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

Author: Mr. Daniele Titomanlio
TECHNO SYSTEM DEV., Italy

Mr. Giuseppe Capuano
TECHNO SYSTEM DEV., Italy
Mr. Francesco Maria Monti
TECHNO SYSTEM DEV., Italy
Mr. Wolfgang Soellner
Astrium Space Transportation, Germany
Mr. Achim Seidel
Astrium Space Transportation, Germany

# INNOVATIVE VIDEO DIAGNOSTIC EQUIPMENT FOR MATERIAL AND FLUID SCIENCE EXPERIMENTS IN SPACE

**Abstract**

The paper provides the description of the High Performance Digital Video System (DVS) used on board different microgravity platforms (ISS, Capsules, Sounding Rockets) to support scientific experiments in the field of Material and Fluid Science. TSD's DVS are based on a technological platform named H2VMU (High resolution/High frame rate Video Management Unit) implementing Video acquisition, storage, compression and transmission that, in spite of its small dimensions, is able to provide a high level of flexibility and outstanding performances that are unique among space equipment dedicated to digital video processing. Being a proprietary platform TSD is capable of customizing it both in terms of functions and performances and also in terms of radiation tolerance thus allowing to fulfill a wide range of different application requirements. The paper presents the DVS flown on board the Maser 12 Sounding Rockets for the campaign of February 2012 (ESA programme primed by Swedish Space Corporation) and the DVS dedicated to the Material Science Laboratory Electromagnetic Levitator (MSM-EML, ESA/DLR programme primed by ASTRIUM Gmbh) that will be accommodated on-board the International Space Station in the ESA Columbus Laboratory (flight foreseen end of 2012). The DVS implements real-time video acquisition, high and low compression, storage and transmission of a continuous flow of video with different characteristics in terms of image dimensions and frame rates The MASER 12 DVS manages the video images from 3 experimental payloads, two dedicated to fluid science (SOURCE and BIOMICS) and one to Material Science (XRMON), and from the Recovery Module Camera. The overall real time video throughput acquired and stored from the 5 video channels amounts to 3.2 Gbit/s; it was compressed real time to optimize the available downlink channel of about 9 Mbit/s thus allowing the PIs to control their experiments during the microgravity period of about 6 minutes . The EML DVS will support scientific experiments on samples of different materials melted and solidified inside electromagnetic fields in 0g environment. The DVS will provide real-time digital images of the samples both to the ISS Payload Specialist and to the scientific community on ground. It is able to operate with the last generation of high performances cameras acquiring high resolution video images up to 4Mpixels at 60 fps or high frame rate video images up to 1000 fps at 512x512 pixels, thus fulfilling a wide range of requirements