Paper ID: 17423
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SPACE LIFE SCIENCES SYMPOSIUM (A1)
Astrobiology and Exploration (5)

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LIFE SCIENCES PAYLOAD DEVELOPMENT AND R&D FOR EXPLORATORY MISSIONS

Abstract

Different exploratory mission scenarios vary a lot between the payload volume, the space and power they offer. Still though, similar experiment types could be performed in regards to life sciences. Thus OHB's approach is the development of a modular and flexible system that allows with one basic design to adapt to

a) different scientific research questions, biological experiments and samples
b) volume, mass and power supply offered by the S/C
c) mission's target location

The basic layout contains of a common service-platform with power and control unit, thermal control, sensors, biological sample units, radiation dose measurement for the samples and gas interfaces. For Lunar and Martian missions a dust collector interface to the sample units is foreseen, as well as a potential gas interface to the Martian atmosphere.

To allow a broad range of scientific questions relevant to future human exploration to be researched on one automated flight, the sample unit is designed to allow several different biological samples to be implemented in one flight opportunity. Thus a variety of experiments can be implemented, ranging from various forms of algae, extremophiles, human cells, fungi, etc. In parallel radiation dose measurements shall be undertaken to support reference studies on ground with the necessary information on other environmental influences, to filter out other side effects specific to the mission parameters. This includes also reference experiments on the S/C and on ground with soil simulants for Lunar and Martian missions.

The basic design of such a modular payload is described, its flexibility to adapt to different mission scenarios, the potential in answering different scientific questions, as well as the expandability to other fields are described in the paper. Additionally the influence of different soil simulant-versions on an exemplary biological ground-reference sample will be explained to line out the expected effects that need further research through exploration missions.