

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
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REFRIGERATION POOL OF THREE MELFI UNITS AND ITS UTILISATION ON BOARD THE ISS

Abstract

The pool of three MELFI units continues providing the scientific community with robust and permanent available refrigeration capabilities for life science experiments in ISS. The first unit is completing by summer 2011 the first five years of continuous operations. This unit has demonstrated outstanding performance on orbit and proved the adequate technical choices during the development program. The two other MELFI units, launched respectively in 2008 and 2009 are supporting the first unit providing additional refrigeration volume, necessary for the science on board and also for preparing thermal inertia to protect the samples on their way down to earth. The MELFI pool is fitted with supporting hardware to allow long stay in orbit including preventive and corrective maintenance. The internal components were designed to allow easy on board maintenance. Spare equipment was installed in the ISS and specific maintenance means were developed, requiring good crew training before intervening on the cold gas cycle. However recent failures on the second MELFI have proven that the less reliable equipment is the electronic box driving the power to the cooling machine. Enough spare boxes were available in orbit to maintain the necessary couple of MELFI working, and a traffic scenario was put in place using the last shuttle flights to support the spare exchange. However after Shuttles missions termination another scenario has to be put in place for supporting the MELFI during the many years to come it is still needed in ISS. The paper will present the results of the 5 years on orbit and the repairing of the encountered failures. It will derive experience for sizing the traffic scenario to be foreseen for the years to come.