

MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)  
Facilities and Operations of Microgravity Experiments (5)

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EXPOSE-E: APPLICATION OF A DECENTRALIZED PAYLOAD OPERATIONS CONCEPT FOR  
EUROPEAN PAYLOADS ON THE ISS

**Abstract**

This paper will describe an application of a decentralized operations concept to the ISS external payload EXPOSE-E.

EXPOSE-E (EXPOSE-EuTEF) is a payload dedicated to the study of exobiology. It contains samples of interdisciplinary astrobiochemical experiments exposed to the space environment for the sake of increasing the knowledge of the origin and of the evolution of life within a planetary context. EXPOSE-E, located with other European payloads on the EuTEF pallet, has been successfully installed outside the Columbus laboratory on the International Space Station, commissioned and put in its nominal status.

In 1998 the European Space Agency (ESA) decided to establish a decentralized infrastructure for the operations of European payloads on board the ISS. A key role within this operations concept has been allocated to national User Support and Operations Centers (USOCs) distributed over 9 European countries.

The operational tasks for the EXPOSE-E payload are shared between two USOCs: MUSC and ERASMUS. MUSC (Microgravity User Support Centre) located in Cologne/Germany acts as EXPOSE-E Facility Support Center. In this role MUSC is responsible for EXPOSE-E Monitoring and Commanding, telemetry analysis, data archiving and data distribution to EXPOSE-E Principal Investigators. ERASMUS, located at ESTEC in the Netherlands, is the Facility Responsible Center (FRC) for EuTEF. ERASMUS holds the overall responsibility for the operations of the EuTEF class-1 payload and the nine experiments it accommodates. ERASMUS has a direct telemetry and command interface to the Columbus Control Center (Col-CC) and provides the TM/TC interface between MUSC and Col-CC. The realization of this operations concept will be presented in detail in this paper.

In addition, this paper will present operational solutions derived from the experience gained in the first mission operations phase of EXPOSE-E. The applicability of these solutions is not limited to the context of ISS decentralized payload operations but it can be extended to generic mission scenarios in which a number of geographically distributed operations centers share certain operations responsibilities.