

## **Testing the Exploration Conops (Excon) Mockup Suit in Lunar Analog Environments in 2022**

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Understanding how to effectively train for Extravehicular Activities (EVAs) for Artemis missions is critical. Developing high-fidelity simulation environments is important for Artemis mission preparation. Because the actual Lunar exploration environment cannot be fully replicated on Earth, it is paramount to determine where and how to properly train the Artemis team. Tasked by the new Extravehicular Activity and Human Surface Mobility Program (EHP), a team of stakeholders from engineering, flight operations, human health and performance, astromaterials and science, and the crew office worked together to perform EVAs in 3 simulated lunar environments. The overall focus for this test series was developing the capability to perform Artemis simulated EVAs in high-fidelity, full-scale environments.

This test series was broken into 3 distinct tests titled after the EHP integrated test team: Joint EVA Test Team (JETT). The test locations are planned to serve as Artemis training sites and were selected because of their relevance to the expected Artemis Lunar terrain. JETT1 was conducted near Kilbourne Hole by El Paso, Texas and focused on hardware development and checkout. JETT2 was conducted in the Icelandic Highlands and began the transition towards EVA concept operations (con-ops), risks and technology. JETT3 was conducted near SP Crater by Flagstaff Arizona and focused on simulating the Artemis III mission with a simulated Houston based Flight Control Team (FCT) and a Science Mission Directorate (SMD) science team.

All three JETT tests utilized the Excon mockup space suit. The Excon mockup suit is a light-weight, unpressurized Exploration Extravehicular Mobility Unit (xEMU) simulator. While it cannot replicate the feel of working within a pressurized suit, it does introduce similar volume constraints and some of the mobility programming to simulate the user experience in the xEMU.

Overall, the JETT testing was able to create a simulated Lunar EVA and have two subjects perform full scale operations in line with Artemis III mission expectations. Future work is planned to continue to improve the simulation quality of Lunar EVA simulations.