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Interactive Presentations - 28th IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (IP)

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ASTROTERRA: CRAFTING HABITATS FOR OFF-WORLD LIVING

Abstract

From the day of its creation, man has always fought for survival and has searched for ways to survive. These struggles and searches have shown us that if we want to survive, we first need an ecosystem, water and food. For years it has been accepted as an immutable law, a purpose of our existence. Why do people work to get food, why do they try to protect nature to survive. Everything we get today comes from the land, even money itself.

As the world nears the goal of creating long-term structures beyond Earth, the threshold of developing independent life support systems is critical. "AstroTerra" investigates the recycling of resources, oxygen production, and food cultivation while concentrating on the implementation of closed loop biosystems for lunar or martian habitats. The study analyzes the potential of fully integrated bioregenerative systems that mimic the Earth's biological cycles using concepts derived from projects like Biosphere 2 MELiSSA and Lunar Greenhouses. Moreover, it analyzes the new challenges met in space and the extreme temperatures, radiation, and low gravity that pose threats to prolonged survival. By examining hydroponic and aerobic plant growth, microbial resource recovery, and ISRU, this aims to enhance the design of lifelong sustainable habitats beyond Earth, thus leading the way for interplanetary settlements.

Keywords : Closed-Loop Biosystems, Lunar and Martian Habitats, ISRU, Closed-Loop Biosystems, Oxygen Production