Paper ID: 9780
oral

MICROGRAVITY SCIENCES AND PROCESSES (A2)
Microgravity Processes onboard Large Space Platforms (7)

Author: Dr. Peter Hofmann
OHB System AG - Munich, Germany

Mr. Ralf Heise-Rotenburg
OHB System AG - Munich, Germany
Dr. Juergen Burfeindt
OHB System AG - Munich, Germany
Mr. Ferdinand Molter
OHB System AG - Munich, Germany
Mr. Jan Dettmann
European Space Agency (ESA), The Netherlands
Dr. Pietro Baglioni
European Space Agency (ESA), The Netherlands
Dr. Elke Rabbow
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany

MULTI-USER EXPOSURE FACILITIES ON EXTERNAL SITES OF THE INTERNATIONAL SPACE STATION

Abstract

EXPOSE-E and EXPOSE-R are two multi-user facilities developed by Kayser-Threde (subcontractor RUAG Aerospace AG) under contract to ESA for scientists working in the field of astrobiology. With these facilities, biological and organic chemical material and/or micro-organisms can be exposed for long periods (typically for one year) to the hostile space environment under known and controlled conditions.

Both the EXPOSE facilities are box-shaped, thermally controlled units, with customized and partly exchangeable sample containers, which, with constantly monitored environmental conditions, allow a defined long-term exposure of the experiments; in particular, to: solar UV radiation, both under vacuum or defined atmosphere. In addition, temperature conditions can be floating or pre-defined and the wavelength of the incident radiation is monitored.

In 2008 two sets of astrobiology experiments with more than 1500 scientific samples in the two EXPOSE facilities were successfully launched to the ISS for external exposure. EXPOSE-E which was situated on the balcony of the European Columbus module was successfully returned to Earth in September 2009. Sample investigation and evaluation of the results are on-going. EXPOSE-R took off to the ISS with the Russian Progress vehicle in November 2008. EXPOSE-R was mounted on an external palette outside the Russian Zwezda until the beginning of 2011. The facility is presently stored within the ISS after recently being dismounted from the palette. Download is planned with the space shuttle STS-133 in March 2011.

The paper will give an overview of the various types of experiments which have been performed in EXPOSE. Furthermore, the facilities themselves and their performance characteristics will be described.

Kayser-Threde and ESA are presently preparing to provide experiments in a third set of new EXPOSE-R trays to be launched to the ISS in 2012, opening the chance for further scientific investigations outside the ISS, in support of astrobiology research and also of future exploration programmes.