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TECHNOLOGY CHALLENGES OF THE METIMAGE OPTICS

Abstract

METimage is an advanced multispectral radiometer for weather and climate forecasting developed by Airbus Defence Space under the auspices of the German Space Administration (DLR) for the EUMETSAT Polar System –Second Generation (EPS-SG). The instrument is equipped with a continuously rotating scan mirror, with a 1.7s period, that is redirecting the light into a static telescope. The scan mirror permits an extended Earth view of 108 per revolution and regular views to on-board calibration sources. A derotator assembly, which is half-speed synchronised with the scanner, is inserted in the optical beam after the telescope to compensate the image rotation in the focal plane. AMOS is in charge of the optical elements that make the METimage optical system, which are facing individual technical constraints. The cylindrical scan mirror has a very large radius of curvature and is made of Nickel-plated Beryllium alloy. The Telescope is a Three-Mirror Anastigmat (TMA) system that maps a circular area of diameter 23.3 km on ground (from a distance of 830 km) to an intermediate image of diameter 46.6 mm. The individual mirrors are made of SCHOTT Zerodur® glass with Invar mounts on a CFRP structure. The derotator optical arrangement is a five-mirror concept that minimises the polarisation sensitivity. The derotator design is constrained by optical performance, mass and compactness, which led to the selection of a full silicon carbide (SiC) concept. This paper describes the technical challenges involved in the design, manufacturing and verification of the METimage optics.