

## 27th IAA SYMPOSIUM ON SPACE AND SOCIETY (E5)

Architecture for humans in space: design, engineering, concepts and mission planning (1)

Author: Dr. Irene Lia Schlacht

Politecnico di Milano, Italy, irene.schlacht@mail.polimi.it

Mr. Jacopo Bernini

Karlsruhe Institute of Technology, Germany, jacobobernini@hotmail.it

Mr. Daniel Schubert

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, daniel.schubert@dlr.de

Mr. Paul Zabel

Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, paul.zabel@dlr.de

Ms. Chiara Montanari

Politecnico di Milano, Italy, chiara.montan@gmail.com

Prof. Giulio Ceppi

Politecnico di Milano, Italy, giulio.ceppi@polimi.it

Mrs. Barbara Imhof

LIQUIFER Systems Group, Vienna, Austria, barbara.imhof@liquifer.com

Mr. Rene Waclavicek

Vienna University of Technology, Austria, waclavicek@hb2.tuwien.ac.at

Prof. Bernard Foing

European Space Agency (ESA/ESTEC), The Netherlands, Bernard.Foing@esa.int

## EDEN ISS: HUMAN FACTORS AND SUSTAINABILITY FOR SPACE AND EARTH ANALOGUE

**Abstract**

In light of upcoming plans for human Moon/Mars missions, the German Aerospace Center (DLR) and its partners are developing a greenhouse to be tested at the German Neumayer station III in Antarctica: the EDEN ISS project. One critical component of future human exploration of unknown worlds will be the supply of edible food for crewmembers. Thus, developing innovations for the cultivation of food in closed-loop systems will become essential for future missions. EDEN ISS focuses on ground demonstration of plant cultivation technologies and their application in space. It develops safe food production for use on board the International Space Station (ISS) and for future human space exploration vehicles and planetary outposts. After an introduction on sustainability and the relationship with the EDEN ISS project, this paper deals with research into a range of challenges regarding the improvement and optimization of the greenhouse project's safety and performance in terms of human-system interaction. The main points are:

1. Human factors safety and performance
2. Analysis of the main challenges of the EDEN ISS project (with a long-term focus on applicability to future space-based plant production systems)
3. Human factors implementation proposals

The focus is on operator interaction, tackled from the human factors perspective and applying a holistic approach. In other words, the operator's needs are investigated with regard to psychological, physical, socio-cultural, environmental, and operational factors that need to be taken into account.