

SYMPOSIUM ON STEPPING STONES TO THE FUTURE: STRATEGIES, ARCHITECTURES,
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Infrastructures and Systems to Enable International Future Exploration and Utilization of Space (3)

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DESIGN AND CONSTRUCTION OF AN INFLATABLE LUNAR BASE WITH PRESSURIZED
ROVERS AND SUITPORTS.

Abstract

As part of a recently awarded 3-year NASA grant titled "Integrated Strategies for the Human Exploration of the Moon and Mars," a group of faculty and students from the Department of Space Studies at the University of North Dakota (UND), United States is designing and building an inflatable lunar habitat. Once completed, the prototype will be tested together with two electric rovers and the recently developed NDX-2 space suit on an analog simulation at the Badlands of North Dakota. The habitat will consist of a rigid frame covered by an inflatable bladder. This arrangement will allow both tensile and compressive loads to be transferred from the soft fabric to the rigid frame avoiding punctures or penetrations. The inflatable material must be malleable and retain strength during folding. It also needs to be lightweight and be able to stow into a significantly smaller volume. An expandable soft goods structure offers a lower mass solution with increased volume than using metal or rigid composite materials. The UND lunar habitat will be built for a crew of four, for a six-month mission period. The interior will consist of four sleeping compartments where the astronauts will be able to rest and stow their personal belongings, a small galley/dining room, a bathroom and laboratory space. The habitat will be about 12 meters long, 3 meters wide and 3 meters high and will be completed by the end of the three year grant with a 30-days analog simulation which will include full pressure suits and pressurized rovers performing scientific and operational tasks.