HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Utilization & Exploitation of Human Spaceflight Systems (3)

Author: Mr. Jan Svoboda
Technical University of Denmark - National Space Institut (DTU Space), Denmark

Dr. Torsten Neubert
Danish National Space Center (DNSC), Denmark
Mr. Per Lundahl Thomsen
Technical University of Denmark - National Space Institut (DTU Space), Denmark

ASIM (ATMOSPHERE SPACE INTERACTIONS MONITOR) – A CUTTING EDGE EARTH OBSERVATION EXPERIMENT FOR ISS

Abstract

ESA (European Space Agency) is currently performing about 40 experiments on ISS (International Space Station) per year, within the context of ELIPS (European Programme for Life and Physical Sciences in Space) programme. ASIM (AtmosphereSpace Interactions Monitor) is one of the future external Columbus payloads to be placed on the CEPA (Columbus External Payload Facility).

ASIM is an instrument suite designed for ISS to study of severe thunderstorms and their effects on the atmosphere and ionosphere. The instruments are designed to observe TLSs (Transient Luminous Events) — sprites, blue jets and elves — and TGFs (Terrestrial Gammaray Flashes). The mission will enable the science community to analyze the pre-requisites for these stunning events as well as chemical effects on the atmosphere, cloud properties, aerosol loading etc.. ASIM is developed within the ESA Directorate of Human Spaceflight, Microgravity and Exploration. The main partners of the payload team are from Denmark, Spain, Norway, Poland and Italy. The ASIM project is currently in phase C/D and is expected be launched in 2016 on a Space-X Dragon launch vehicle.

The ASIM payload consists of an optical instrument assembly – MMIA (Modular Multi-spectral Imaging Array) with two cameras and three photometers on an optical bench. Further, X and gamma ray instrument – MXGS (Modular X- and Gamma-Ray Sensor) is included with two unique detector layers. One Low Energy Detector (LED) layer based on Cadmium Zink Telluride (CZT) crystals and one High Energy Detector (HED) layer based on Beryllium Germanium Oxide (BGO) crystals. Each instrument assembly is included with a Virtex-5 based DPU (Data Processing Unit). The data and power is distributed and controlled by the DHPU (Data Handling and Power Unit). The DHPU also controls the interfaces to the Columbus module, from which data uplink, data downlink, and power is available. All 3 main payload elements are mounted on the CEPA which provides the interface framework towards the Columbus module.

The challenging flight hardware design and development process is currently being finalized and the payload is heading for flight model manufacturing, integration and testing in order to be ready for its placement on the ISS in 2016. In this paper, the cutting edge design and technical challenges are presented. Further, the design approach to fulfill the strict technical, safety and programmatic requirements is described - beneficial to the development of future payloads for Earth Observation on ISS and beyond.