IASI New Generation

Program status, System overview and scientific objectives

A. Deschamps, F. Bermudo, E. Jurado, F. Bernard

CNES

IASI - New Generation

- IASI-NG and the EPS-SG program
- From IASI to IASI-NG: scientific objectives
- Innovations and new challenges
- Status of the IASI-NG performances at Level 1C
- Planning and next steps

IASI-NG: continuation of the IASI program

- **IASI: part of EPS program** EUMETSAT
- **EPS ➡ EPS-SG, IASI ➡ IASI-NG**
- IASI-NG **: one of the main payloads of the future METOP-SG satellites**

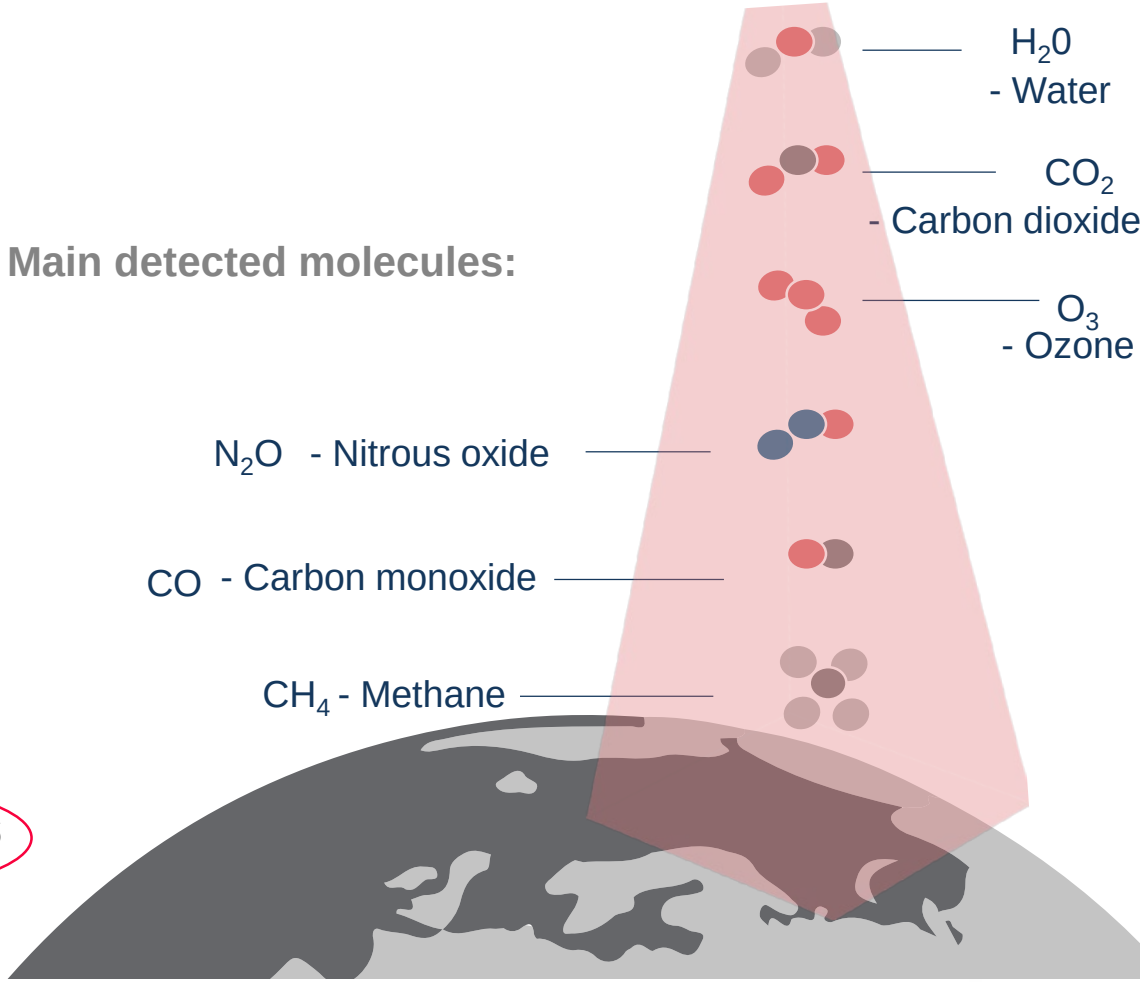
- **For both IASI and IASI-NG, CNES is in charge of:**
  - ✓ The development of the instrument
  - ✓ The definition of the Level1 processing algorithms
  - ✓ The development of the L1 operational chain (L1CPOP)
  - ✓ The commissioning phase and the monitoring of the performances during the mission

Level 2 products are under EUMETSAT responsibility
CNES supports the development of the retrievals algorithms in the laboratories

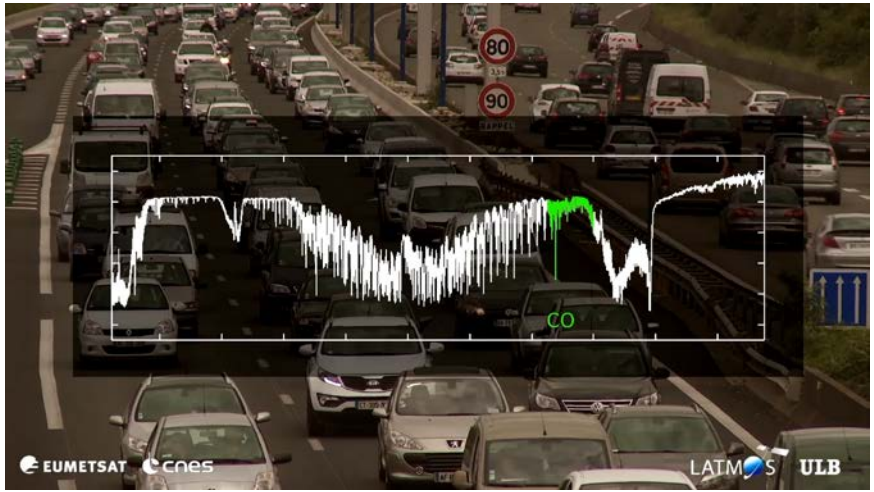
Applications are the same:

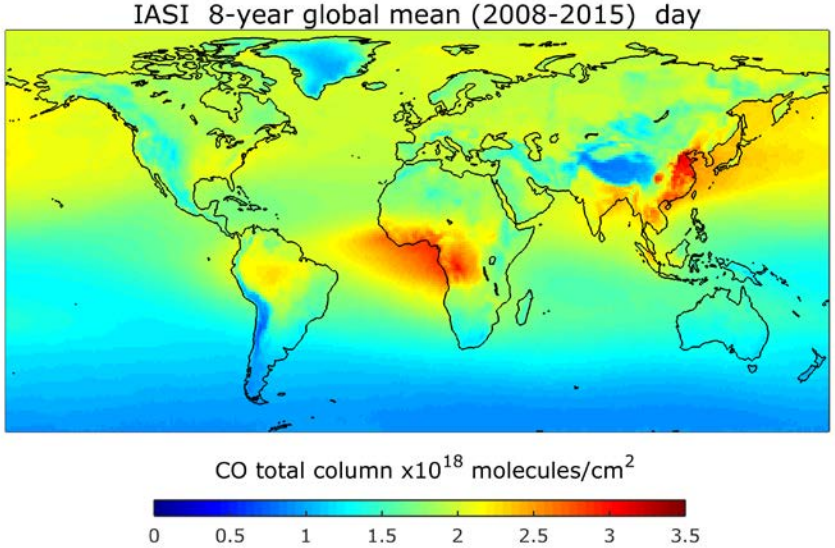
- Temperature
- Water Vapor
- Aerosol
- Pollutants
- Volcanic Plumes
- Greenhouse Gases

Main detected molecules:

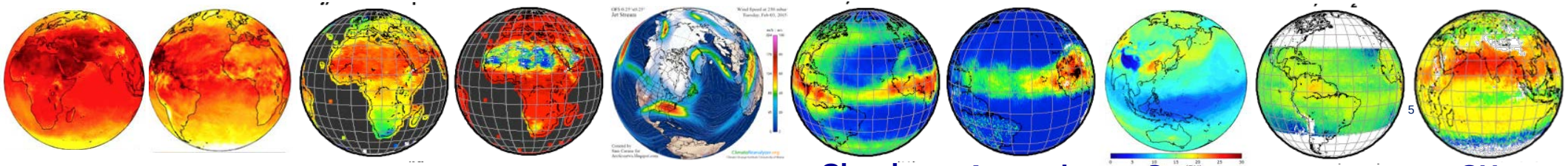


- **Estimation of CO total column using IASI data (from LATMOS/ULB)**





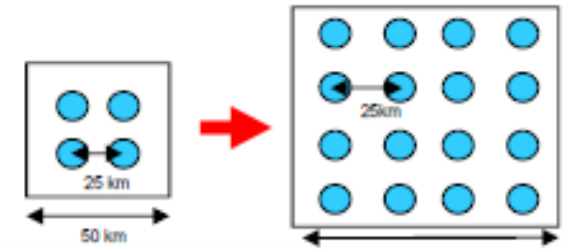
- **Other Essential Climate Variables retrievals (from LMD/LA/LOA/LATMOS)**



Temperature **H_2O** **T_{surf}** **Emissivity** **Wind** **Clouds** **Aerosols** **Ozone** **CO_2** **CH_4**

IASI-NG Level 1 main characteristics

Main figures	IASI	IASI-NG
Radiometric Resolution (NeDT)		IASI/2
Spectral resolution	0.5 cm^{-1}	IASI/2 (0.25 cm^{-1}@L1C)
Absolute Radiometric Calibration	< 0,5K	IASI/2 (<0,25K@280K)
Spectral bands	3 bands	4 bands
Number of sounder pixels per acquisition	4 pixels	16 pixels
Ground Pixel diameter	12 km	12 km
Ground sampling	25 km	25 km



IASI IASI-NG

The expected added-value of IASI-NG

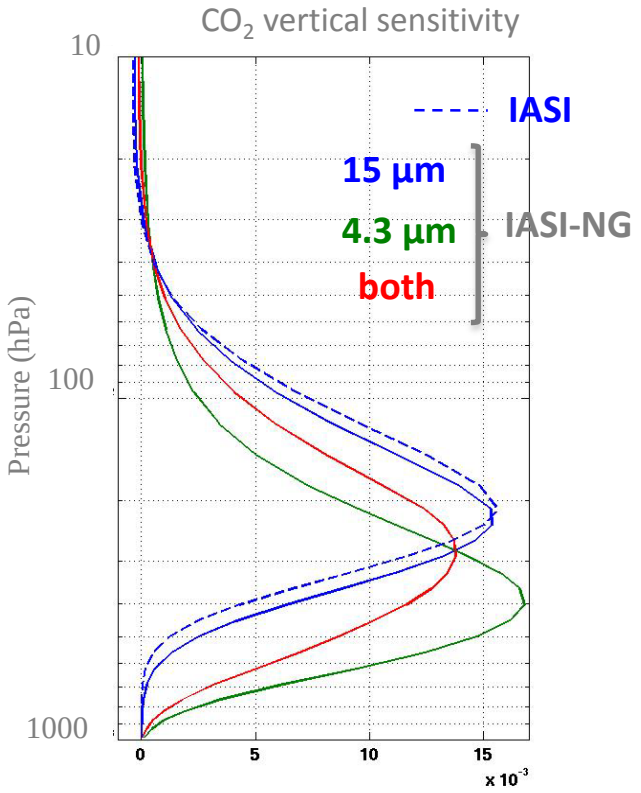
The better spectral resolution of IASI-NG (combined with a lower noise) aims at enabling better retrievals in the lower atmospheric layers

Example of the CO_2 retrieval:

Brightness temperature variation in the 15µm spectral region:

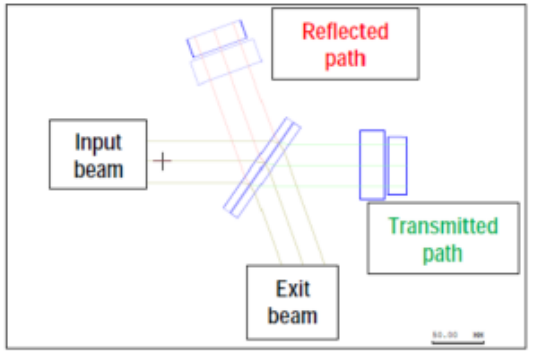
	1 % CO_2	1 K Temp.	Noise	Other species
IASI	0.1 K	1 K	0.2 K	O_3, H_2O
IASI-NG	0.15 K	1 K	0.1 K	Less interferences

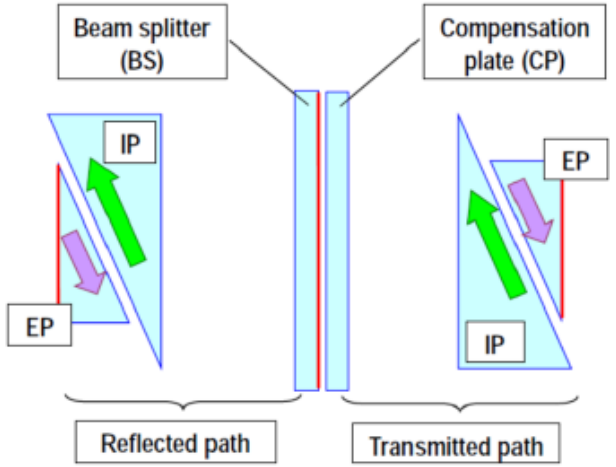
Courtesy: LMD



Hard challenges but encouraging performances budgets

- **To deal with the stronger requirements in terms of performances, a new instrumental concept has been proposed:**
  - ✓ The Mertz interferometer allows a field compensation (self-apodisation correction)
  - ✓ Field compensation is achieved by introducing optics with correct optical index
  - ✓ A single ‘dual swing” mechanism translates two pairs of prisms proportionally and creates simultaneously the OPD change and the self-apodisation compensation

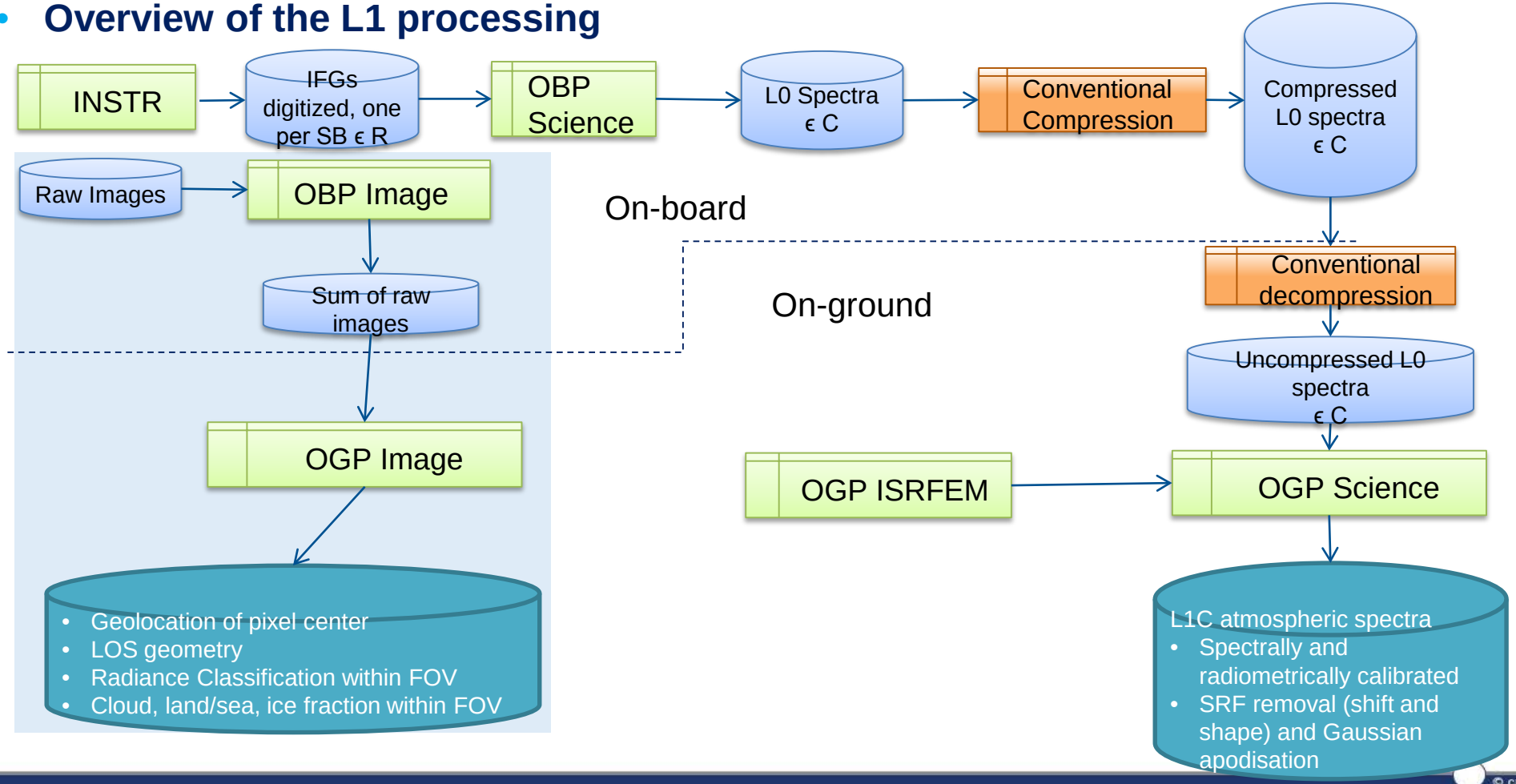




- ✓ **The level 1 processing has been modified consequently, especially to estimate the Instrument Spectral Response Function (ISRF)**

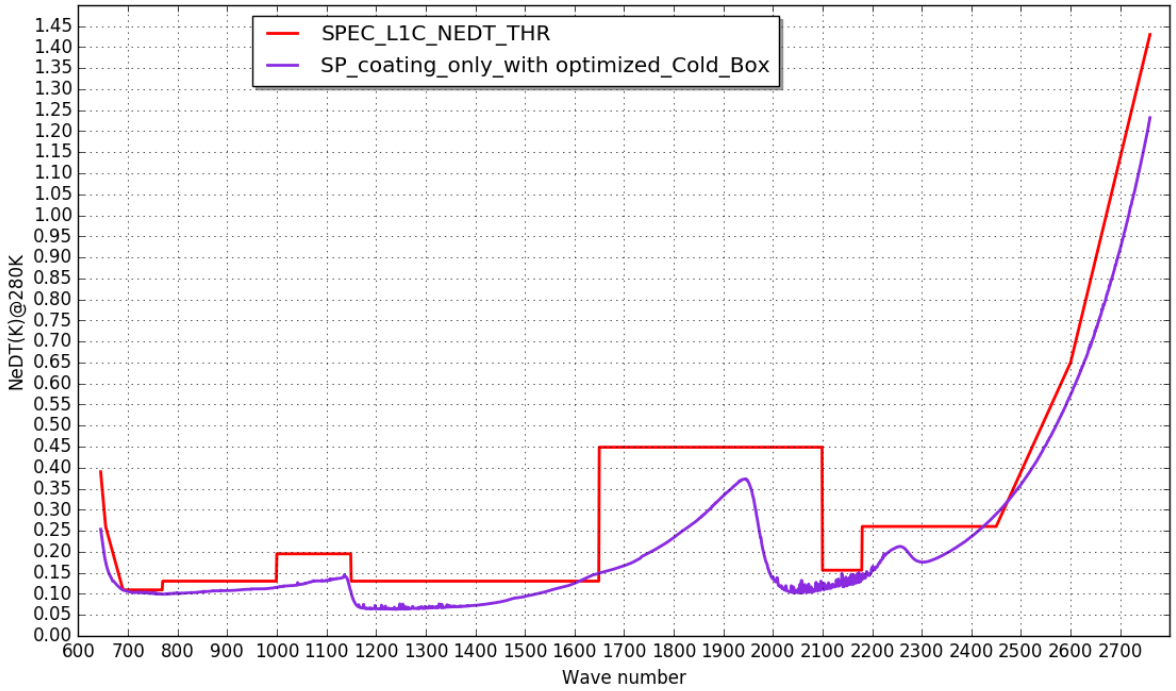
Hard challenges but encouraging performances budgets

- **Overview of the L1 processing**

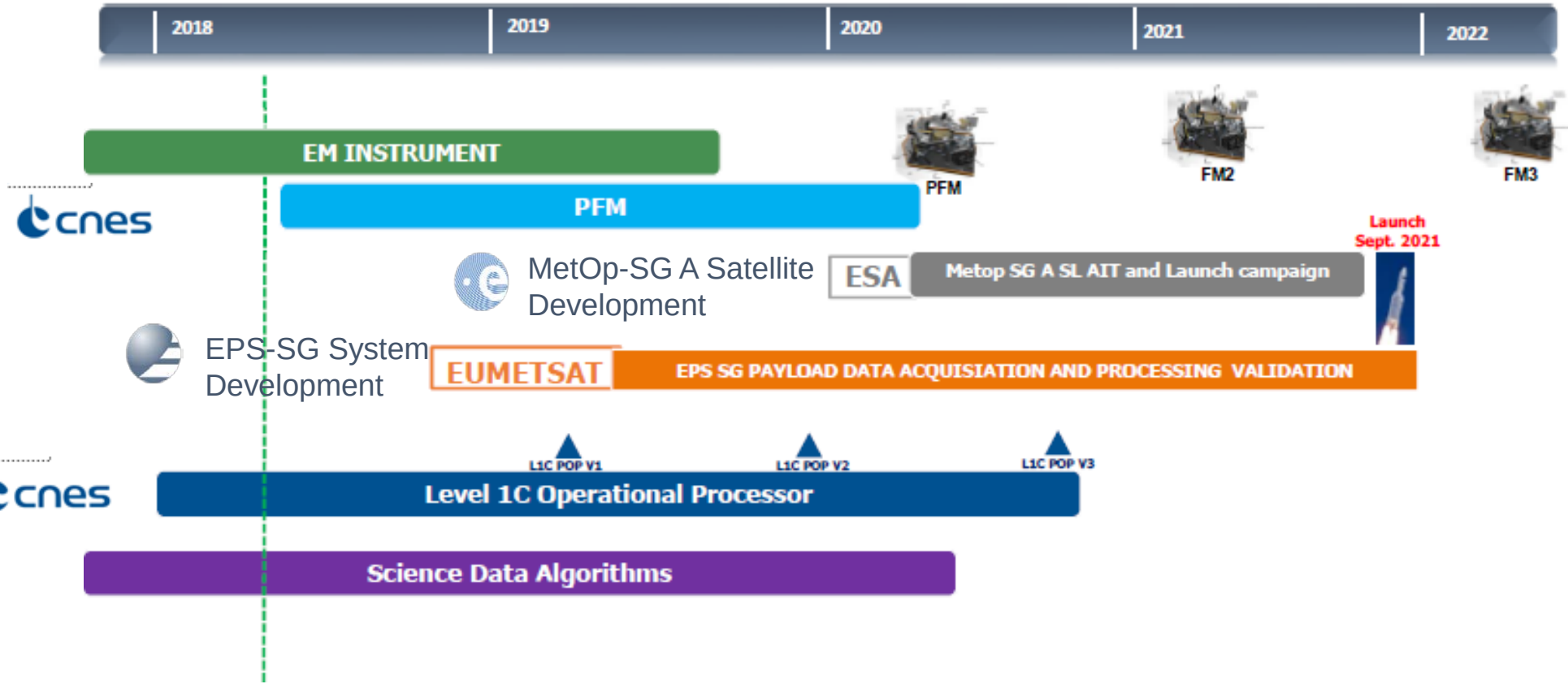


Hard challenges but encouraging performances budgets

- **The first system budget shows very encouraging results in terms of**
  - ✓ **Geometric performances**
  - ✓ **Spectral performances**
  - ✓ **Radiometric performances**



EPS-SG planning



Thank you ...