Paper ID: 86994
oral

22nd IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)
Systems and Infrastructures to Implement Sustainable Space Development and Settlement - Systems (2A)

Author: Dr. Volker Maiwald
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany

Ms. Charmaine Neufeld
University of British Columbia, Canada
Mr. Michel Fabien Franke
German Aerospace Center (DLR), Germany
Dr. Daniel Schubert
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany

LUNAR AGRICULTURAL MODULE GROUND TEST DEMONSTRATOR – AN INTERNATIONAL APPROACH FOR REALIZING PLANT-BASED BIO-REGENERATIVE LIFE-SUPPORT

Abstract

Long-term human lunar exploration requires advancement of life-support systems. Bio-regenerative life-support systems (BLSS) have been shown to have a reduced equivalent mass for such long-term missions compared to more traditional methods, e.g. physical-chemical life-support, which reduces mission costs and effort in general. Currently no such (near) closed-loop systems exist and several challenges for their realization are still present, such as understanding of e.g. scaling of the system, interaction of technical and biological components, interaction and dependency of technical elements, and the microbiome. Beginning with a prototype-test in Antarctica, the German Aerospace Center (DLR) has joined an international effort, comprising the Canadian Space Agency (CSA) and several subcontractors of now creating ground-test demonstrator capable of addressing the many unknowns of designing, developing and operating a lunar agricultural module. This paper presents the current updated status of the design and project and informs about the international effort behind it, highlighting the importance of the project. We present a system overview and inform about how the system will be able to address open issues currently associated with BLSS as well as a roadmap of the GTD usage and how it will eventually lead to the operation of an actual agricultural module on the lunar surface.