IASI mission implementation and status

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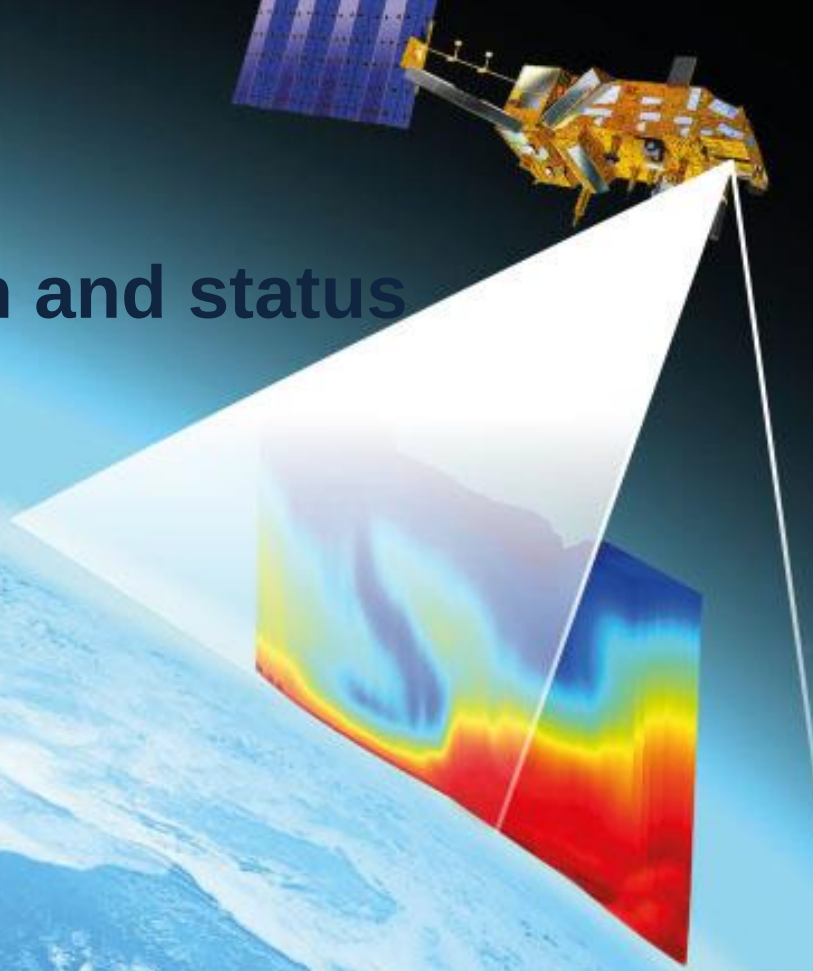
[(1)] CNES, [(2)] EUMETSAT

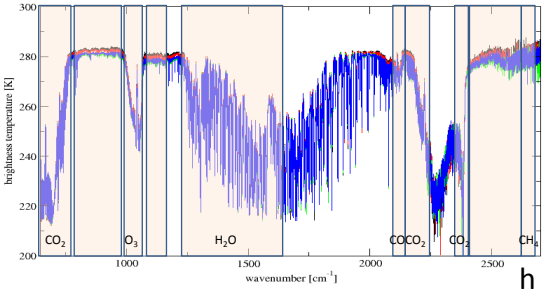
IASI 2016

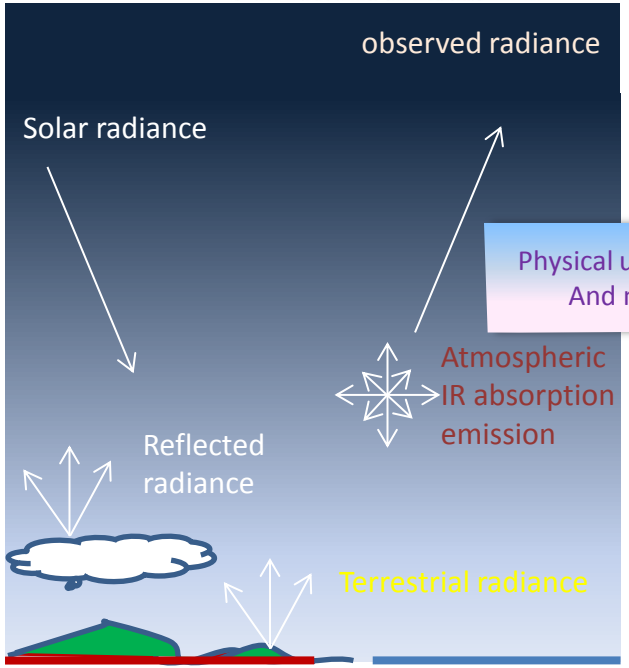
11-15 April 2016 Antibes Juan-les-Pins, France

WWW.IASI2016.COM



IASI Mission
TIR sounding of the Earth Atmosphere on board Metop





Physical understanding
And modelling

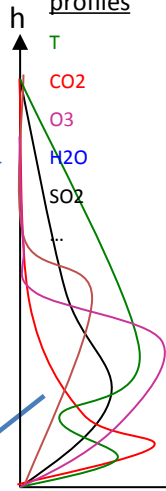
Assimilation / Retrieval processes

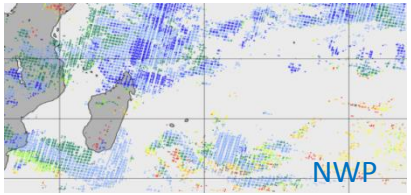
Radiative Transfer codes

Spectroscopic Data Base

Validation / Calibration !

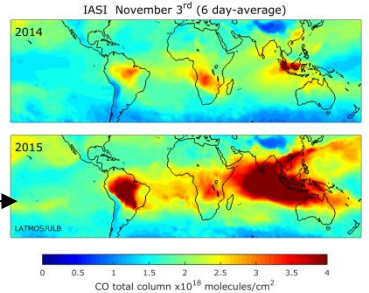
Vertical profiles



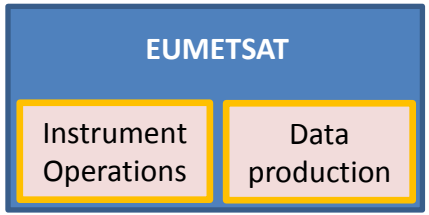


Operational applications

Chemistry, Physics, Properties Climate Studies & monitoring



IASI In flight system



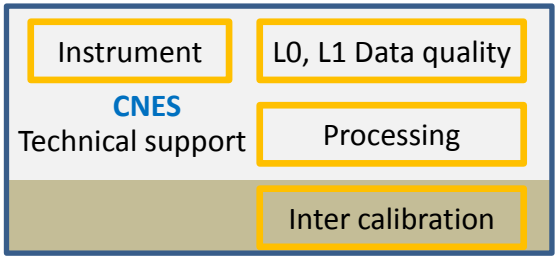
L1 (NRT Distribution through EUMETCAST)

Users

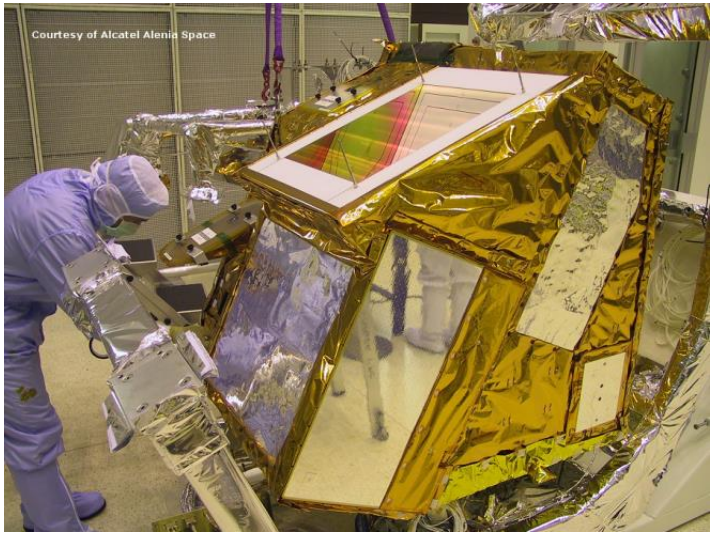
TM
L0, L1ver, L1ENG

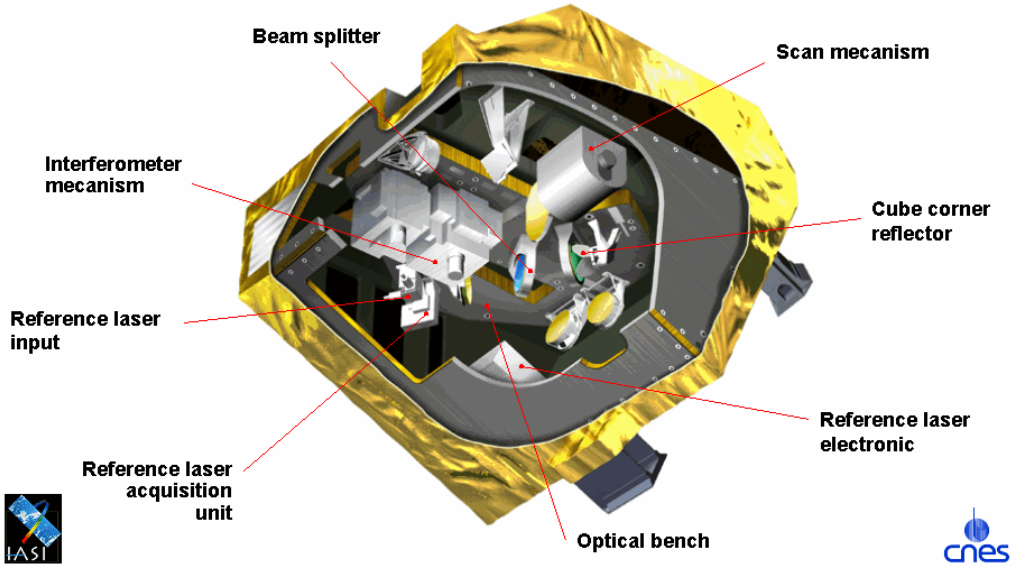
Maintenance of the Processing
Instrument operation requests

TAS

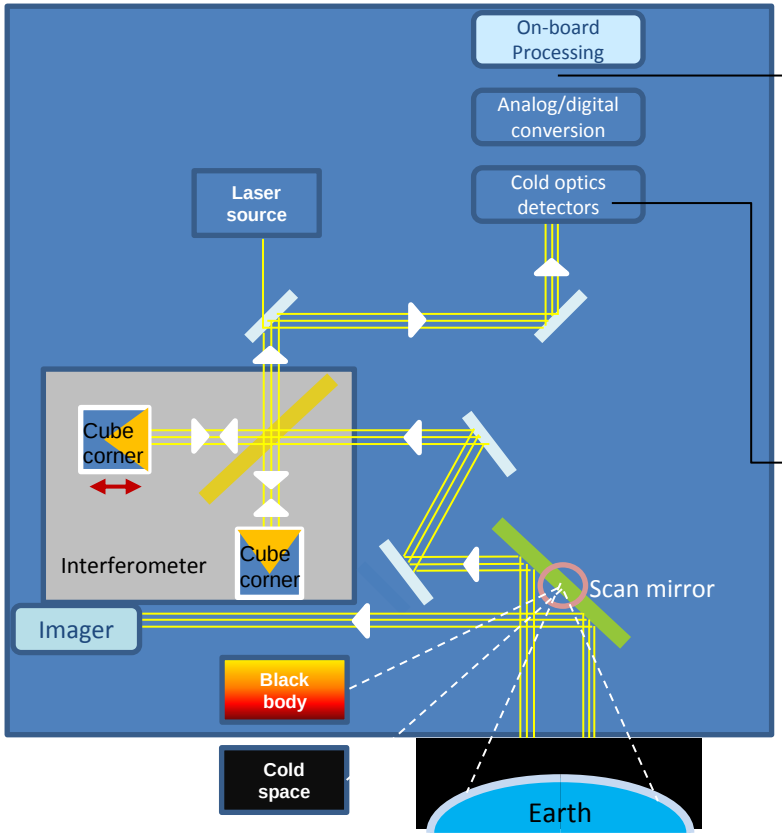


IASI Instrument

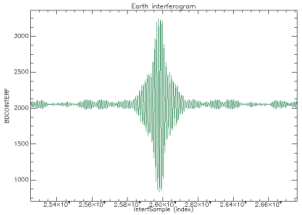




IASI Instrument : IR interferometry with processing

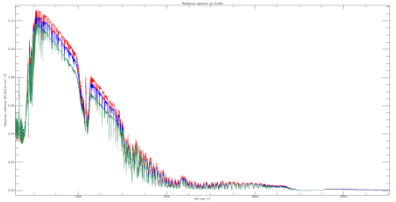


Scan Rate : 8 secs – 30 Earth Views
Swath : ± 48.98° ⇔ ± 1066 km



4 x Raw interferograms
x 3 spectral bands

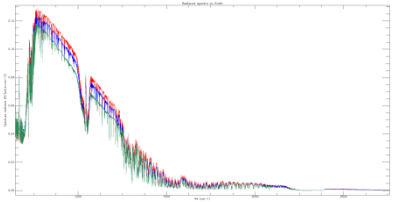
On-board Processing



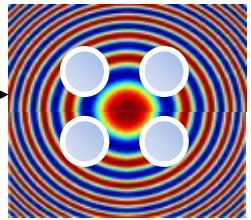
4 x Radiance Spectra

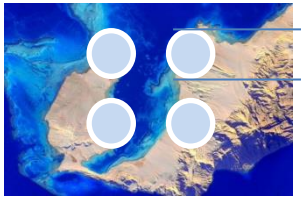
Spectral Range : 3.62 - 15.5 um
Spectral Sampling : 0.25 cm-1

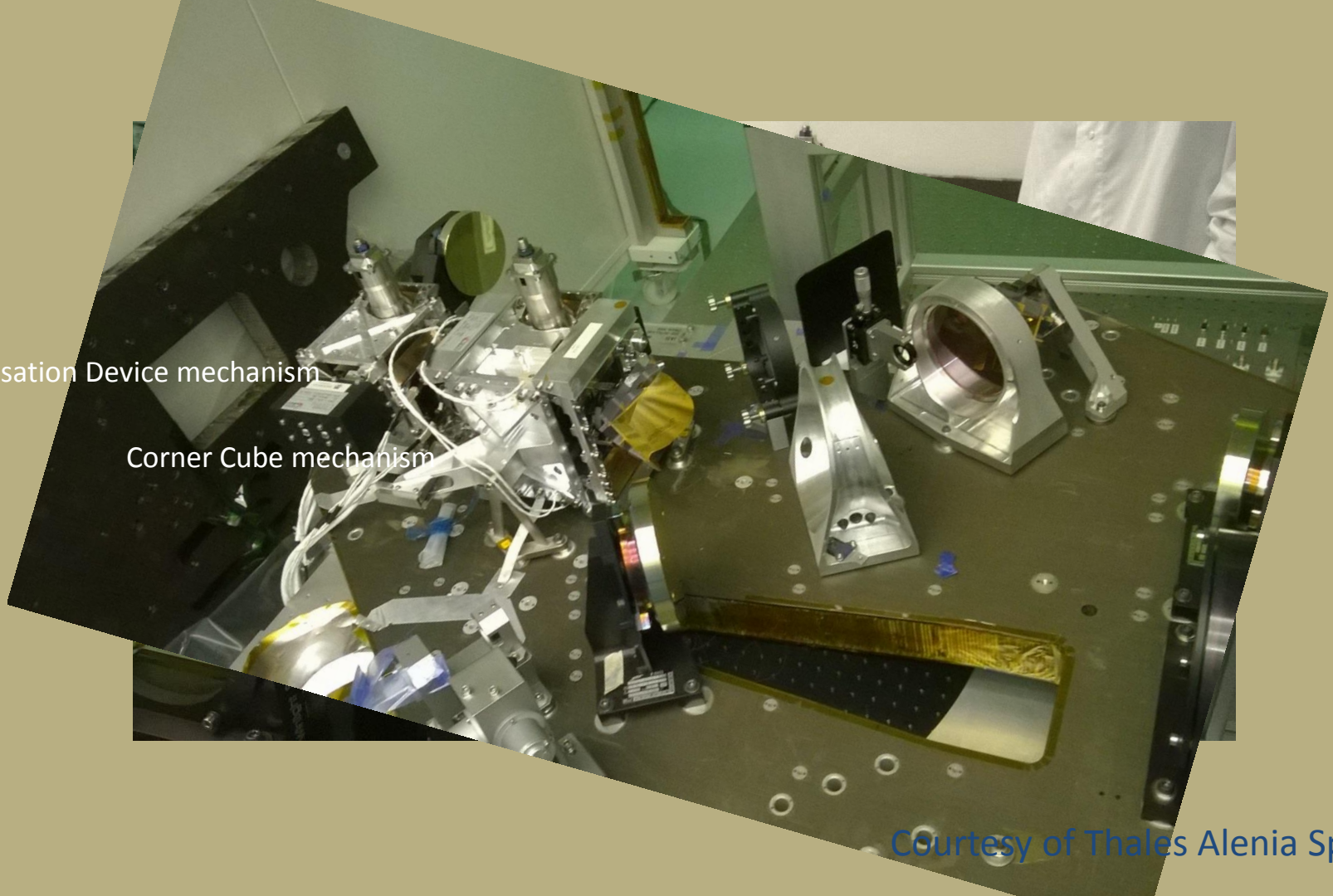
On-ground Processing



4 x Fully calibrated Spectra



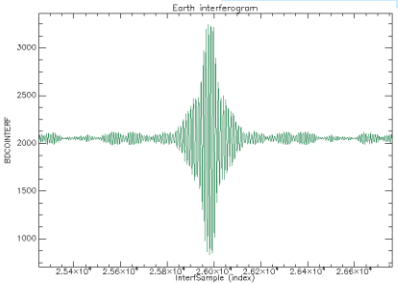


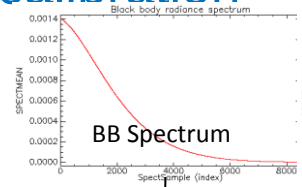


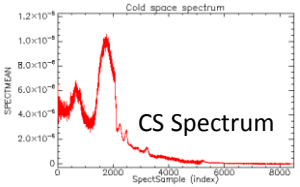
Courtesy of Thales Alenia Space

The processing and the self calibration

45 Mbits / sec → **ON-BOARD processing** → 1.5 Mbits / sec







Every 8 s

4 x Earth View Interferograms
Every 0.216 s

Pre-processing
Non linearity correction
Spike detection
NZPD determination

FFT-1

Radiometric calibration

Band Merging

Spectrum coding

4 x Coded & pre-calibrated Real EW Spectra

IIS Infrared Images
AVHRR Images

Images processing
- IIS radiometric calibration
- IIS/AVHRR registration
- AVHRR radiances analysis

ON-GROUND processing

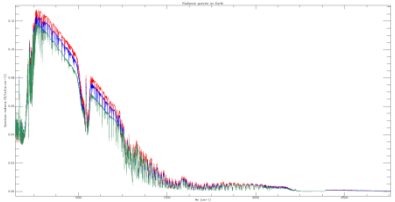
ISRF model

Spectral database

Spectral Calibration
- Resampling (0.25cm^{-1}) , Shift removal,
- Apodisation, Shape removal (0.5cm^{-1})

Radiometric post-calibration
including Black Body emissivity & scan mirror reflectivity correction

Spectrum decoding



L1C products

4 Fully calibrated spectra, cleaned from instrumental effects

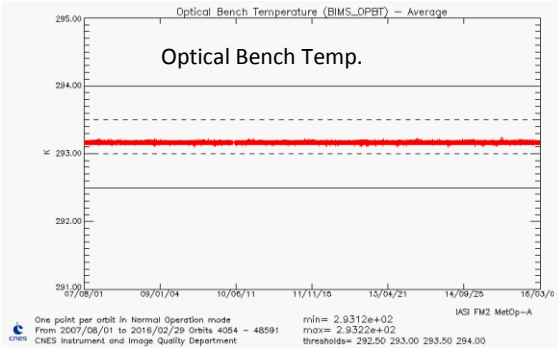
+ Geolocation & classification data

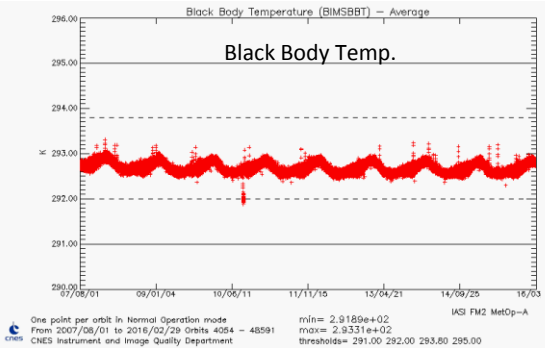
Processing parameter monitoring & update
- Reduced spectra, coding table
- Request for decontamination
- Scan miror reflectivity
- user's databases (Noise cov., spectral DB)

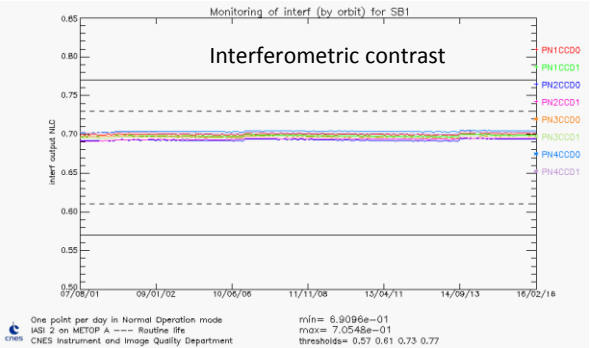
Instrument design + on-ground monitoring

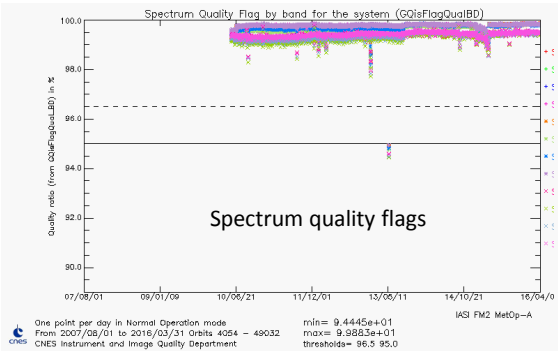
⬇

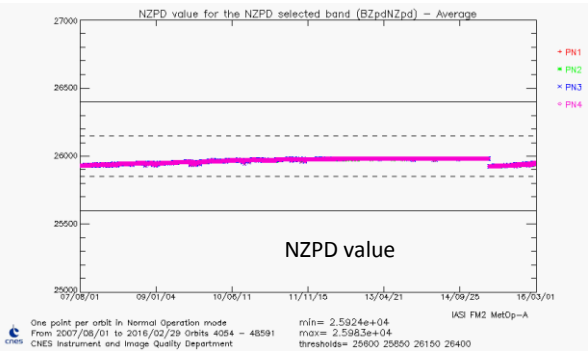
The stability of IASI performances over years

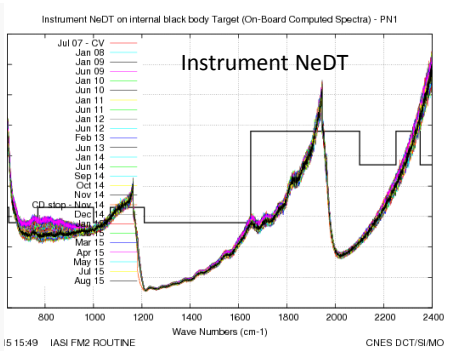




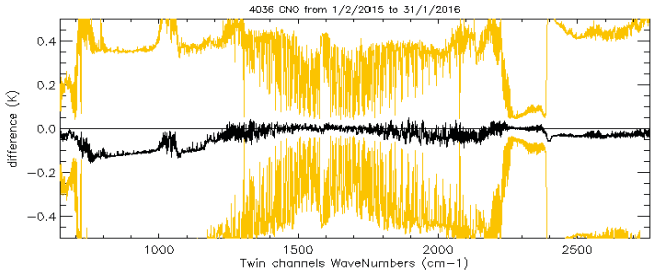


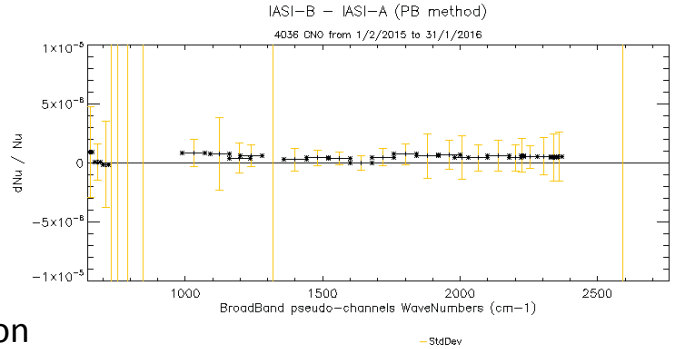




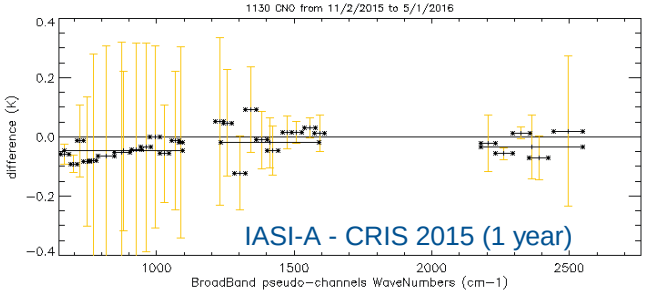


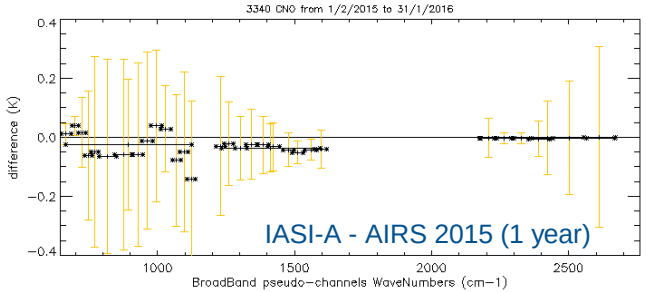
Inter comparisons of radiometric and spectral quality between IASI A, IASI B, CRIS and AIRS





Direct IASI-A / IASI-B inter-comparison





IASI / CRIS & AIRS intercomparison

IASI-A and IASI-B are very consistent:

- Biases between 0 and ~0.1K
- Shape in B1 under investigation
- Spectral performances compliant with rqrt $\Delta v/v < 2$ ppm

The comparison with CRIS and AIRS instruments shows also a very good agreement :

- Biases between 0 and 0.15K

Very accurate cross-calibration.

Same behavior as the previous years, no degradation. The performances are very stable with time.

Conclusion

- **2 instruments currently in operation (>12 years of cumulated operation),**
- **the confidence in IASI data is very high,**
- **IASI has become a key element in the 3 domains NWT, the study of the atmosphere chemistry, the monitoring of ECVs,**

thanks to the joint and coordinated efforts from engineers and scientists …

IASI is a big success !