Paper ID: 87135
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IAF EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Sensors and Technology (3)

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THE CHIME SPECTROMETERS: DEVELOPMENT AND QUALIFICATION STATUS.

Abstract

Copernicus is the major European Union's programme for observing and monitoring the Earth. It represents one of the most successful space programmes coordinated and managed by the European Commission in partnership with ESA, the Member States and Agencies. Copernicus relies on global data acquired from satellites as well as ground-based, airborne and seaborne systems that generate information freely made available to service providers, public authorities and international organizations to improve the quality of life of citizens in Europe and in the world. The six services offered by Copernicus cover the following fields: Atmosphere, Marine, Land, Climate Change, Security and Emergency. Six missions entered B2CD implementation by the fall of 2020, namely CHIME, LSTM, CO2M, CRISTAL, ROSE-L, and CIMR. CHIME stands for the Copernicus Hyperspectral Imaging Mission for the Environment. The development of the CHIME space segment is managed by an industrial consortium led by Thales Alenia Space (FR), as Mission Prime, and OHB (DE), as Instrument Prime. Within the instrument team, important responsibilities have been assigned, among others, to AMOS (BE) and Leonardo (IT). In particular, AMOS is responsible for the development of the CHIME spectrometers. The spectrometer system (SPS) is the centrepiece of the CHIME instrument, ensuring the accurate spectral dispersion of the imaged ground swath over wide focal planes. The SPS consists of three identical spectrometer units drawn from the compact de-magnifying freeform Offner optical solution developed at AMOS. The SPS throughput is guaranteed by the broadband convex diffraction grating, while the image quality and distortion control are enabled using freeform mirrors. This paper reports the latest updates of the CHIME spectrometer development after the completion of TRL-raising and qualification activities for components, materials and processes, and the successful testing and delivery of the structural and thermal model of the spectrometers. This paper is presented at the time a first flight-representative qualification model of the spectrometer is produced.