EUMETSAT

MAIAN: Monitoring IASI-NG L1C

Jose Luis Villaescusa Nadal
Bertrand Theodore
Dorothee Coppens

IASI conference 2024

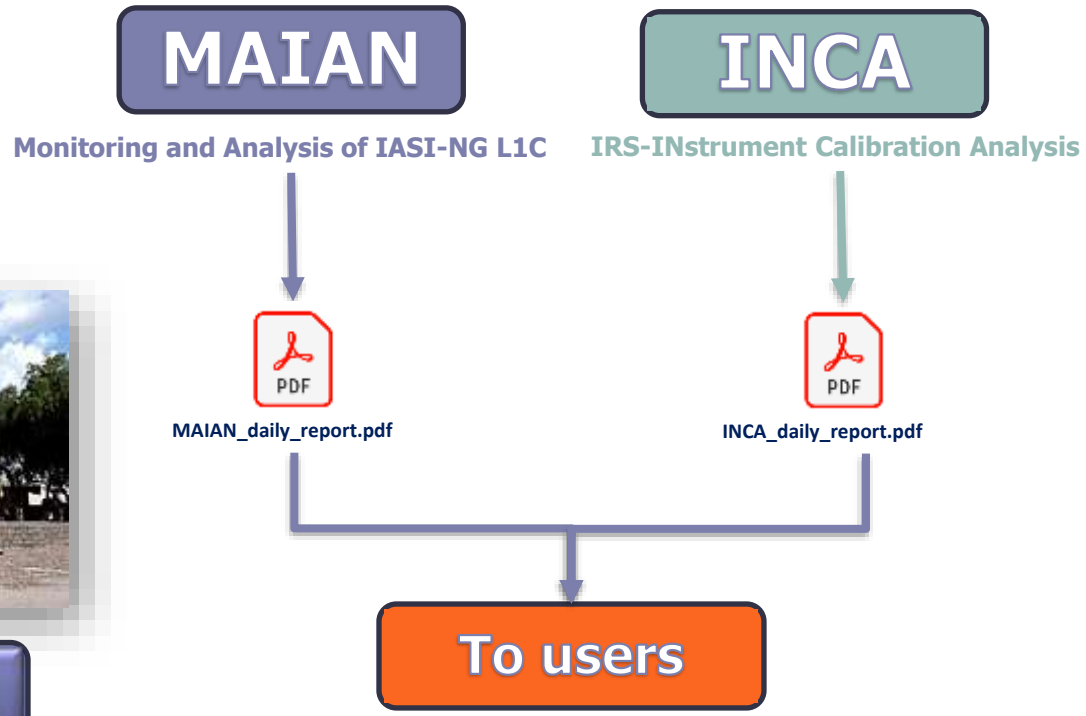
Our role

EUMETSAT

- L1C IASI monitoring
- L1C IASI-NG frontline monitoring (MAIAN)
- Report generation
- Distribution to users

cnes
CENTRE NATIONAL D'ÉTUDES SPATIALES

HSIR L1 team



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IASTEC

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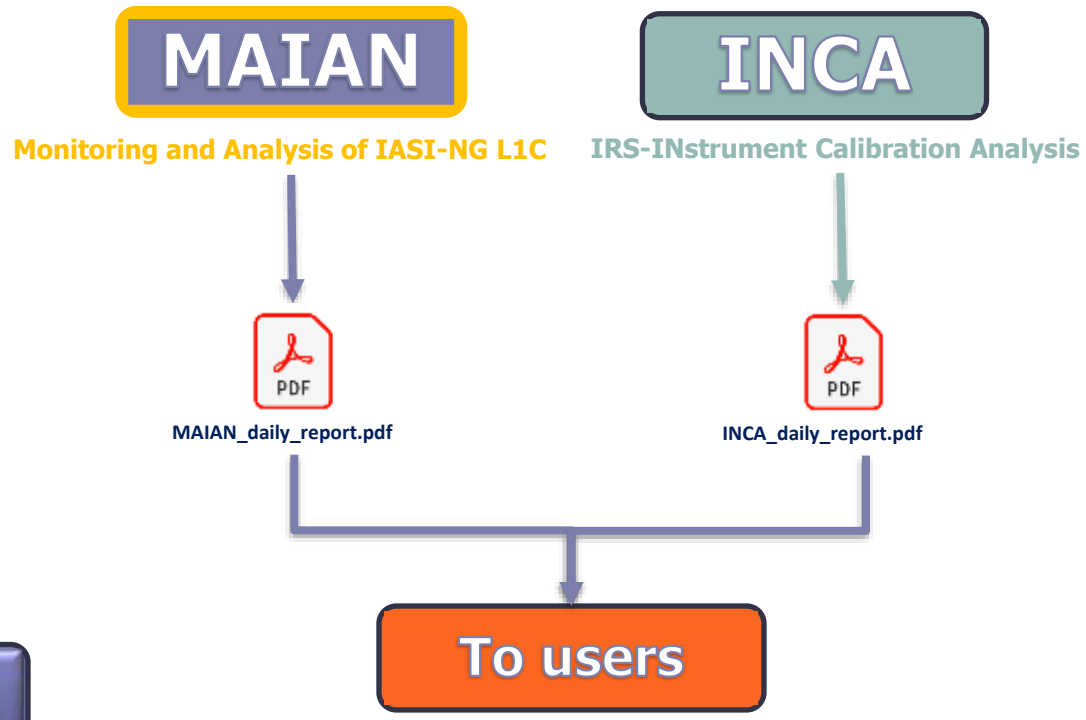
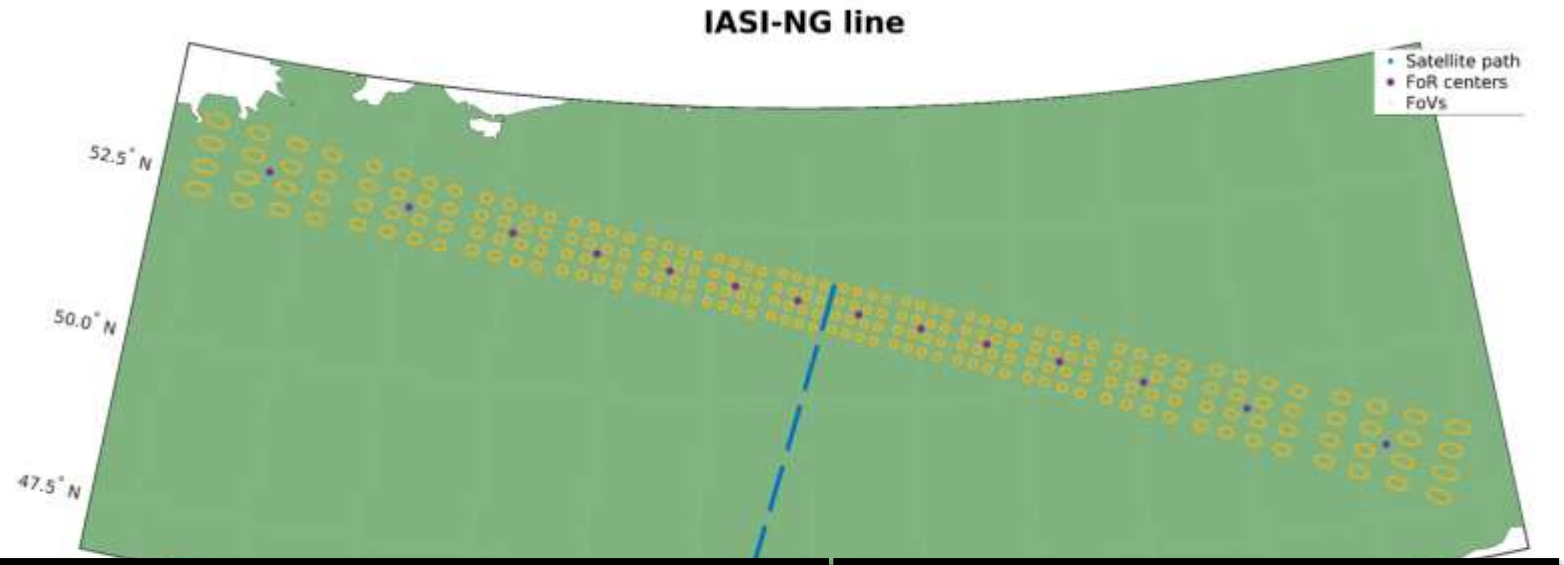
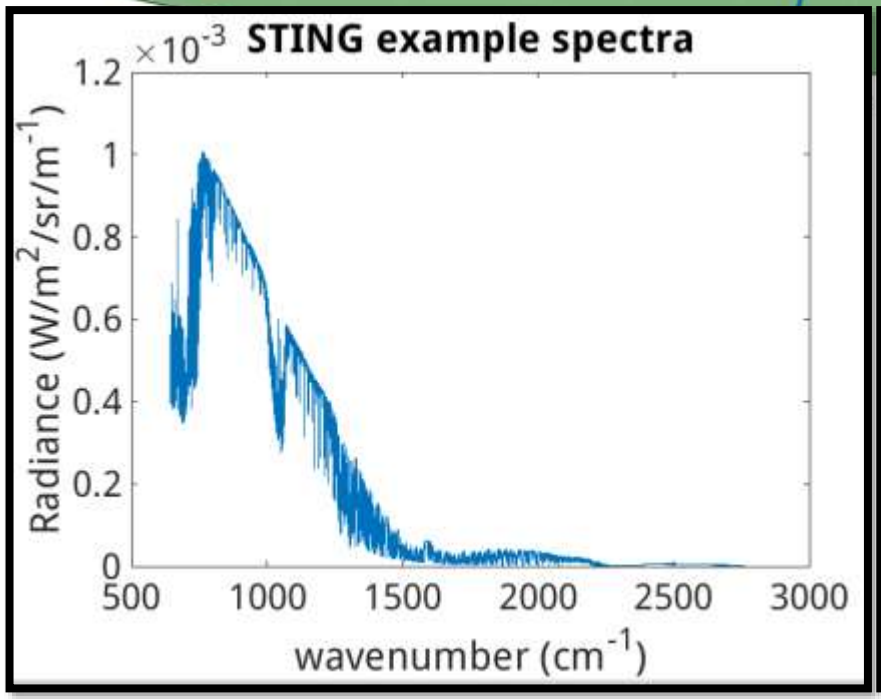


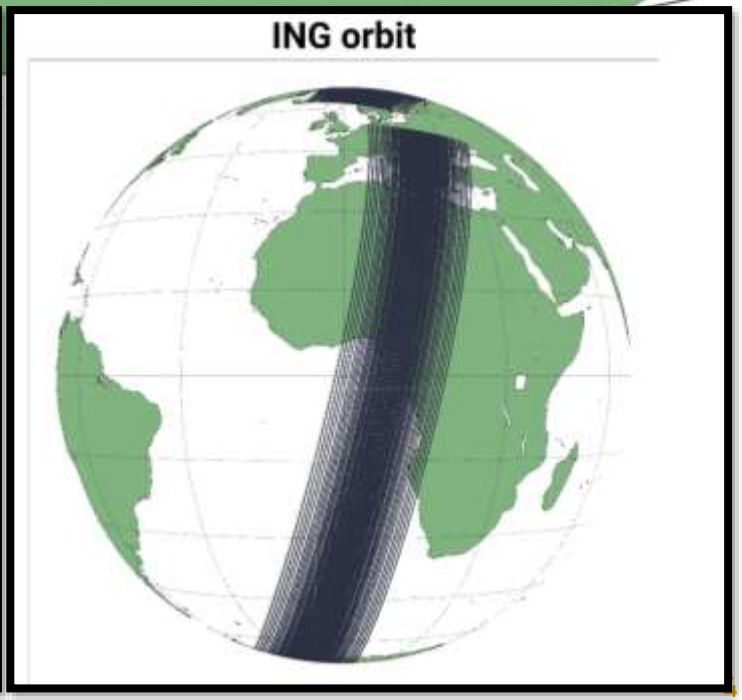
Simulation Tool for IASI-NG

STING

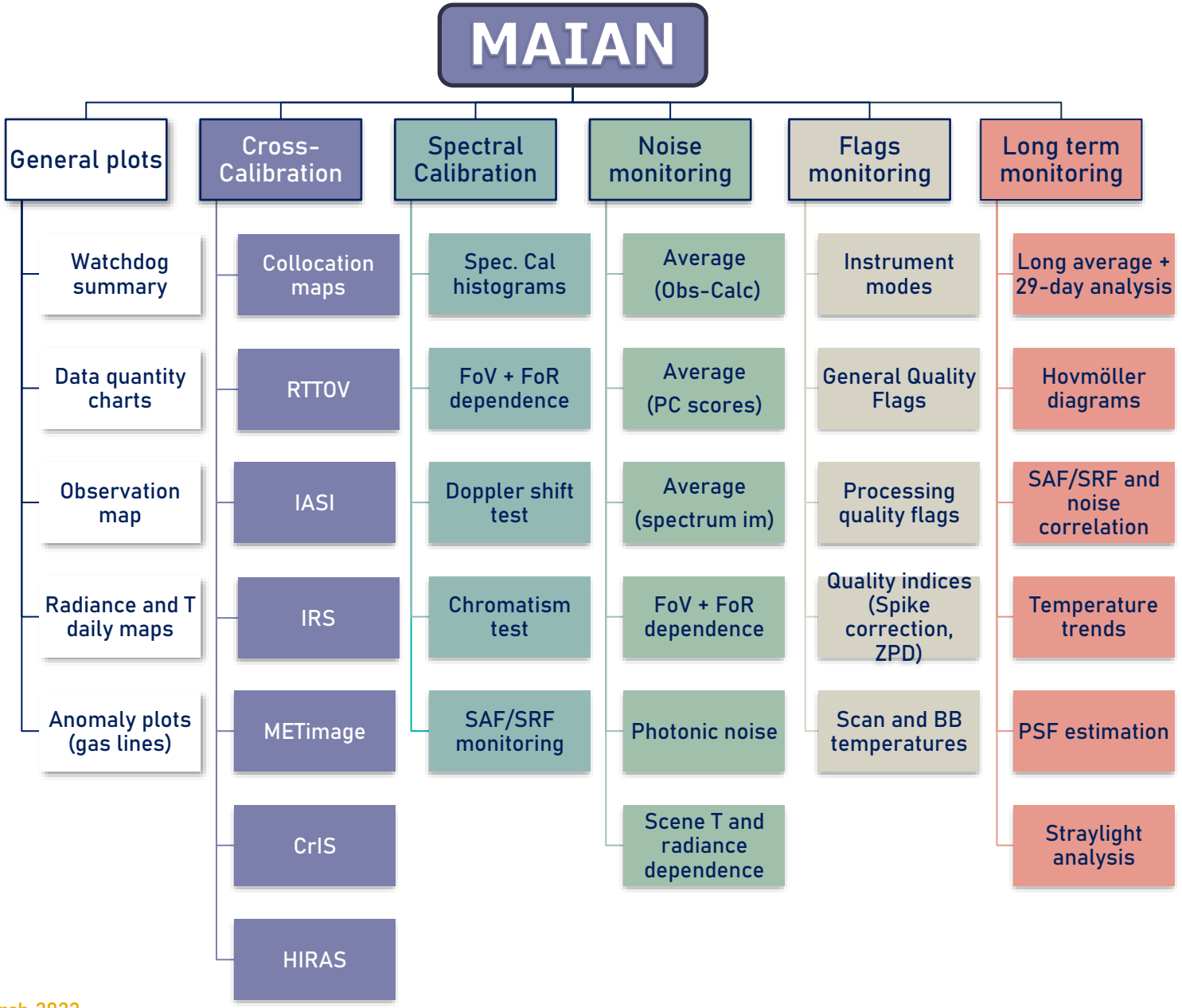
- Use IASI-C orbit parameters
- Calculate viewing geometry and acquisition
- Simulate spectra using ERA5 + RTTOV
- Simulate noise and flags/parameters
- Save file to format specifications (netCDF)





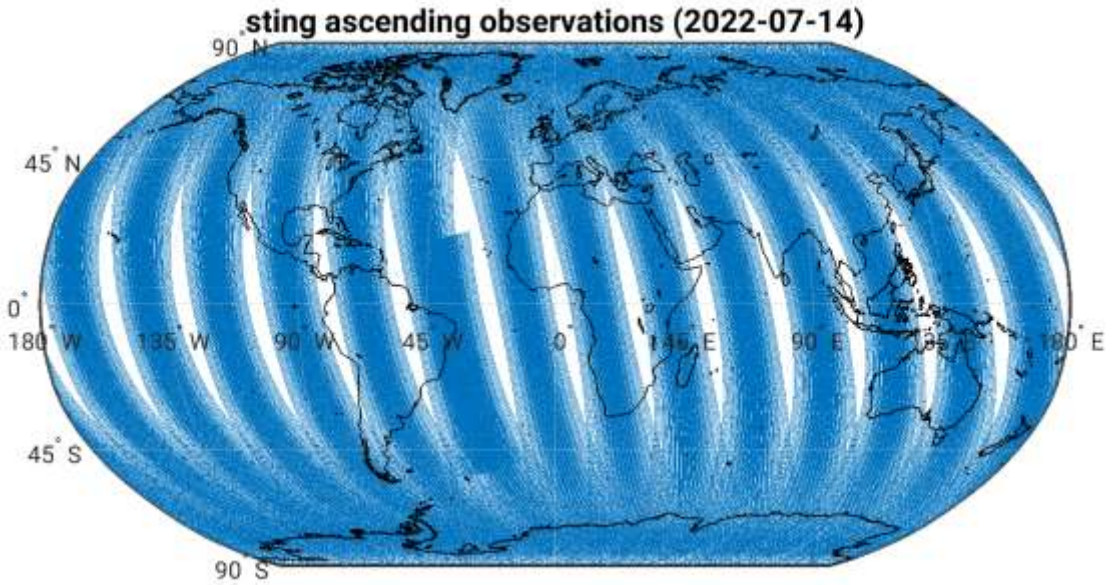


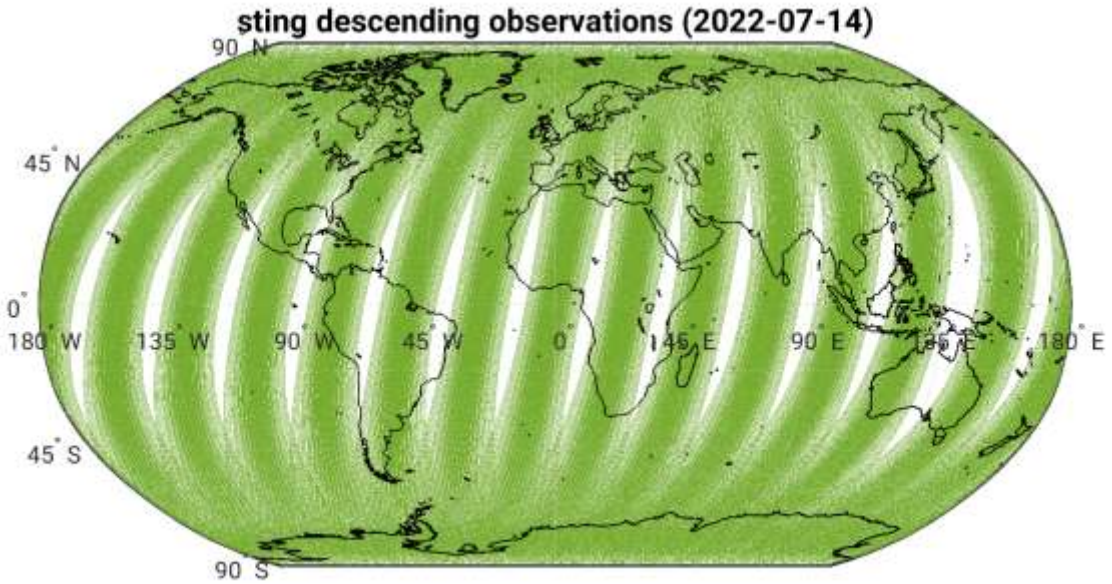
MAIAN: Monitoring and Analysis of IASI-NG L1C



General plots

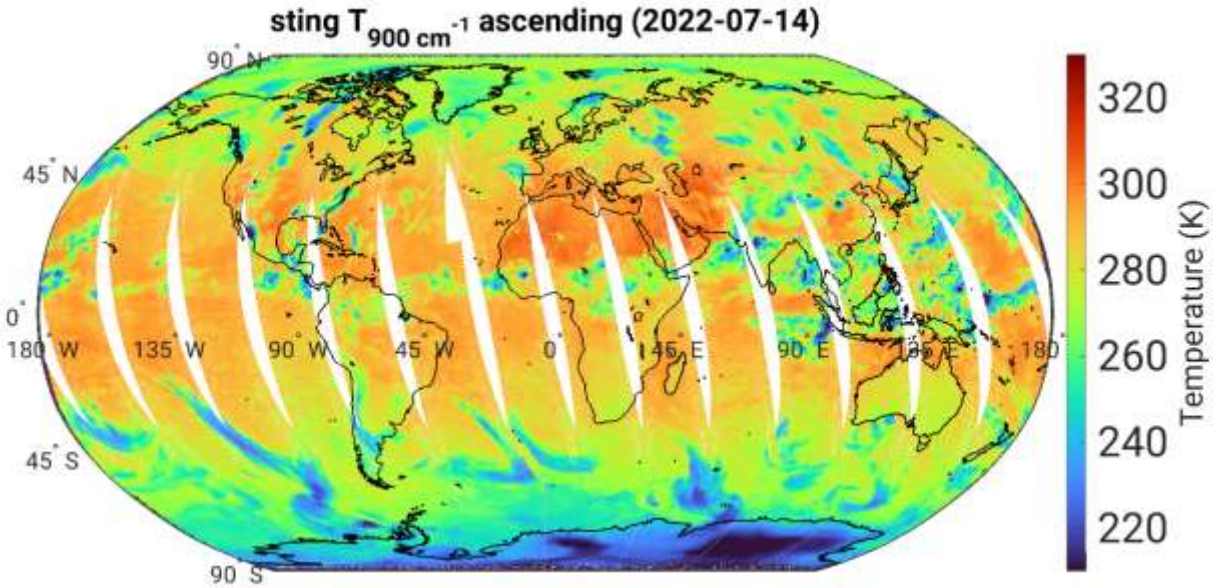
Observation Map

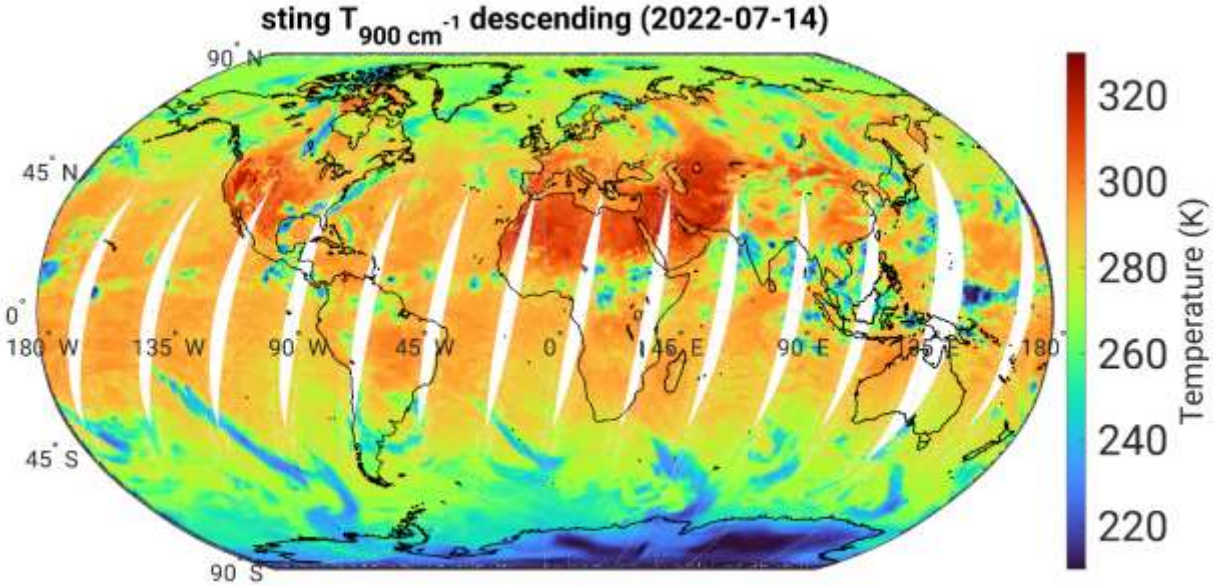




General plots

- Observation Map
- Radiance and T daily maps



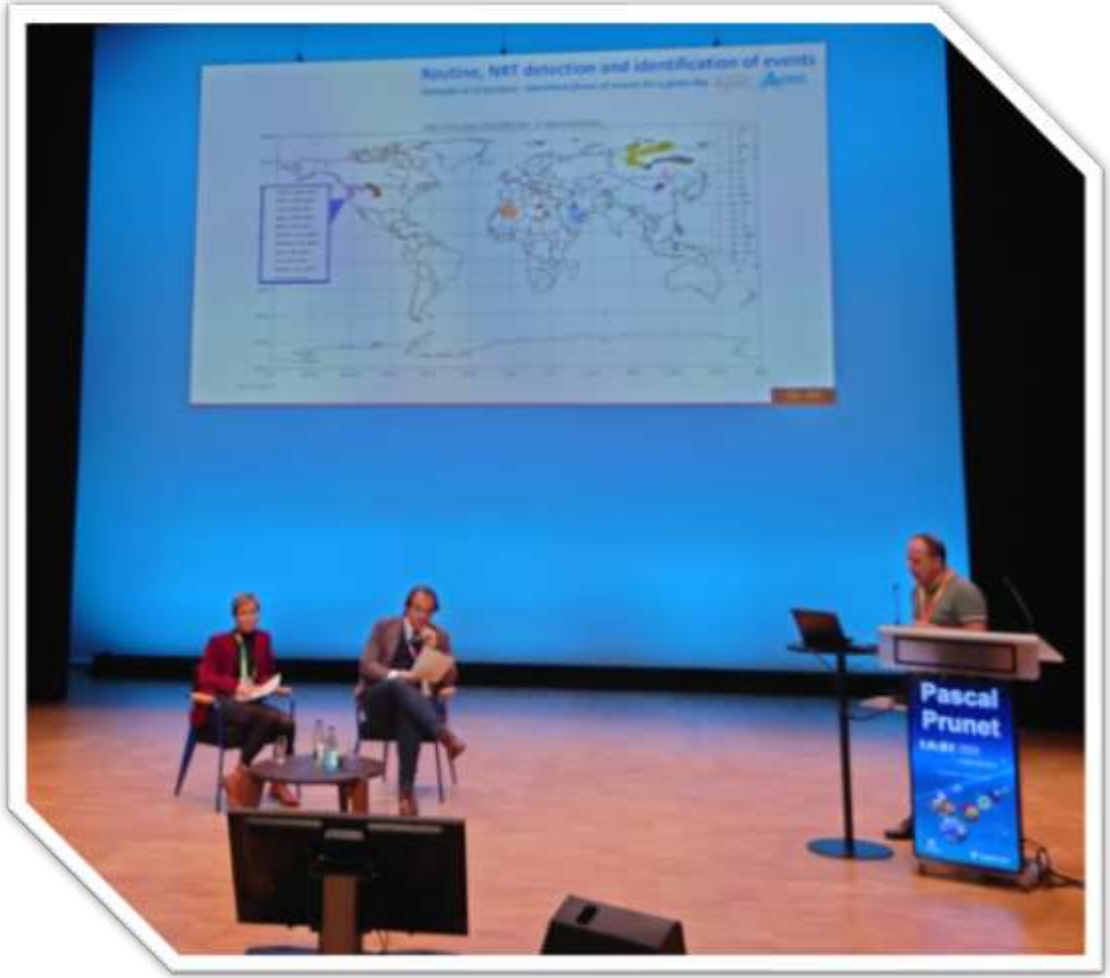


MAIAN: Monitoring and Analysis of IASI-NG L1C

General plots

- Observation Map
- Radiance and T daily maps
- Watchdog

- Goal: Finding rare atmospheric events
- High difference between (L1C spectra – PC reconstructed spectra) = likely atmospheric event
- Application to IASI → IASI-NG



Credit: Jonas Wilzewski and Tim Hultberg (gitlab.eumetsat.int/HSIR/rare-reconstruction-errors)

MAIAN: Monitoring and Analysis of IASI-NG L1C

General plots

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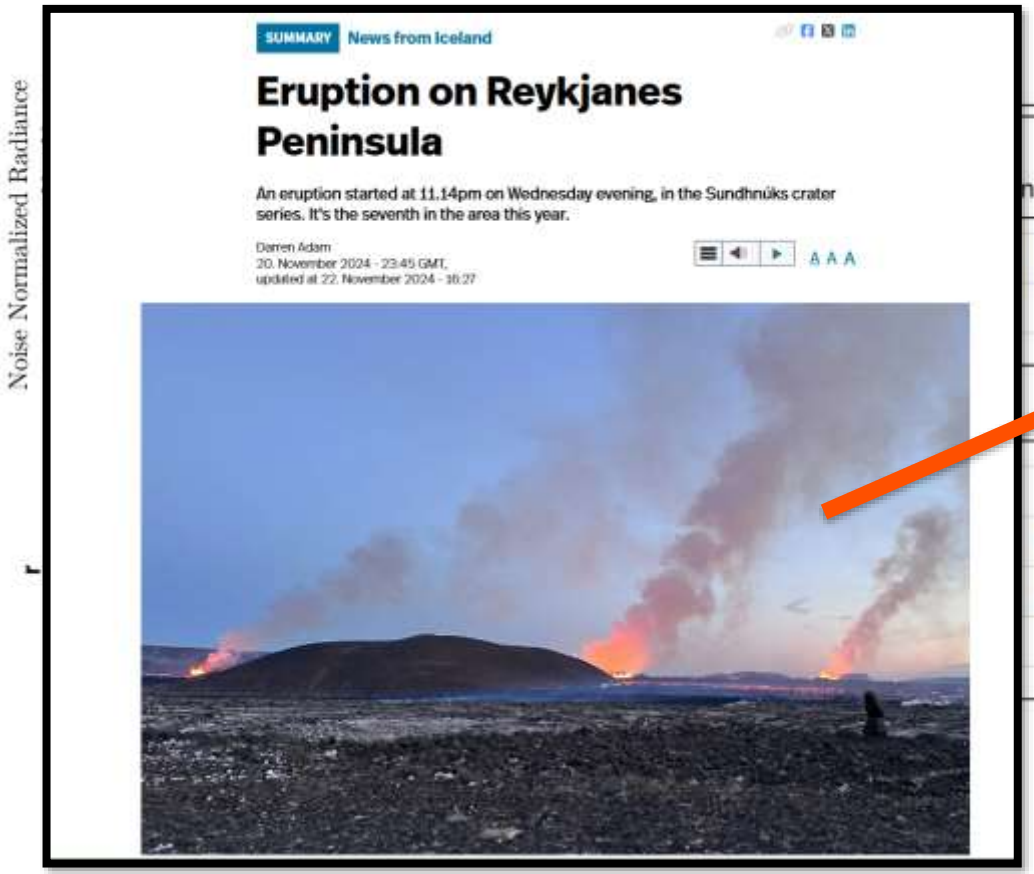
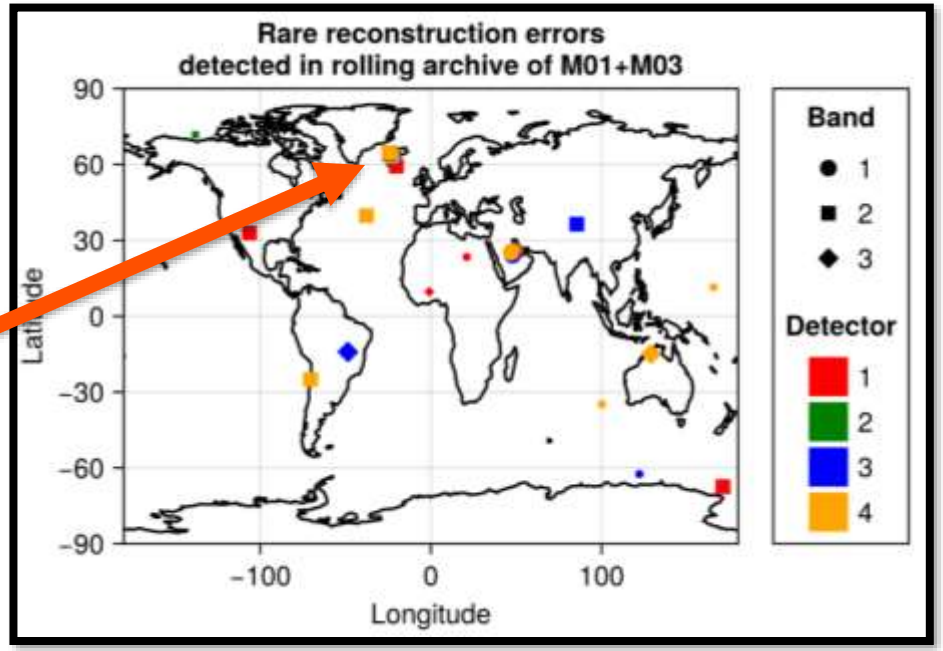
Observation Map

Radiance and T daily maps

Watchdog





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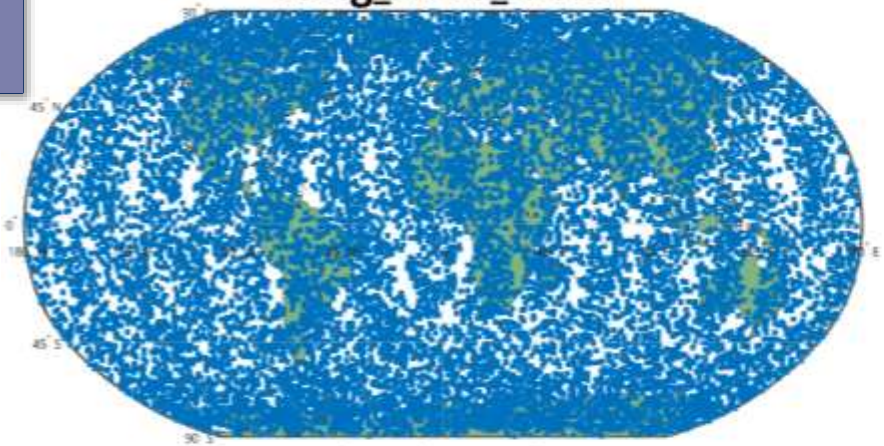
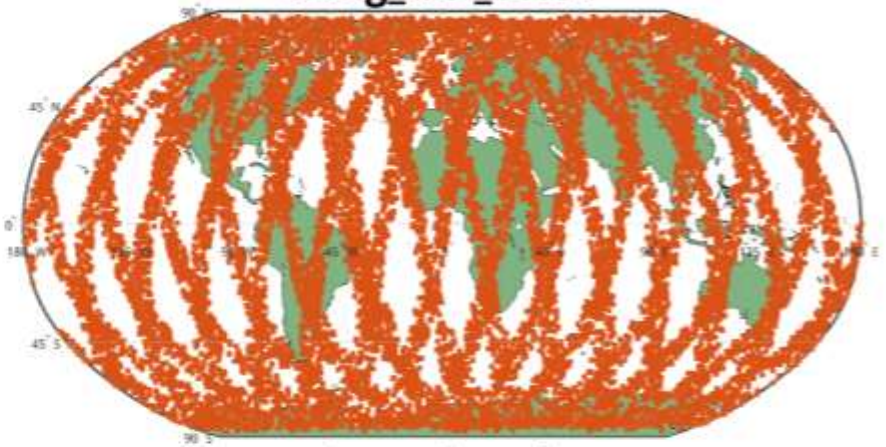
Cross-Calibration

- Collocation Maps

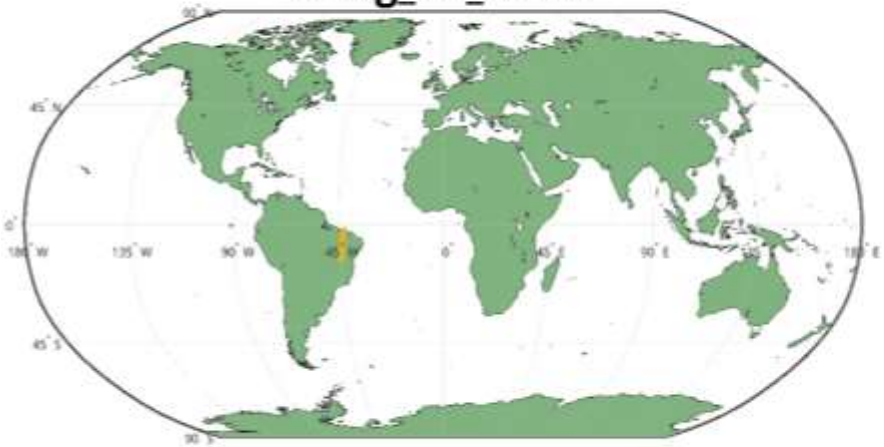
sting_rttov_coloc



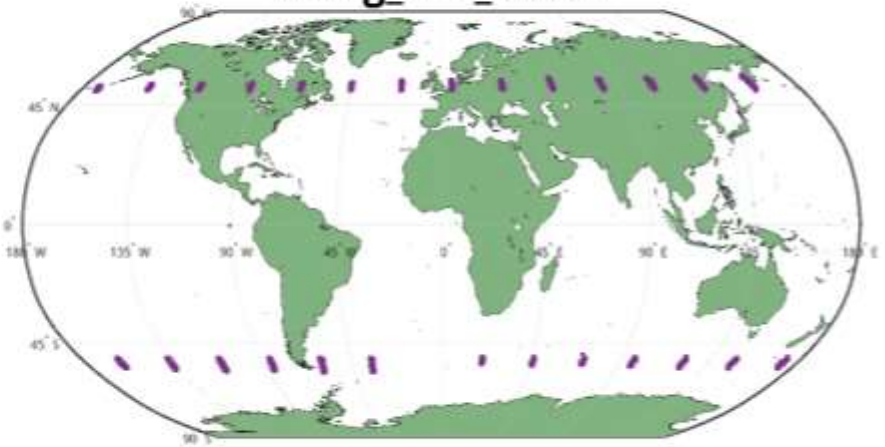
sting_iasi_coloc



sting_irs_coloc



sting_cris_coloc



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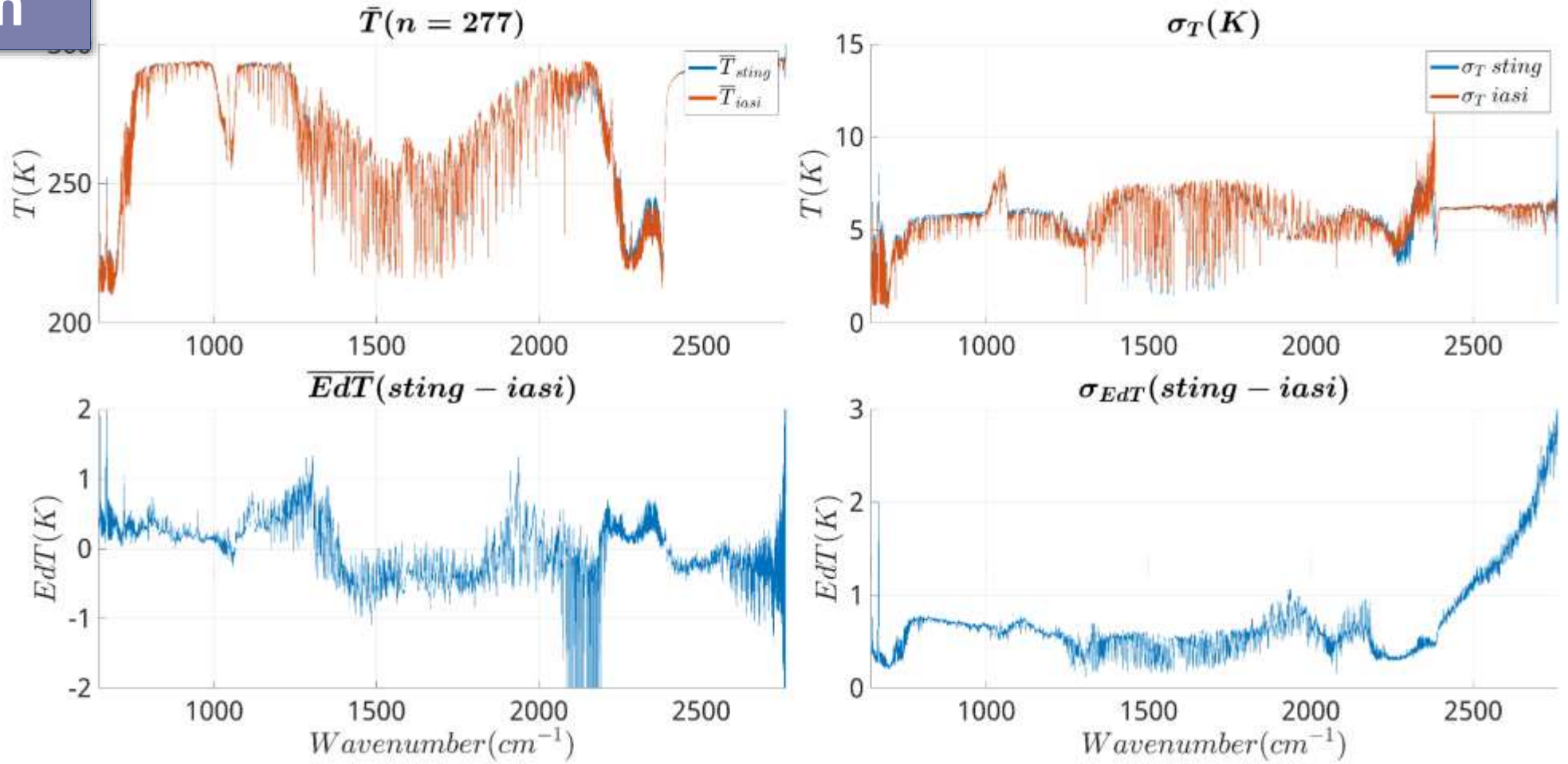
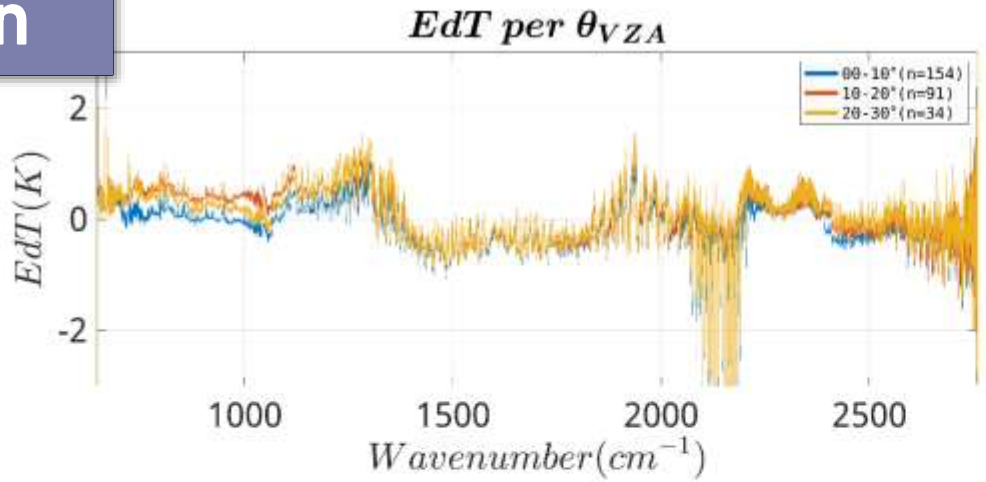
Cross-Calibration

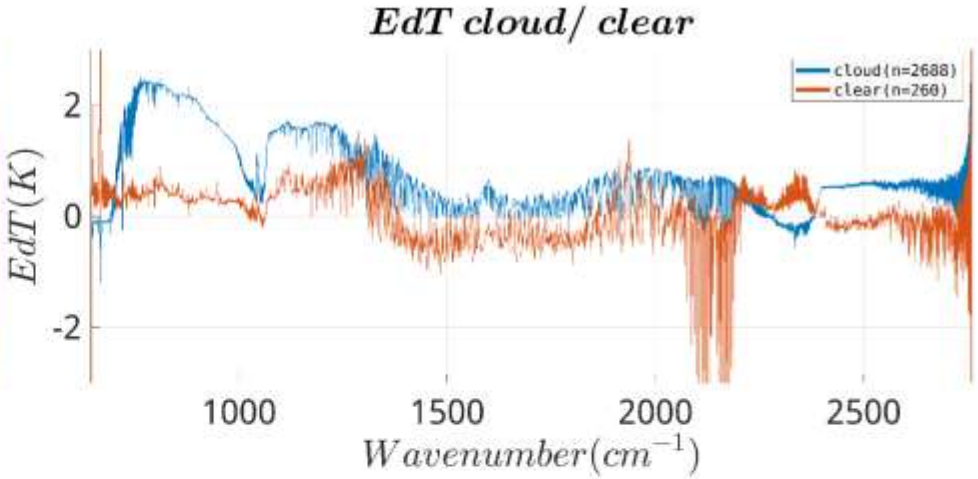
- Collocation Maps
- IASI

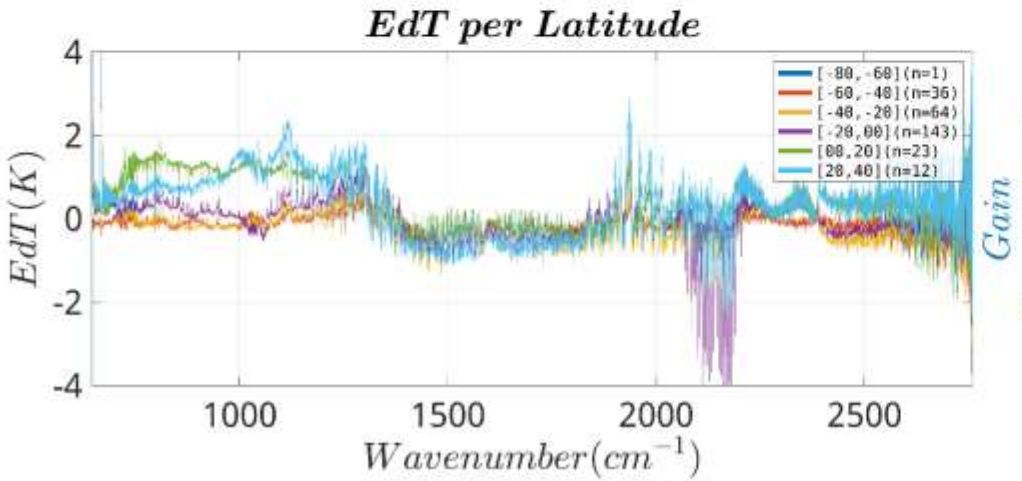


MAIAN: Monitoring and Analysis of IASI-NG L1C

- **Cross-Calibration**
  - Collocation Maps
  - IASI



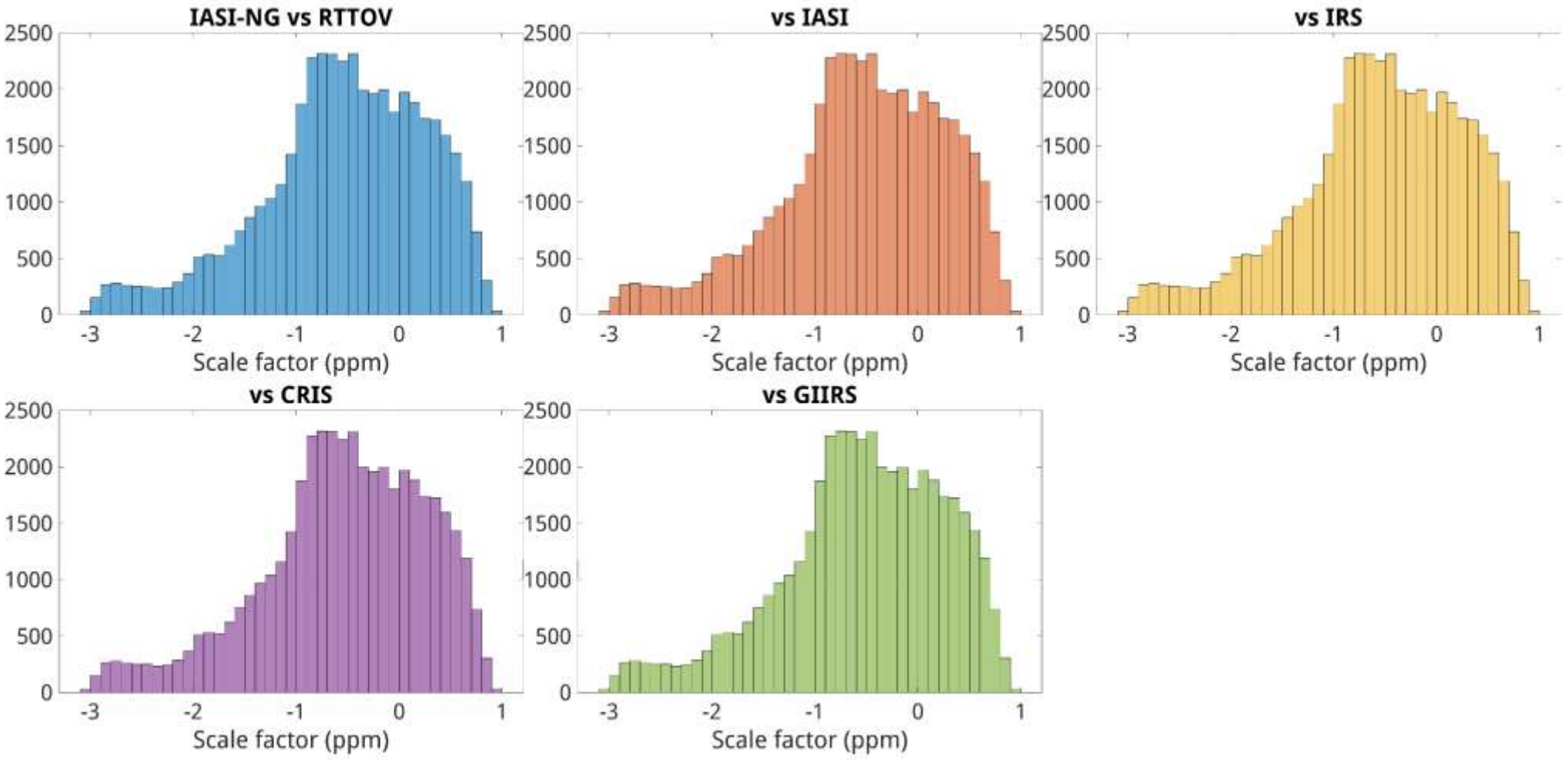




Per FoV, FoR
IASI-NG vs RTTOV, IRS, CrIS, HIRAS, METimage…

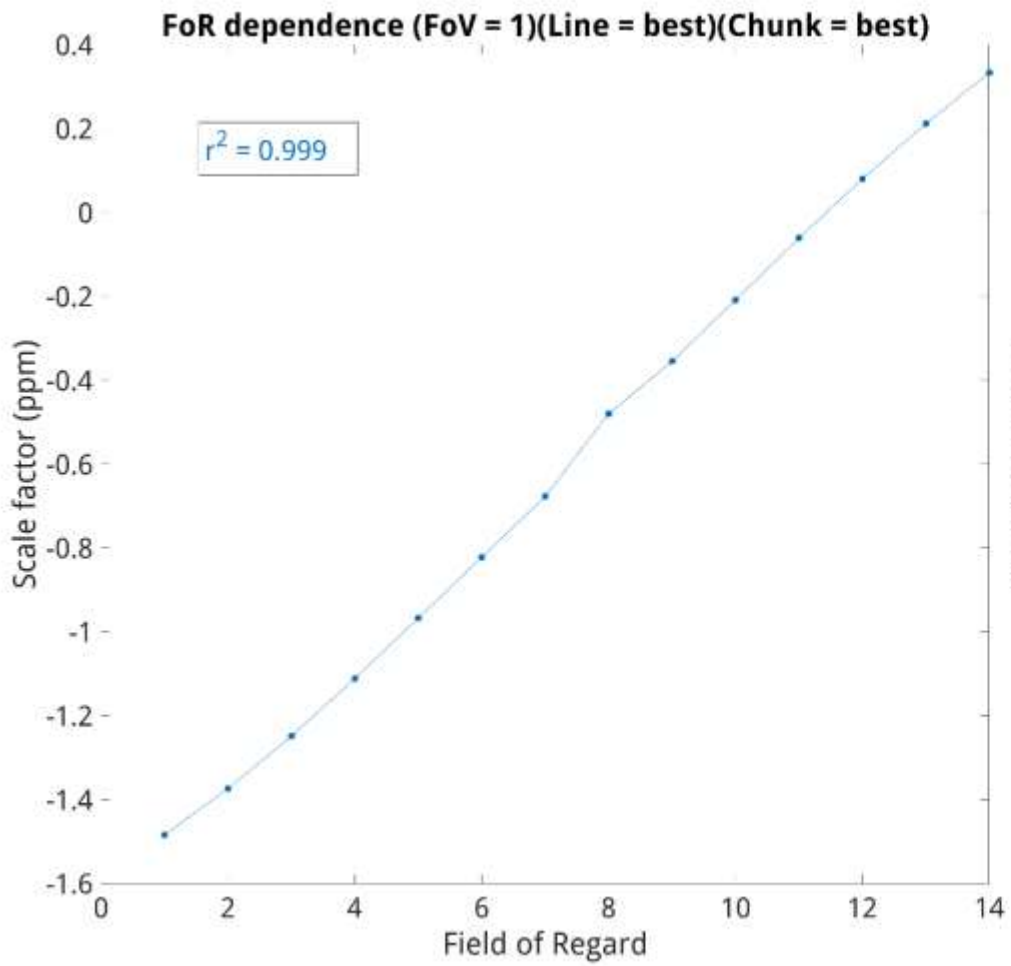
Spectral Calibration

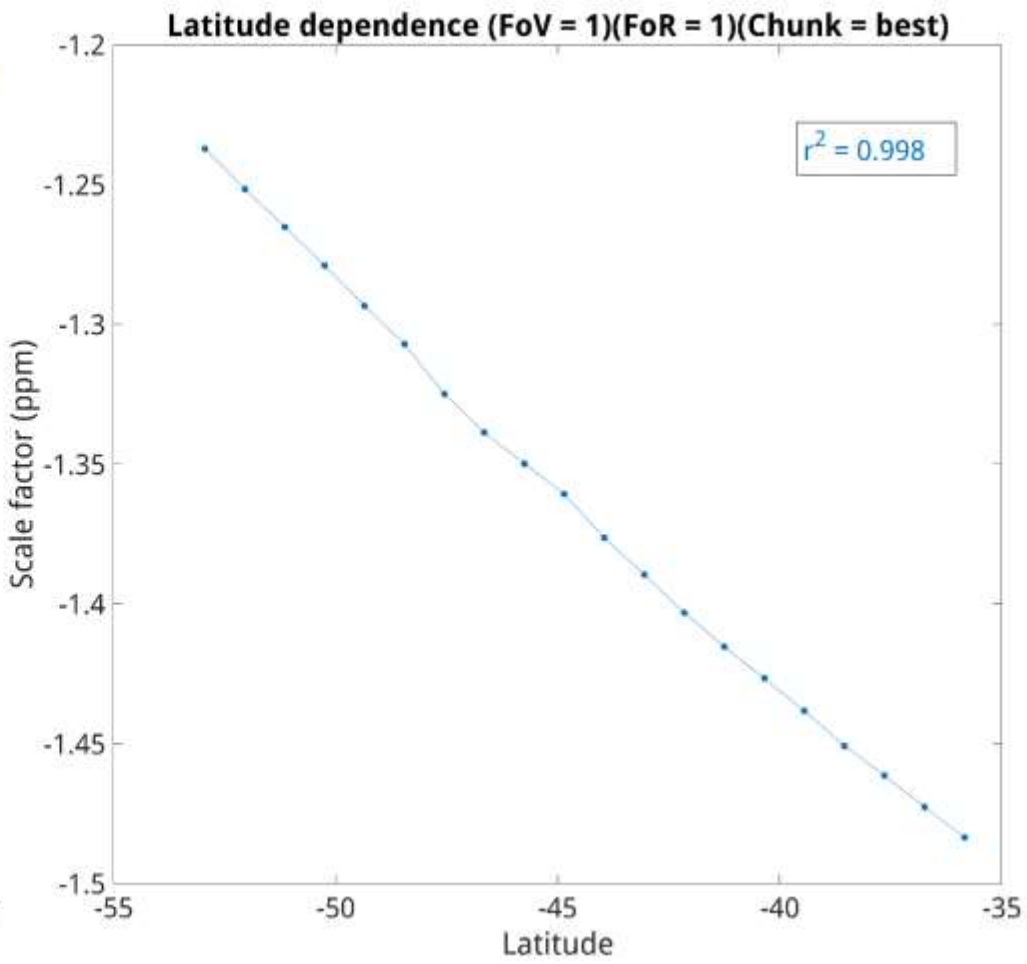
Spec. Cal histograms



Spectral Calibration

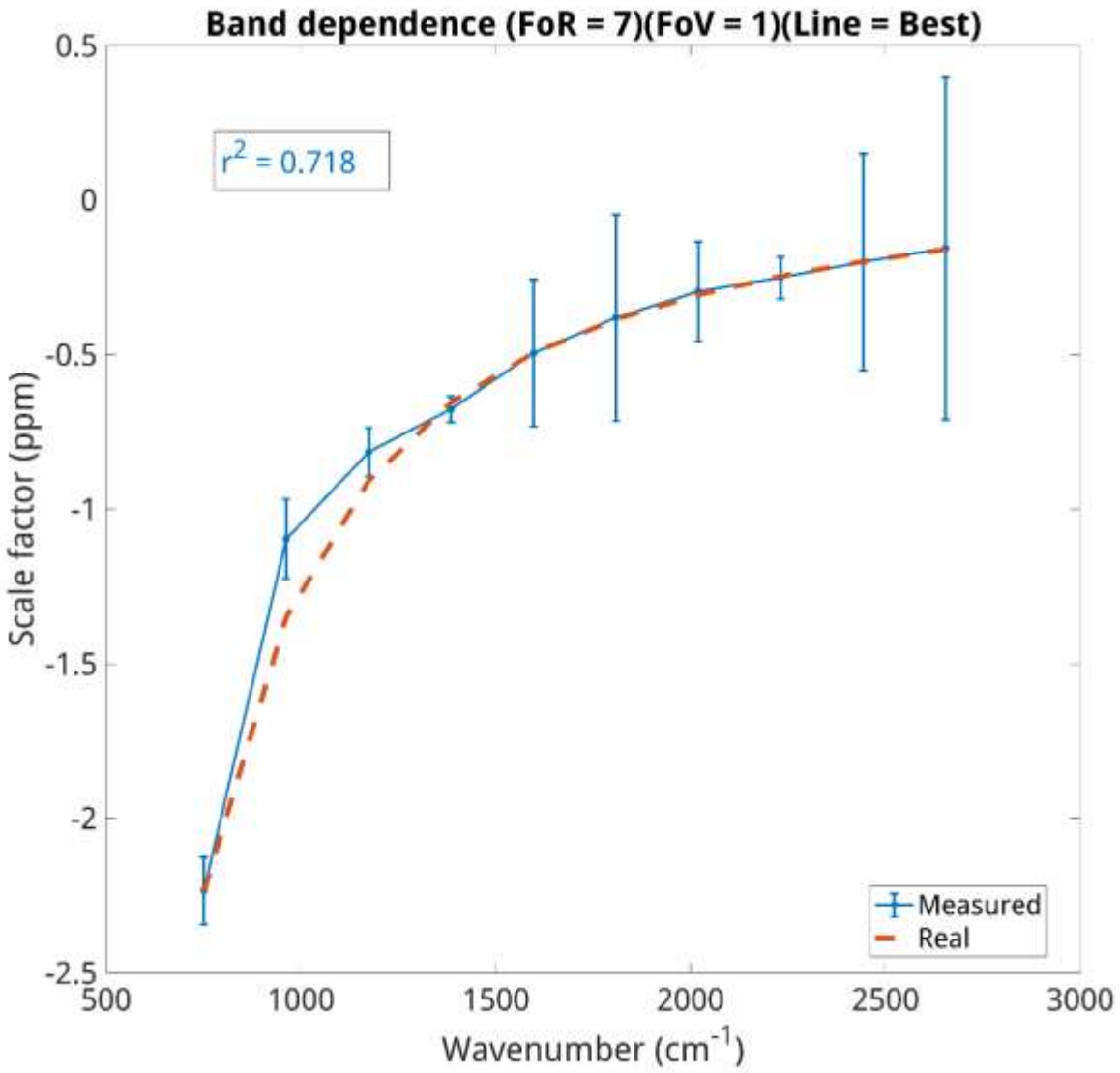
- Spec. Cal histograms
- Doppler shift test





Spectral Calibration

- Spec. Cal histograms
- Doppler shift test
- Chromatism test

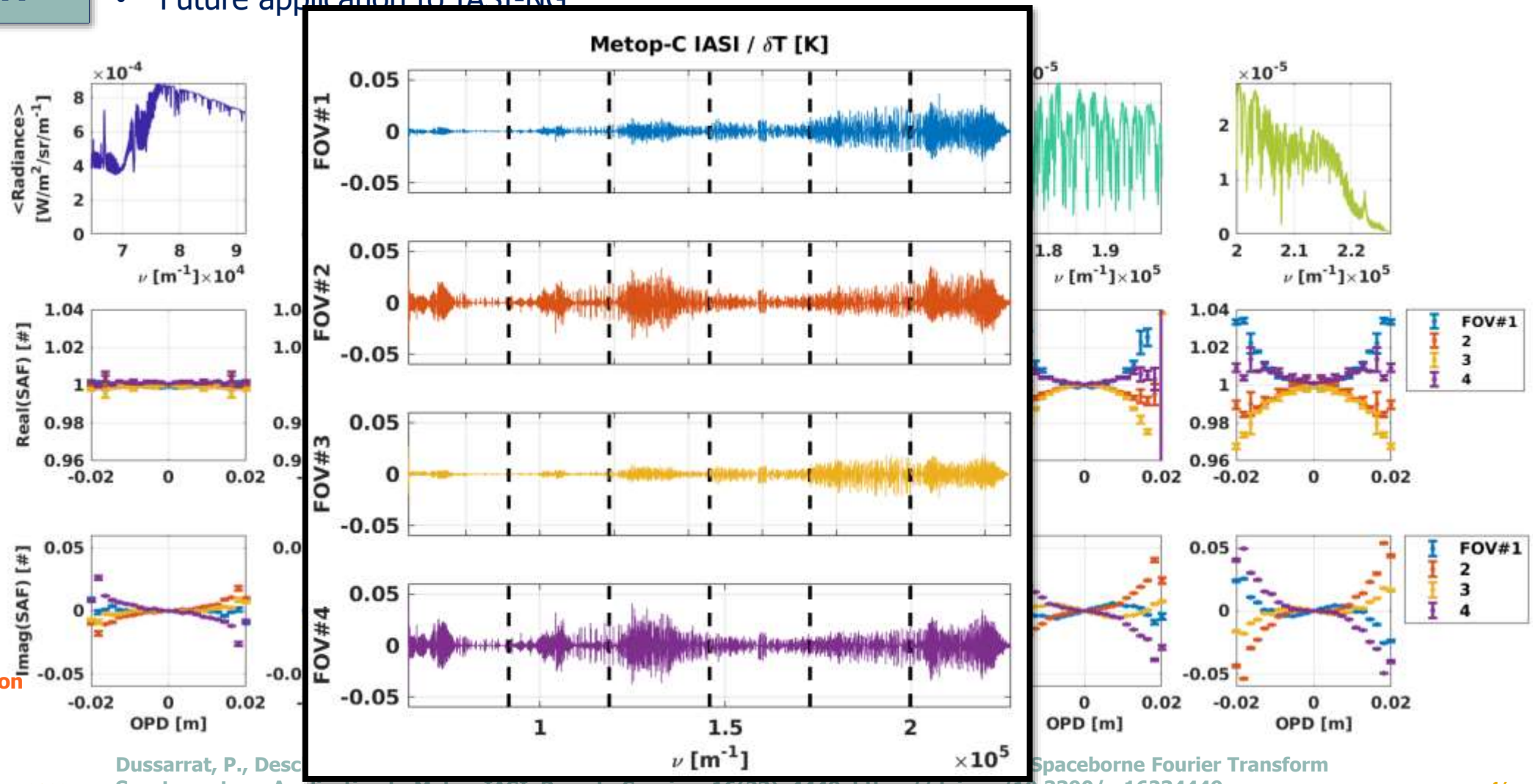


MAIAN: Monitoring and Analysis of IASI-NG L1C

Spectral Calibration

- Spec. Cal histograms
- Doppler shift test
- Chromatism test
- SAF/SRF monitoring

- New methodology to estimate SRF differences between FoVs from the ground
- Application to Metop-C IASI ↓
- Capable of detecting very fine instrumental defects between IASI FoVs
- Future application to IASI-NG



SAF = Self Apodisation Function
SRF = Spectral Response Function

Dussarrat, P., Desc… Spaceborne Fourier Transform Spectrometers: Application to Metop-IASI. Remote Sensing, 16(23), 4449. https://doi.org/10.3390/rs16234449

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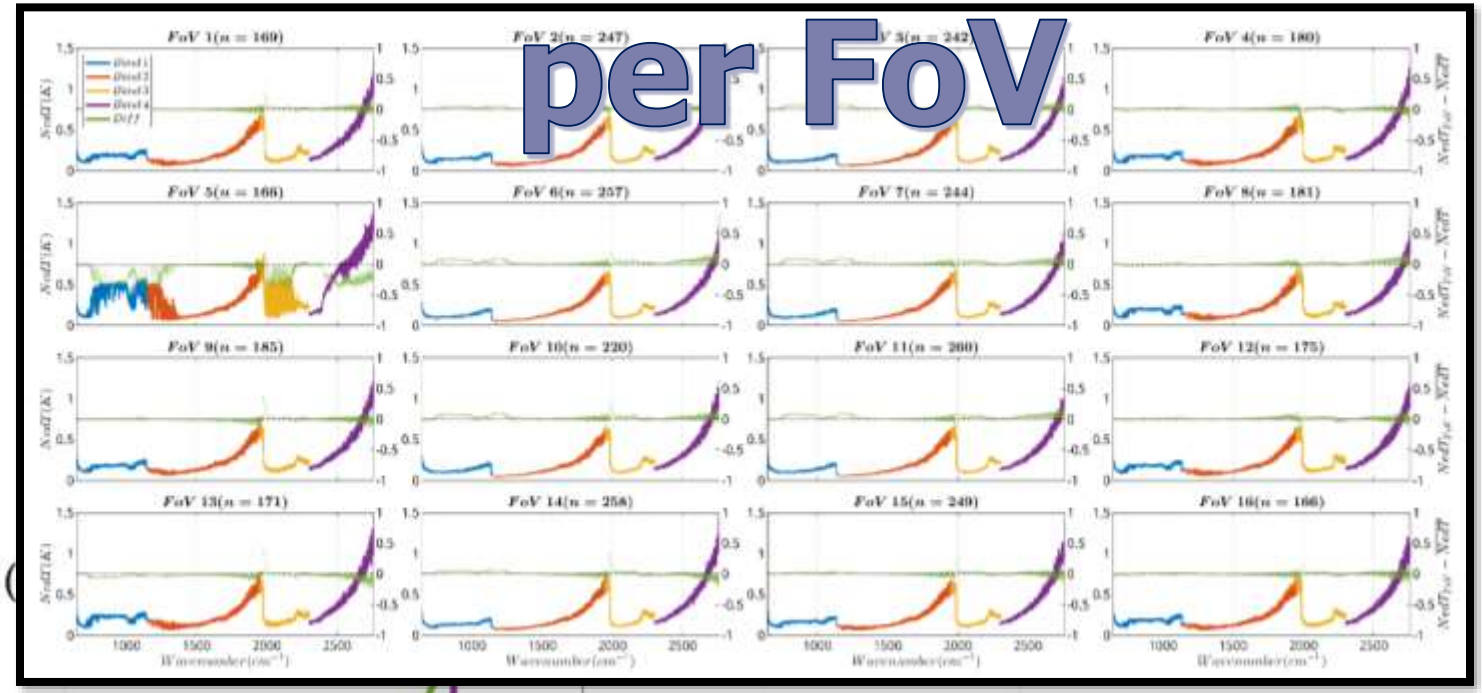
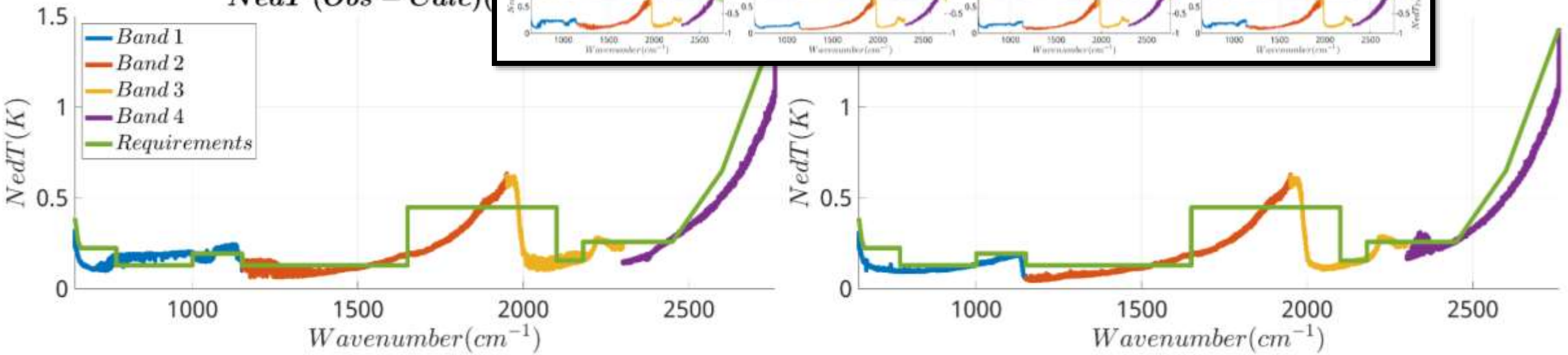
Noise monitoring

- Average

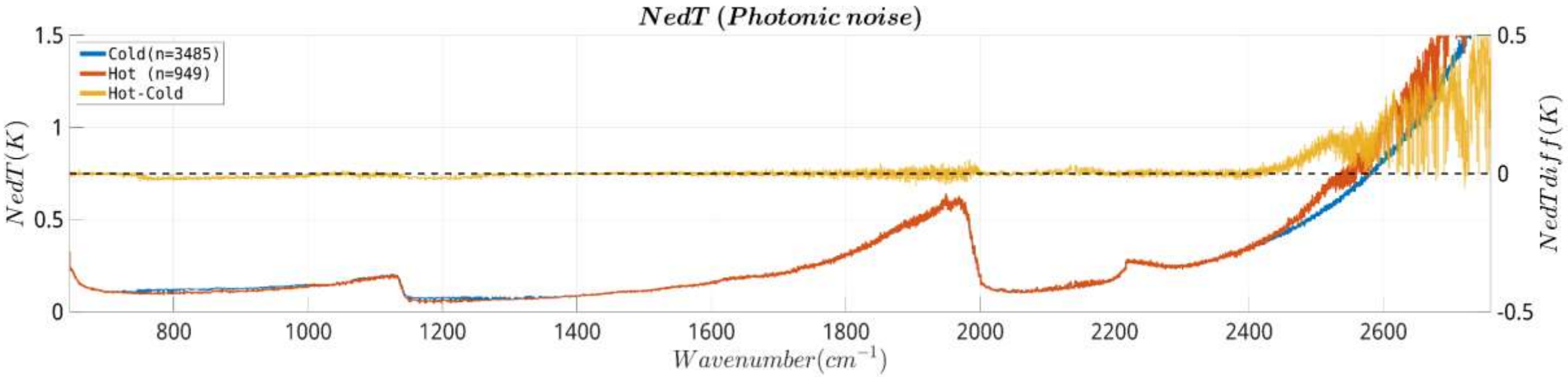




MAIAN: Monitoring and Analysis of IASI-NG L1C

Noise monitoring

- Average
- Photonic noise



Flags monitoring

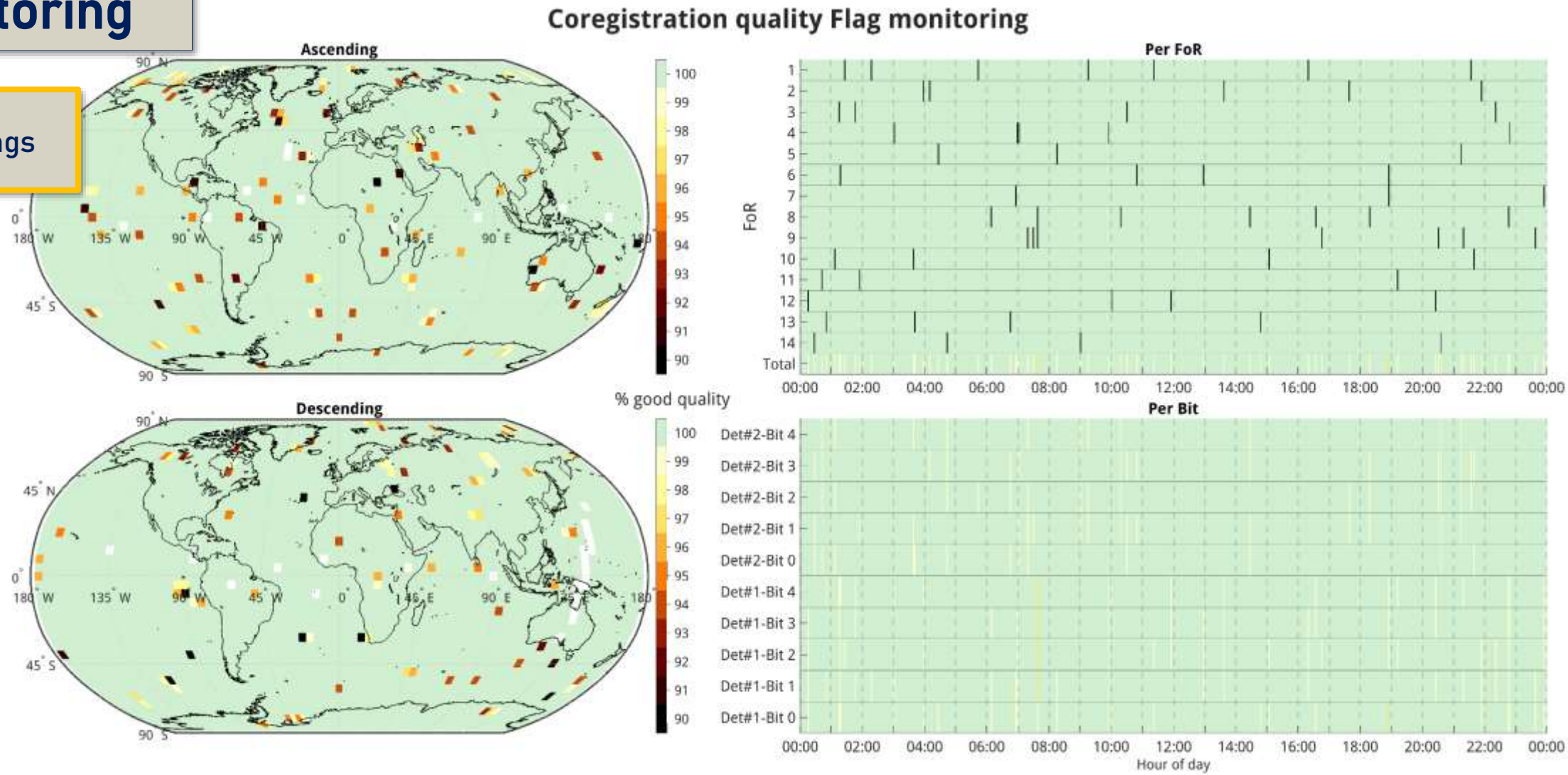
Quality Flags

- RAD + ENG files

Flag	Number of flags raised	Total obs.	% Good quality	
general_quality_flags	1234	1.24186e+06	99.9	Geolocation
sb_missing_flag	1263	1.24186e+06	99.9	
rdcoe_quality_flag	4373	1.24186e+06	99.65	Calibration
spkco_quality_flag	3651	1.24186e+06	99.71	Interferogram
zpd_f_quality_flag	2533	1.24186e+06	99.8	Interferogram
resmp_quality_flag	2537	1.24186e+06	99.8	Interferogram
spcal_quality_flag	2443	1.24186e+06	99.8	Calibration
metfm_quality_flag	72	77616	99.91	Interferogram
zpdme_quality_flag	77	77616	99.9	Interferogram
metin_quality_flag	2515	1.24186e+06	99.8	Interferogram
coeff_quality_flag	15	5544	99.73	
rdcal_quality_flag	129	77616	99.83	Calibration
viirad_quality_flag	170	77616	99.78	Geolocation
geolc_quality_flag	47	77616	99.94	Geolocation
sasfe_quality_flag	4782	1.24186e+06	99.61	Interferogram
sasfe_spectral_shift_quality_flag	648	1.24186e+06	99.95	Calibration
offst_quality_flag	139	77616	99.82	Geolocation

Flags monitoring

Quality Flags



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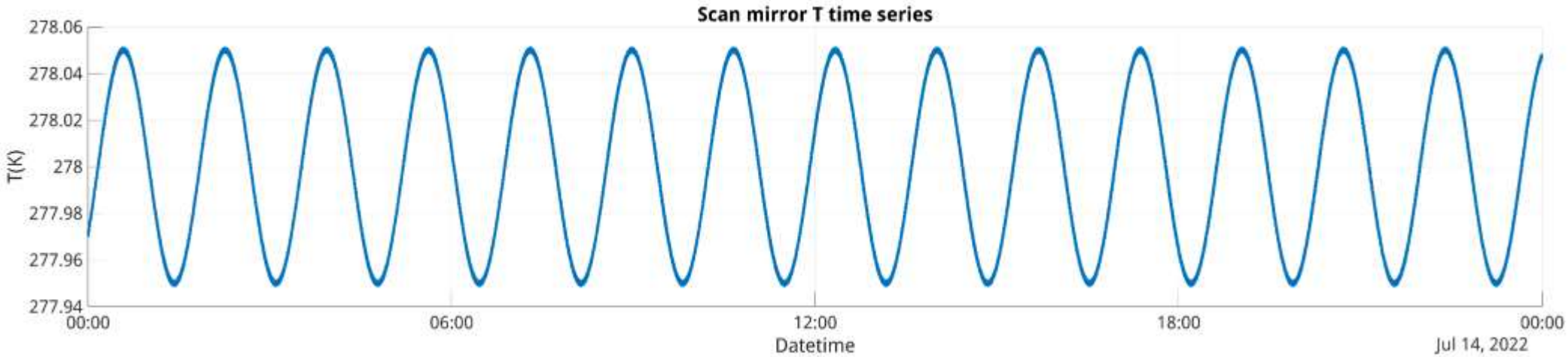
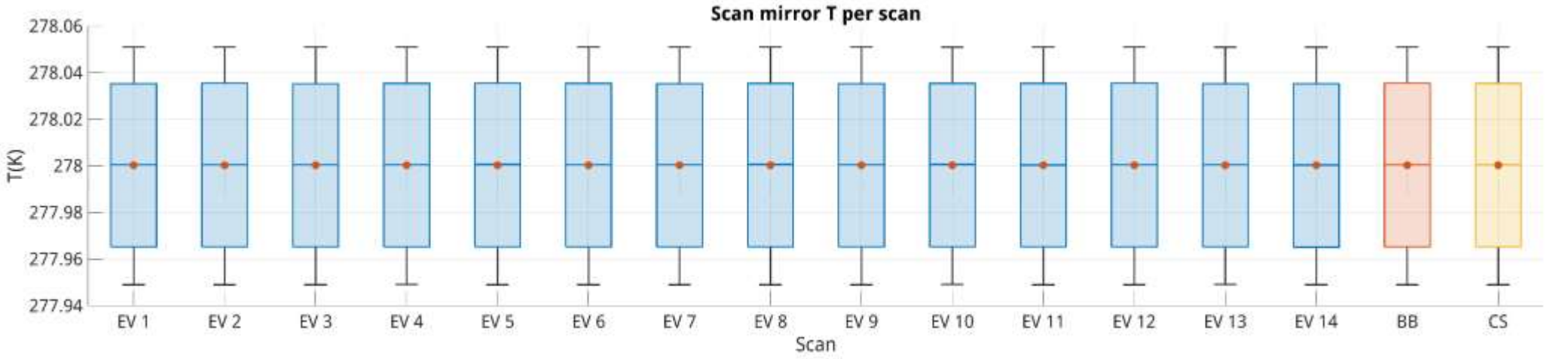
Flags monitoring

- Quality Flags
- Temperatures





Daily report

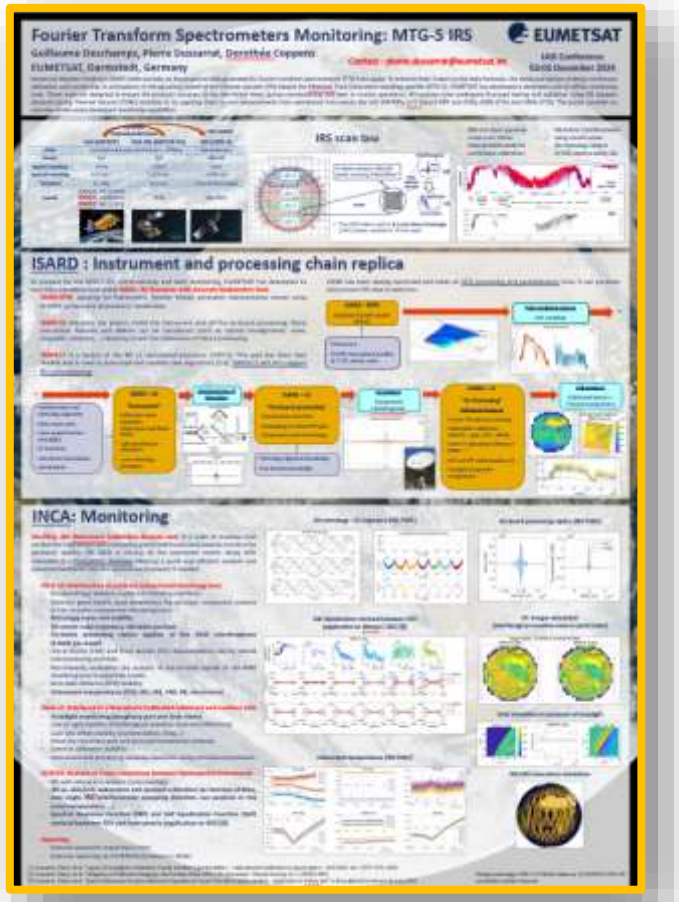
What else would you like to see in the report?

Give us your feedback!

EUMETSAT

HSIR L1 team

Don't miss our IRS-INCA poster!



MAIAN

Monitoring and Analysis of IASI-NG L1C

INCA

IRS-INstrument Calibration Analysis

PDF

MAIAN_daily_report.pdf

PDF

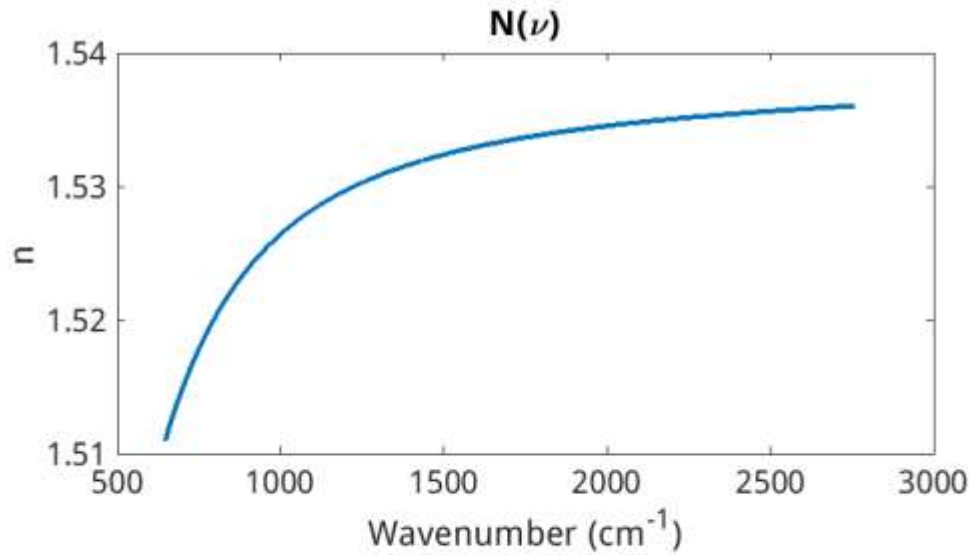
INCA_daily_report.pdf

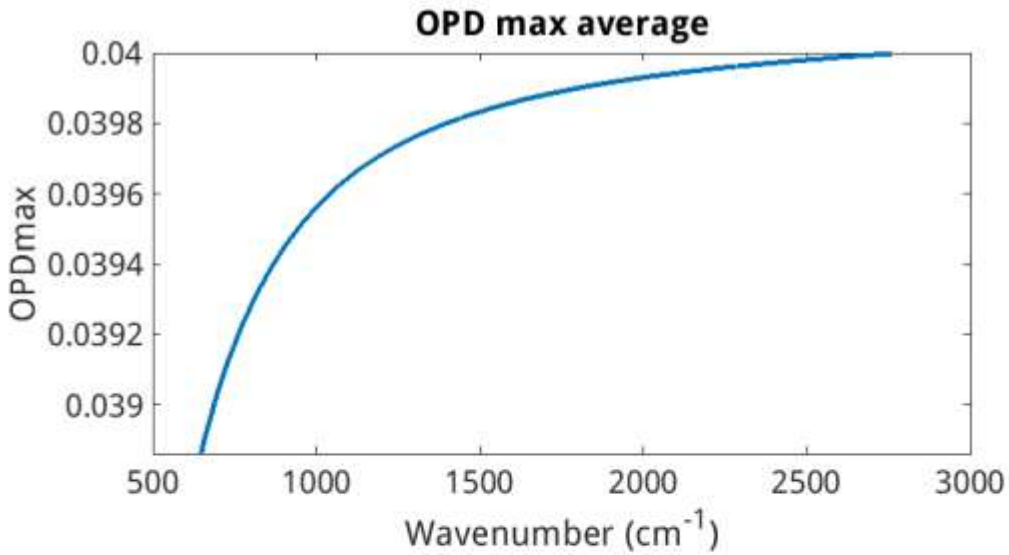
To users

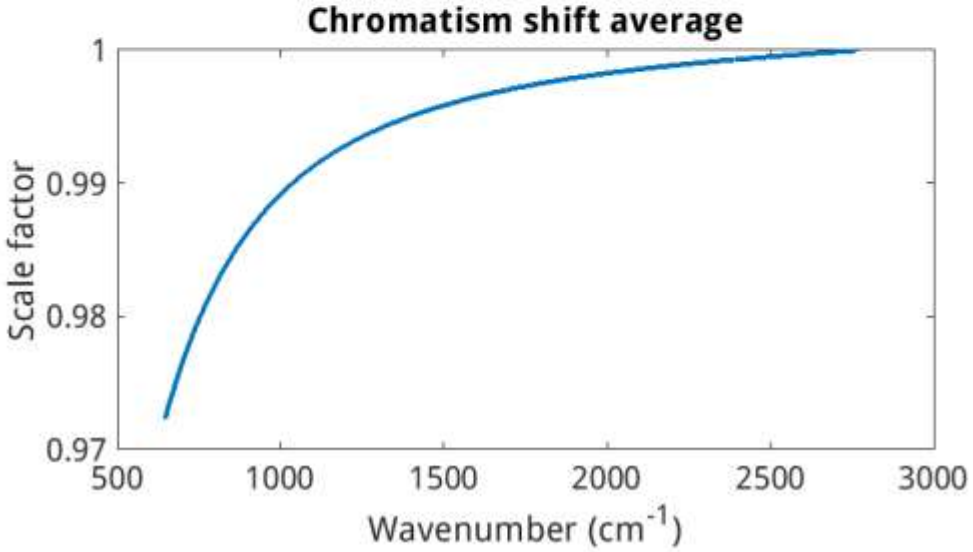
Thank you!

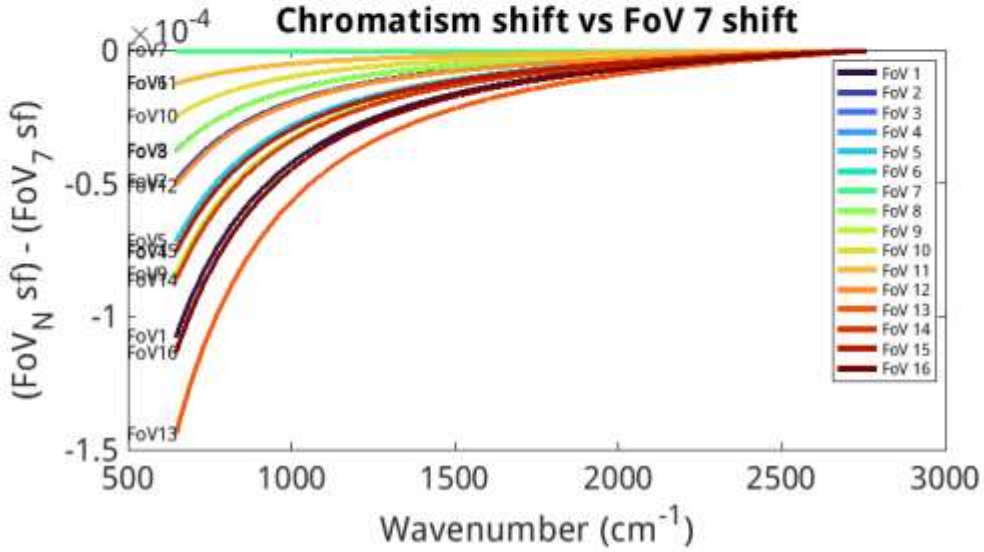
Questions are welcome.

Spectral calibration module









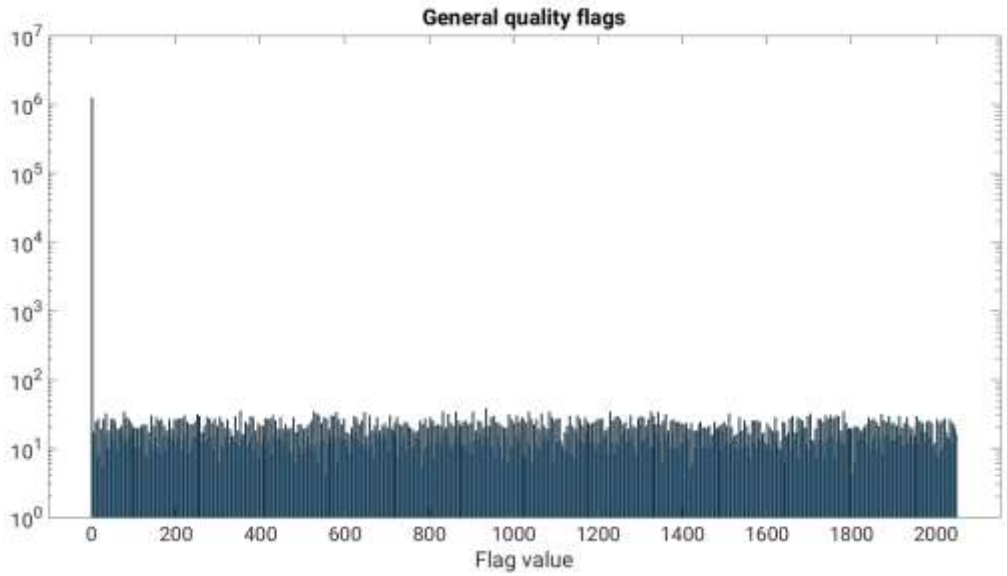
Remnant effect only

Flags monitoring

Flags simulation:

- **How to simulate flags with bits?**

0.1% probability of non zero value



- **How to store flags per band?**

rdcoe_quality_flag: 4x16x14x4

- **Bit 0:** to indicate that default values of coefficients have been used
- **Bit 1:** to indicate that the calibration is performed with old data and may be degraded
- **Bit 2:** to indicate that the calibration is performed with fewer data and may be degraded.

Band 1: 100 = 4
Band 2: 110 = 6
Band 3: 001 = 1
Band 4: 000 = 0

→ 000001110100 = 116

- **How to simulate temperatures?**

Periodic ascending/descending values
Hover over average
Random noise added