IASI-NG : a cooperation for a New Generation of Infrared Atmospheric Sounding Interferometer

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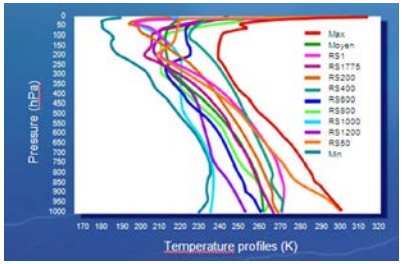
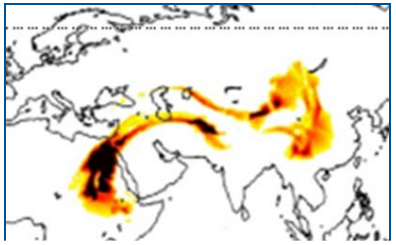
[1] CNES (Centre National d'Etudes Spatiales).

IASI New Generation Mission

- In the frame of the Second Generation of the Eumetsat Polar System (EPS-SG), a **New Generation of Infrared Atmospheric Sounding Interferometer** (IASI-NG) **will be developed by CNES** in cooperation with Eumetsat.



- IASI-New Generation will ensure the **continuity of the IASI programme** for :
  - operational meteorology
  - characterization of atmospheric composition related to atmospheric chemistry and environment
  - climate monitoring
- **IASI-New Generation will improve** :
  - the precision of the retrievals for Numerica… Prediction
  - the detection of new species
  - the characterization the full atmospheric c… lower part of the Atmosphere…



Cf. Javier Andrey-Andres Poster . A step towards IASI-NG: Simulation of orbits and first impact assessment compared to IASI

IASI New Generation Performances

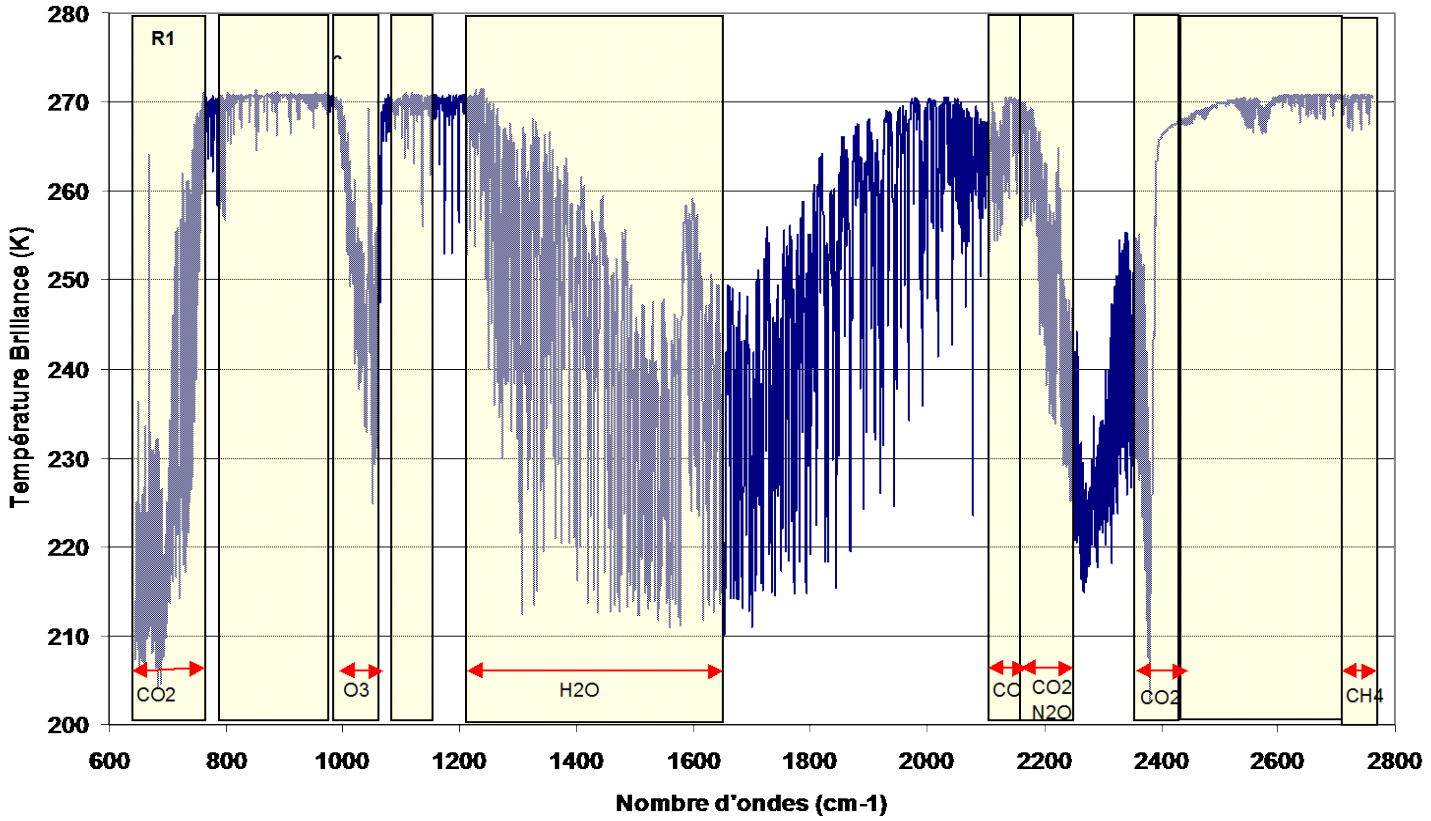
- IASI NG will improve the IASI demonstrated performances by a factor of 2

Main figures	IASI	IASI-NG
Radiometric Resolution (NeDT)		IASI/2
Spectral resolution		IASI/2 (0.25 cm^{-1}@L1C)
Absolute Radiometric Calibration		IASI/2 (<0,25K@280K)
Spectral bands	3 bands	4 bands
Mass	235 kg	350 kg
Power	240 W	500 W

100 km

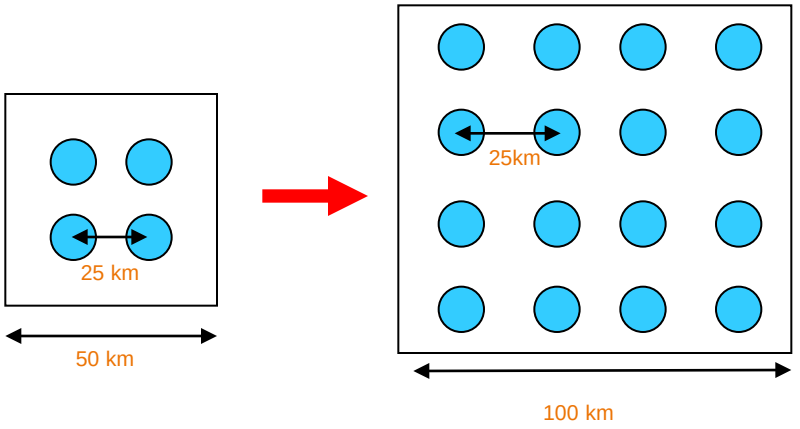
IASI NG Level 1 data

- IASI-NG will provide infrared radiance spectra measurements continuously from 645 to 2760 cm-1 (15,5 µm to 3,6 µm)



IASI New Generation Performances

Main figures	IASI	IASI-NG
Ground Pixel diameter	12 km	12 km
Ground sampling	25 km	25 km
Number of sounder pixels per acquisition	4 pixels	16 pixels



Line # Earth view pattern X 14

IASI New Generation Program

- CNES will manage the development of the **IASI-NG System** comprising:
  - the development and delivery of **IASI-NG** Metop-SG A Satellites
  - the development of the **Level 1 Process** segment for processing of the instrument
  - the development of a **Technical Expertis** Toulouse Center premise in charge of t and long term instrument performance monitoring.

Cf. Stephane Rousseau Poster: IASI NG System Overview

- **IASI NG Program status**
  - Phase A study started early 2010 : different instrument concepts trade-off performed
  - Instrument concept selection Mid 2013 : CNES selected AIRBUS DEFENCE & SPACE France for the conception and the realization of the IASI-NG instrument flight models
  - System Phase B will be concluded by System PDR mid 2015

Performances Improvement Technical Rationale

IASI performances Improvement :
- **Radiometry by factor 2**
- **Spectral Resolution by factor 2**

An increase of collected signal of a factor ≈4

- ❑ **Instrument field of view Increase (integration time)**

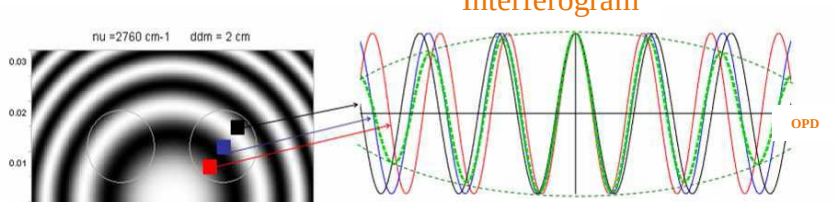
A larger interferometer optical path difference of a factor 2

- ❑ **Optical Path difference Increase**

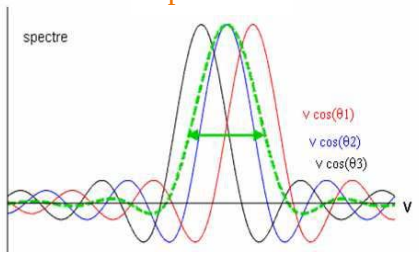
Main challenge : to compensate interferometer Self-Apodisation

IASI-NG Performances
the self-apodisation issue

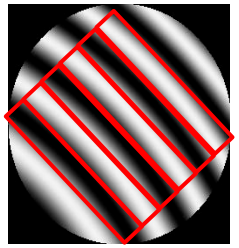
Interferogram

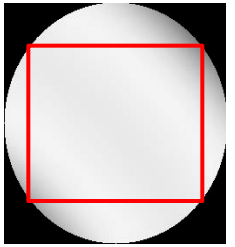


Spectrum



For the highest Optical path differences, the highest wave numbers, and the off-axis pixels:
The interference fringes are merged inside a sounder pixel





possible approaches

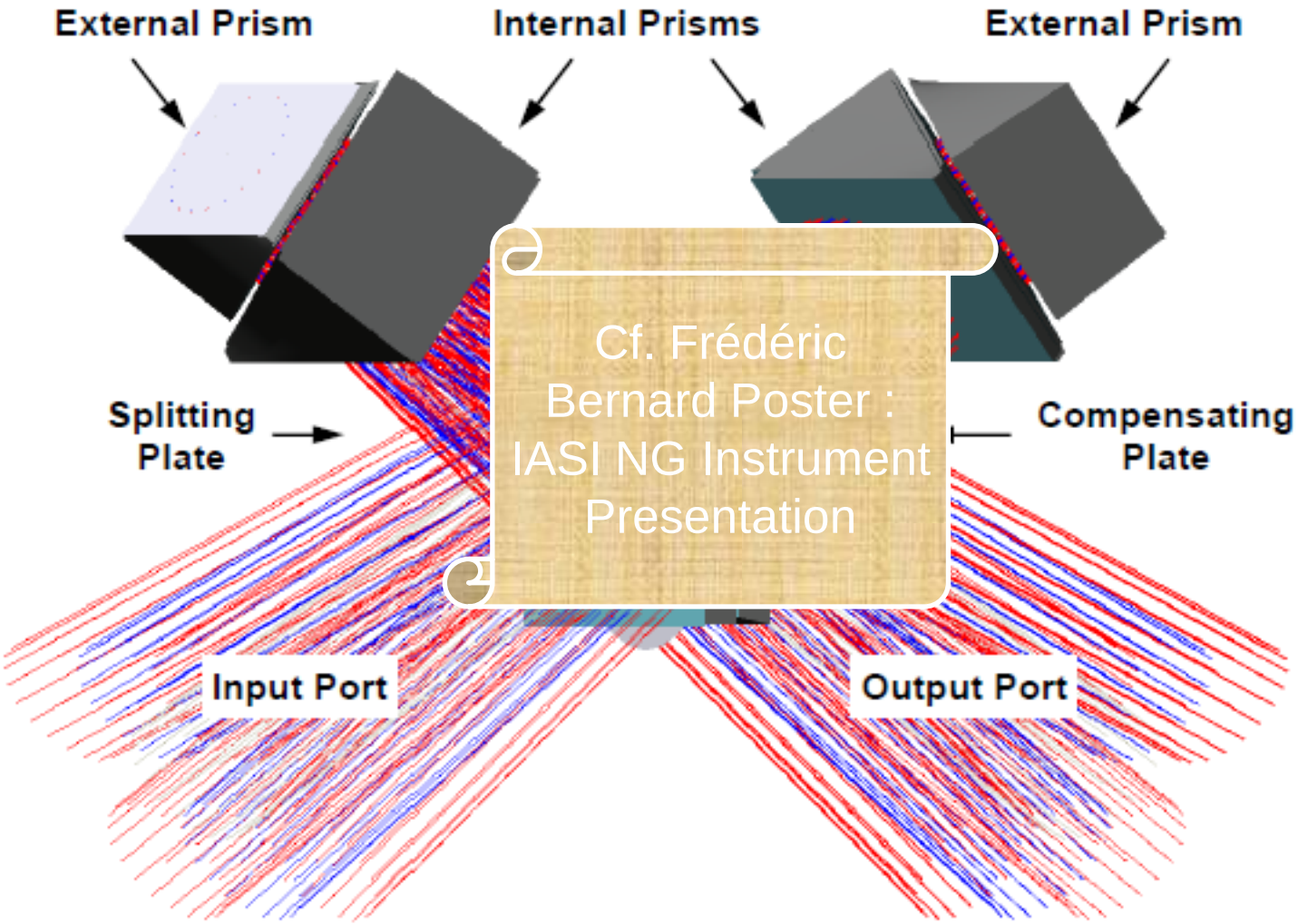
"Numerical" Solutions

"Optical" Solutions

Split the sounder pixel into many smaller pixels
→ Matrix detectors

Suppress/mitigate the self-apodisation effect
→ self-apodisation compensation

IASI-NG Instrument Concept



Cf. Frédéric Bernard Poster : IASI NG Instrument Presentation

Schedule Overview

2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022

Phase 0 | Phase A | Phase B | Phase C/D | Operations

EPS-SG System Development

2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2027 | 2035

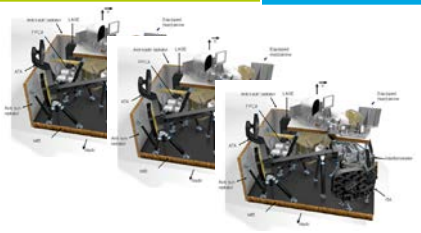
Pre-Phase A | Phase A/B1 | Phase B2/C/D | Phase E



MetOp-SG A Satellite Development

2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022

Phase 0 | Phase A | Phase B | Phase C/D | Phase E



IASI-NG System Development

Thank you

for your attention