

FOURIER TRANSFORM SPECTROMETERS MONITORING: APPLICATION TO MTG-S IRS

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ABSTRACT

Numerical Weather Prediction (NWP) relies partially on hyperspectral data generated by Fourier transform spectrometers (FTS) from space. To enhance their impact on the daily forecasts, the measured spectra undergo continuous calibration and monitoring.

In anticipation of the upcoming launch of the Infrared sounder (IRS) aboard the Meteosat Third Generation sounding satellite (MTG-S), EUMETSAT has developed a dedicated suite of offline monitoring tools. These tools are designed to ensure the products' accuracy at the deci-Kelvin level, during commissioning and later in routine operations.

All modules have undergone thorough testing and validation using IRS datasets obtained during Thermal Vacuum (TVAC) activities or by applying them to real measurements from operational instruments like IASI (METOP), CrIS (Suomi-NPP and JPSS), GIIRS (FY4) and HIRAS (FY3). The poster provides an overview of the newly developed monitoring capabilities, including:

- Monitoring of the instrument gain and offsets,
- Retrievals for interferometer and detector alignment,
- Analysis of the corner-cube trajectory,
- Assessment of on-board laser metrology quality,
- Evaluation of video chain noise and non-linearity,
- Monitoring of the Instrument Spectral Response Functions (SRF),
- Examination of Point Spread Functions (PSF) with consideration for straylight effects,
- Radiometric and spectral calibration comparing to other operational instruments as IASI (METOP) and radiative transfer (RT) models,
- Detection of instrument defects using Principal Components Analysis (PCA).