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EDEN 2.0: A TESTBED FOR CREW PSYCHOLOGICAL HEALTH AND FLEXIBLE FOOD PRODUCTION IN SPACE HABITATS

Abstract

The EDEN research initiative at the German Aerospace Center (DLR) explores the potential of Bioregenerative Life-Support Systems (BLSS) for sustainable long-term human space exploration. Focusing on the EDEN ISS MTF (Mobile Test Facility) in Antarctica, and its successors like EDEN 2.0, this research highlights the integration of greenhouses into space missions for fresh food production and psychological benefits. The EDEN 2.0 project, specifically, aims to incorporate a greenhouse within the Neumayer-III (NM-III) station, facilitating remote management from DLR in Bremen and advancing towards lunar mission applications.

This paper covers the collaborative design process, system requirements, and preliminary design outcomes of the EDEN 2.0 project. A significant aspect of this project is the conceptualization of a greenhouse at Neumayer Station III, designed to merge food production with social well-being. Addressing the psychological impact of long-duration missions in extreme environments, the concept includes a variety of plant growing areas and a social space with a herb garden and green walls. This innovative approach not only ensures sustainable food supply but also enhances crew morale and mental health, providing valuable insights for future space habitats.