005. Print. pp. 648.



Figure 1, Telescope Set-Up EVA