

On-Ground Calibration Targets for the Ice Cloud Imager Instrument on the MetOP Second Generation Satellite

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Abstract—This paper presents the optical and thermal design of the On Ground Calibration Targets for the Ice Cloud Imager Instrument for the MetOP-SG satellites, as well as the first radiometric test results of these targets.

Keywords—radiometric calibration, blackbody target, submillimeter-wave optics,

I. INTRODUCTION

The Ice Cloud Imager (ICI) instrument is currently being developed for the second generation of the European operational meteorological satellites (MetOP-SG) [1]. The conically scanning imager includes seven radiometers with different polarizations and frequency channels between 183 GHz and 664 GHz. The radiometer feed horns are clustered in the focal plane of an off-axis parabolic reflector with a projected diameter of 255 mm. The radiometers and the main reflector are mounted under a sun shield on a rotating platform which spins around the nadir axis at a constant rate of 45 rpm. The stationary part of the instrument includes the On-Board Calibration Target (OBCT) [2] and a Cold Sky Reflector (CSR). They block the field-of-view (FOV) of the feed horns at each rotation to provide a hot and cold scene for the radiometric calibration of the instrument. The Earth's atmosphere will be observed over a rotation angle of $\pm 65^\circ$, while angular segments of $\pm 2.5^\circ$ will be used on each calibration scene.

The radiometric performance of the ICI instrument has been verified on ground in a thermal vacuum chamber. The cold space view is simulated by a Fixed Temperature Target (FTT) blackbody cooled to about 77 K, and the Earth view with a Variable Temperature Target (VTT) that is temperature controlled between 80 K and 335 K. An additional liquid nitrogen (LN2) cold target in an ambient temperature and normal pressure environment (CAT) was used for simpler performance checks. The optical and thermal design of these On Ground Calibration Targets (OGCT) are described together with the radiometric model for ICI in [3, 4].

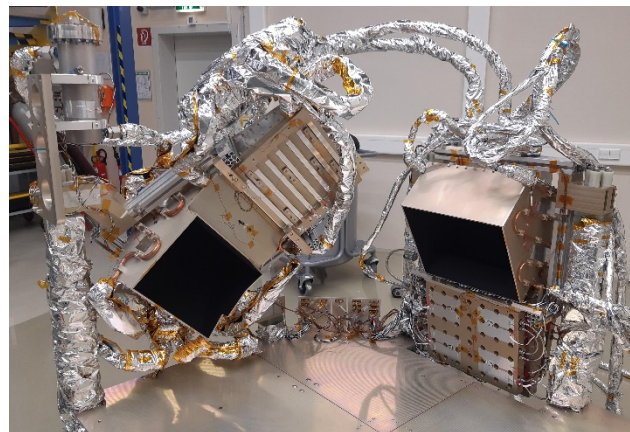


Fig. 1. ICI on-ground calibration targets during integration.

In this contribution, we report on the radiometric performance of the OGCT system which was achieved during the test campaign with the Protoflight Model (PFM) of the ICI instrument. The telemetry data from the radiometers of the instrument will be compared with model results based on Physical Optics simulations and the measured temperature distribution in the blackbody cavities.

REFERENCES

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