IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Life and Physical Sciences under reduced Gravity (7)

Author: Ms. Maria Grulich
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany

Ms. Katharina Hildebrandt
DLR (German Aerospace Center), Germany
Mrs. Angelika Diefenbach
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
Mr. Philipp Wever
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
Dr. Jessica Kronenberg
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
Dr. Jean-Pierre Paul de Vera
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
Ms. Theresa Schmakeit
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
Mrs. Cinzia Fantinati
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
Mr. Nico Maas
Deutsches Zentrum fuer Luft- und Raumfahrt (DLR), Germany

OPERATION OF LIFE SCIENCE FACILITIES AT THE MICROGRAVITY USER SUPPORT CENTER (MUSC)

Abstract

The Microgravity User Support Center (MUSC) in Cologne/Germany operates major equipment for the scientific use of space exploration in the disciplines of materials science, biological and extraterrestrial sciences and technology.

At MUSC, two control centers are being operated: the European User Support and Operations Center (USOC) for the International Space Station (ISS) and the Lander Control Center. Currently, the focus of the Lander Control Center is on preparing for the upcoming MMX mission to explore the Martian moon Phobos.

The USOC supports the development and validation of space experiments to flight readiness and operational products on flight-like payload/experiment ground models at the MUSC premises. MUSC supports operation during flight with the necessary infrastructure (e.g. ground science reference models of flight units and ground support computing systems). MUSC collaborates very closely with the respective scientists, crew, other operational centers in Europe and international partners. In addition to the established operation of payloads on behalf of space agencies, MUSC has gained first experience with the support for commercial payloads by successfully supporting the German radiation detector M-42 on the commercial Peregrine Mission launched by ASTROBOTIC.

With respect to life science, MUSC operates the Biolab, a multi-user payload facility for biological experiments, located in the Columbus module since 2008. Biolab offers two centrifuges inside an incubator to allow experiments to be undertaken in micro-gravity but also under simulated gravity of up to 2g as

an in-orbit control run. Since 2009, the operations of the suite of DOSIS payloads dedicated to the measurement of radiation within the ISS are also performed by MUSC.

In the future, MUSC will support the operation of the Life Cell Imaging (LCI) payload, an innovative 3D fluorescence microscope to observe cell changes in real time. This payload will provide new insight into human tissue, cell cultures, microorganisms and plants in space and is scheduled to be launched to the ISS in 2026. Over time, processes and equipment at MUSC have been adapted to the growing scientific requirements for e.g. high amounts of scientific data to be transferred to ground and provided to the scientific community securely. User-oriented command, data acquisition and archiving systems for space experiments are provided to the Principal Investigators and their partners in near real-time.

The paper will give a survey on life science operations at MUSC over the last decade and provide an outlook for future life science operations in the evolving space utilization environment.