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THE PRISMA PAYLOAD AND PRODUCTS – PRELIMINARY RESULTS OF COMMISSIONING PHASE

Abstract

PRISMA (PRecursore IperSpettrale della Missione Applicativa) is an Italian programme funded by the Italian Space Agency and realised by an industrial consortium of Italian companies. The satellite is being launched in March 2019 with the VEGA Launcher and the foreseen operational life of the mission is five years. The PRISMA Hyperspectral Payload is a state-of-the-art Electro-Optical instrument composed of a hyperspectral imager optically integrated with a medium resolution panchromatic camera. The optical design is based on high transmittance optical assemblies, including a reflective common telescope in Three-Mirror Anastigmat (TMA) configuration, a panchromatic (PAN) camera (700-900 nm), and a spectrometer operating in Visible and Near Infrared (VNIR) and Short Wave Infrared (SWIR) regions, therefore covering the wavelength range between 400 and 2500 nm. PAN images are provided at higher spatial resolution in order to allow for image fusion techniques (i.e. "pan sharpening"). The instruments is managed by a Main Electronics box, which also handles power supply distribution and interfaces the Platform On Board Data Handling (OBDH) and Payload Data Handling and Transmission (PDHT) modules. An in-flight Internal Calibration Unit (ICU) is present in order to allow absolute and relative radiometric calibration, spectral calibration, and to meet requirements on the radiometric accuracy. The highly demanding SNR requirements have been the main driver of technological trade-offs, resulting in the need for a large main aperture and leading to the selection of a prism-based spectrometers. The need to implement data compression to manage high data volume also increased the complexity of the Main Electronics box design, due to the development of a dedicated board. Data acquired by the payload is transmitted to the ground and processed, resulting in PRISMA products are managed will be delivered to the end users, according to appropriate policies. Level 0 products carry raw scientific data and include instrument and satellite ancillary data. They populate the PRISMA mission data catalogue. Level 1 products carry top-of-atmosphere radiometrically and geometrically calibrated hyperspectral and panchromatic data. Further elaboration is executed at level 2. Applications include geological analysis, monitoring of agriculture and forestry, urban areas, water resources and natural hazards. After the instrument-level qualification, the Payload was integrated into the PRISMA platform and went through the Satellite-level acceptance campaign. In-flight commissioning is expected to take place for about three months. The extensive verification will be conducted according to payload performances and accuracy of data products. Preliminary results will be presented in the article.