

SPACE EXPLORATION SYMPOSIUM (A3)  
Solar System Exploration (5)

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SIMBIO-SYS FOR BEPICOLOMBO: THE DESIGN AND QUALIFICATION OF THE ITALIAN  
“EYES” TOWARDS MERCURY

**Abstract**

The SIMBIO-SYS (Spectrometer and Imaging for MPO BepiColombo Integrated Observatory System) is an instrument suite part of the scientific payload of the Mercury Planetary Orbiter for the Bepi-Colombo mission, one of the cornerstone mission of the European Space Agency (ESA) science program, devoted to the study of the planet Mercury and its environment. SIMBIOSYS consist of a High Resolution Imaging Channel (HRIC), a STereo imaging Channel (STC) and a VISual and Infrared Hyperspectral Imager (VIHI) channel, with dedicated Proximity Electronics (PE) and a common main electronics (ME) and power supply (PDU). The scientific objectives of the instruments are: the study of the surface geology of Mercury, of its magmatic activity, global tectonics, age of the main geological provinces and the surface composition. Selex Galileo (SG) is charge of the instrument realization under a contract of the Italian Space Agency (ASI), with CNES contributions by IAS and LESIA institutes, i.e. the development of VIHI PE, ME and system final calibration. In this paper, the design and early qualification of SIMBIOSYS instrument is described, with particular emphasis to the challenging innovative aspects encountered during the development phases. The complex architecture incorporates the three independent channels (STC, VIHI, HRIC) with dedicated baffles, detectors and a proximity electronics, while the power resources and the control are shared, so that operation modes and functional timeline must be optimized. Each optical design has been tailored with respect to the mission objectives. The detectors, CMOS matrix type, needed a complex requirements definition phase and a dedicated procurement activity. The design has been mainly driven by the limited on board resources and strict environmental conditions imposed by the particular mission characteristics, the most critical, experienced during the transfer phase, were the high mechanical loads caused by the modules separations, while during the operative phase in Mercury orbit, were the irradiative and thermal harsh conditions due to the proximity of the Sun. Also the contamina-

tion aspects have been carefully considered in the SIMBIOSYS channels development. The development philosophy was harmonized with the bus one, managed by Astrium under ESA responsibility, in order to satisfy the mission technical and scientific requirements.