EUMETSAT

IASI-NG Instrument Status and Performances

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IASI-NG

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IASI-NG

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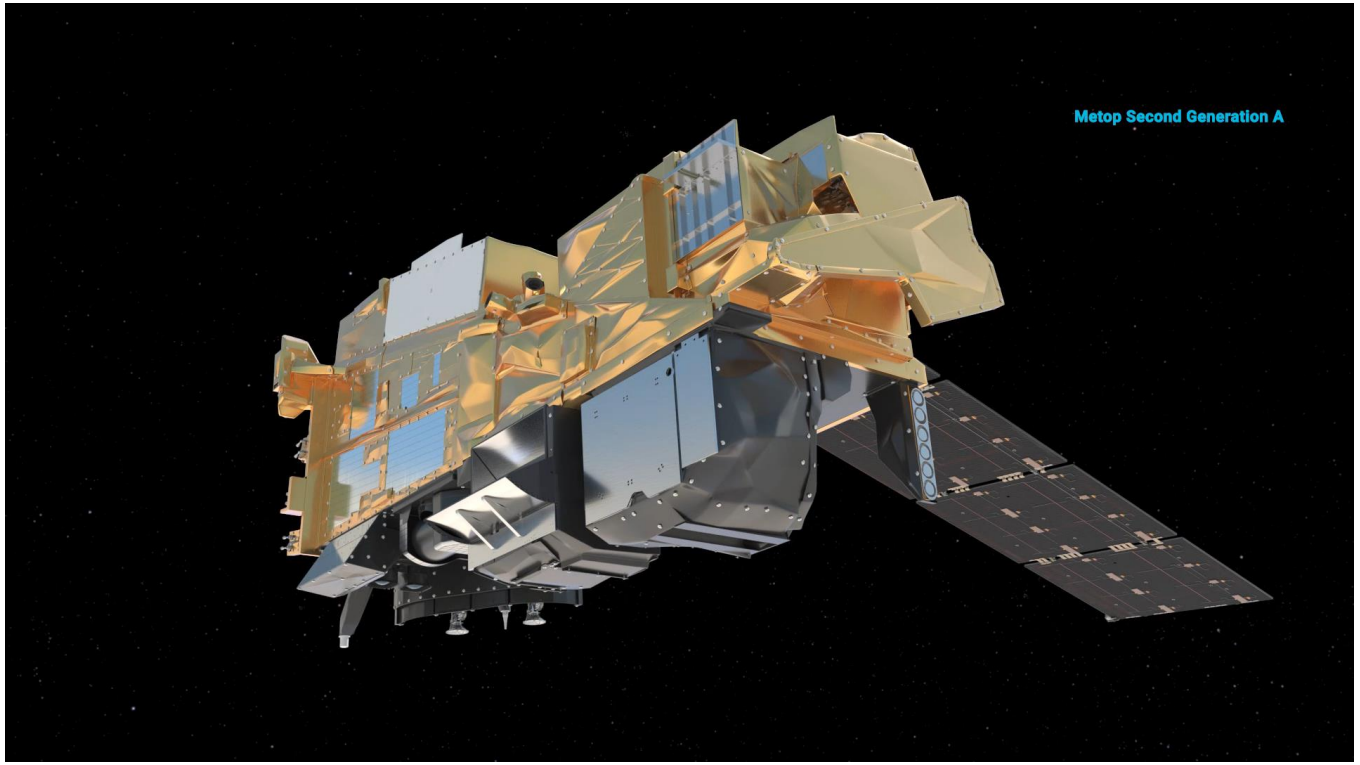

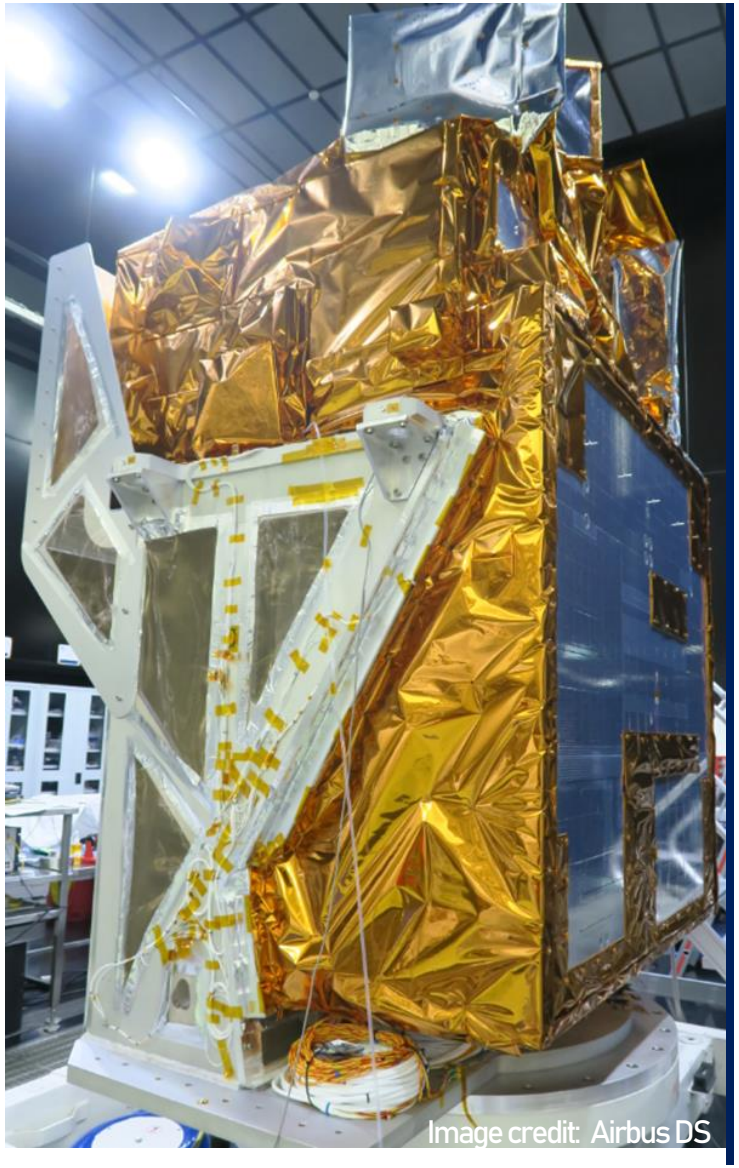
Image credit: Airbus DS

"Infrared Atmospheric Sounding Interferometer – New Generation" (IASI-NG)
Passive infrared sounder on board the MetOp-SG A satellites

Cooperation: partnership between CNES and EUMETSAT, with Airbus Defence and Space Toulouse as Prime Contractor

IASI-NG Mission Overview

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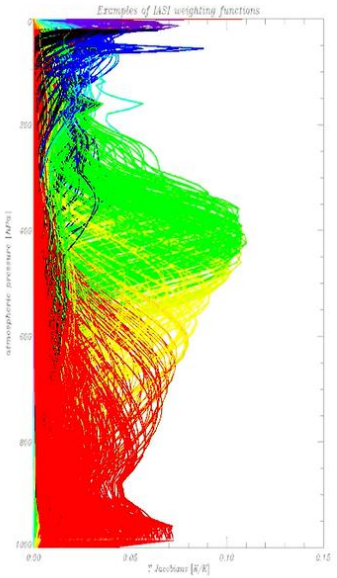
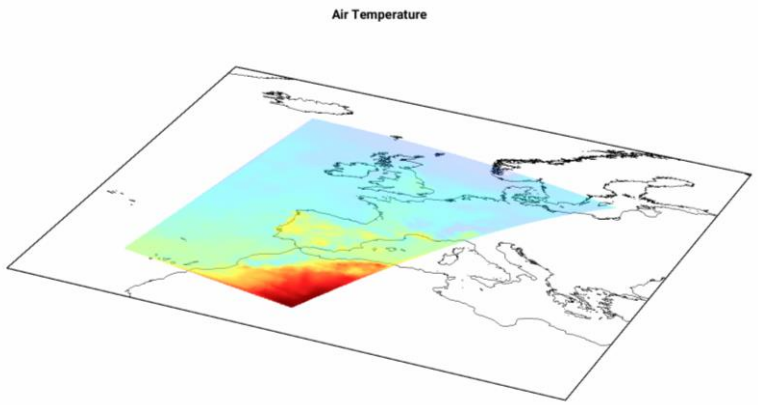
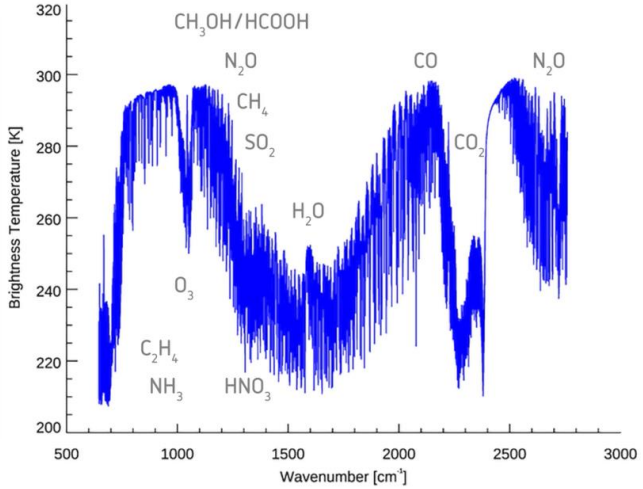
The **primary objective** of the IASI-NG mission is to support Numerical Weather Prediction (NWP) through the provision of infrared radiance spectra measurements with information on:

- Atmospheric temperature and water vapour profiles at high vertical resolution in clear and partly cloudy air.
- Surface temperature over sea, ice, and land surfaces.
- Cloud variables.
- Atmospheric trace gases (ozone, methane, etc.)







Secondary objectives :

- To support air quality monitoring by observation of pollutants in the free troposphere.
- To support climate monitoring by providing well calibrated radiance spectra.

IASI-NG Instrument Overview

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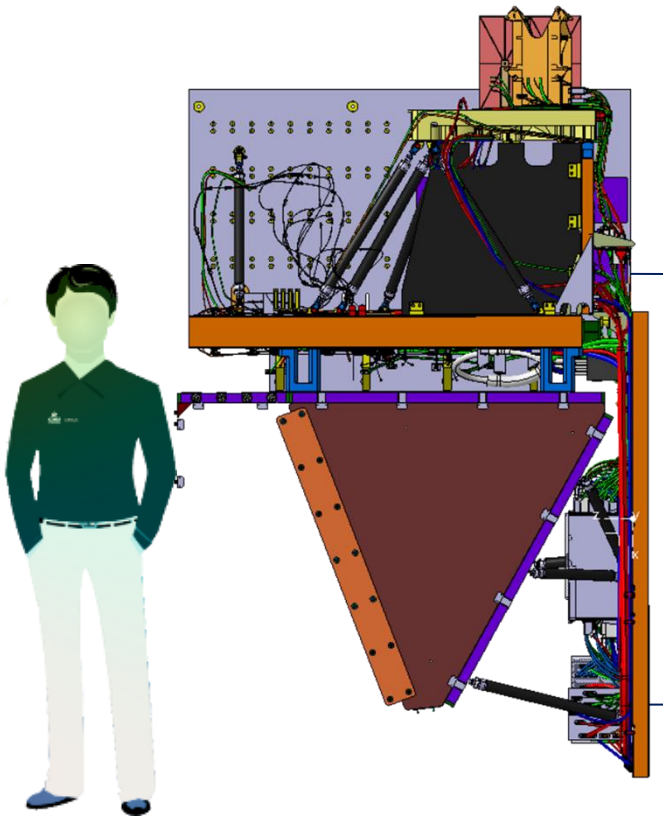
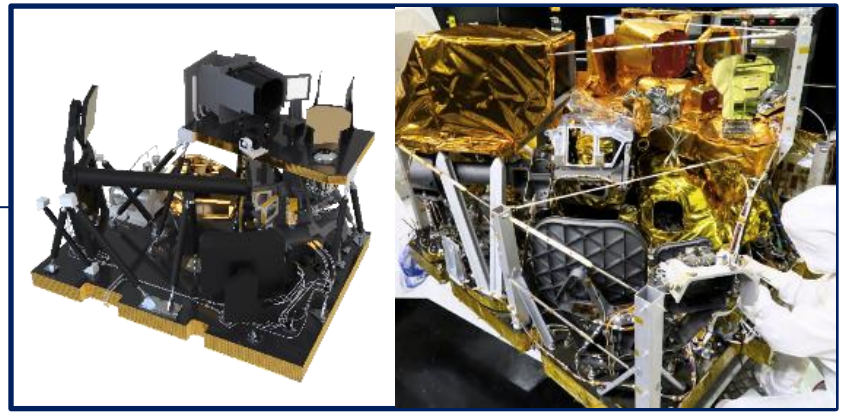
Key parameters	IASI-NG	IASI
Scan mode	Step and stare	
Swath width	~2000 km	
Sounding Point	12 km	
Spatial Resolution (at Nadir)	~25 km (4x4 in 100x100km)	~25 km (2x2 in 50x50km)
Spectral range	3.6µm to 15.5µm	
Spectral channels	16,921	8,461
Spectral sampling	0.125 cm^{-1}	0.250 cm^{-1}
Spectral resolution	0.250 cm^{-1}	0.500 cm^{-1}
Spectral calibration error	10^{-6}	$2*10^{-6}$
Radiometric Accuracy	0.25÷0.50 K	0.50 K
NedT @280K	Up to x2 better	
Mass	~430 kg	236 kg
Power	~520 W	210 W
Data Rate	~6 Mbps	1.5 Mbps
Lifetime	7 years (9.5 extd)	5 years



I-OH
(OPTICAL MODULE)



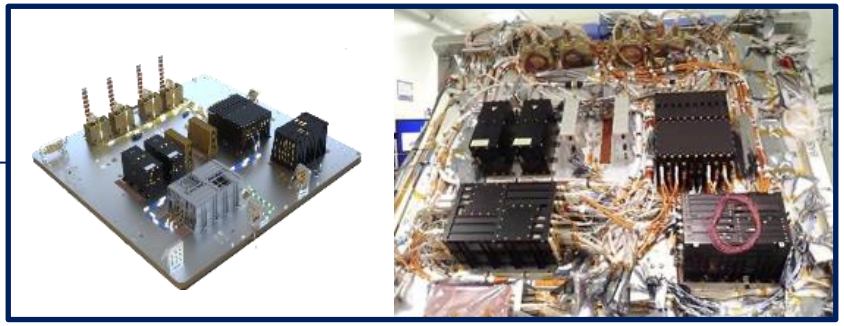


Image credit: Airbus DS

I-EM
(ELECTRONICS MODULE)

IASI-NG Instrument Overview

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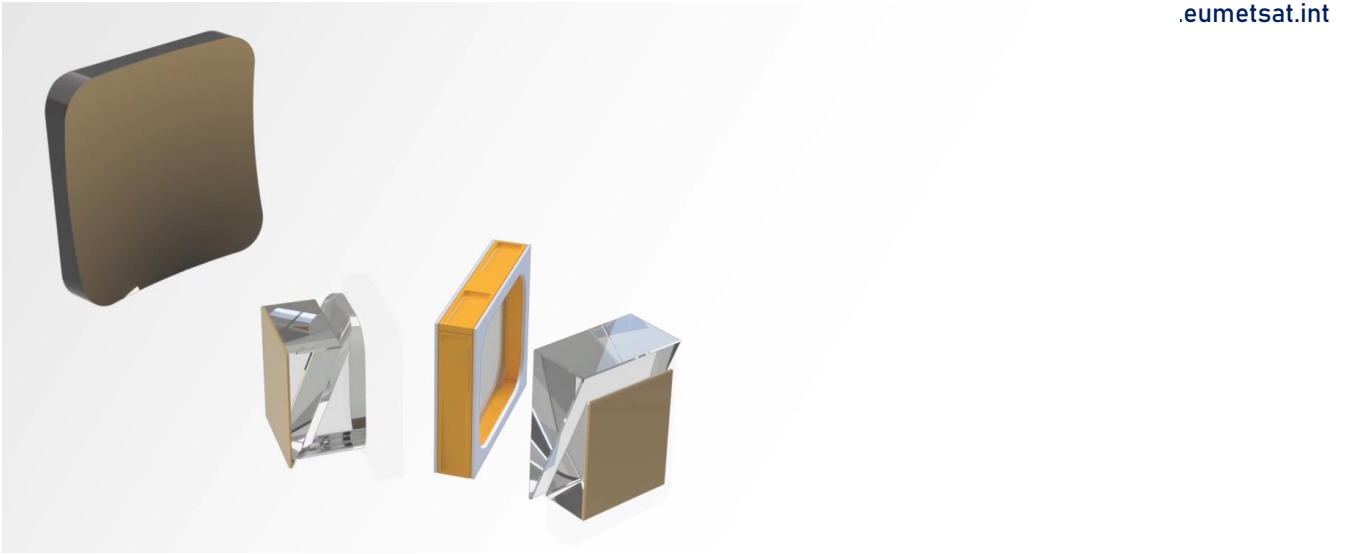
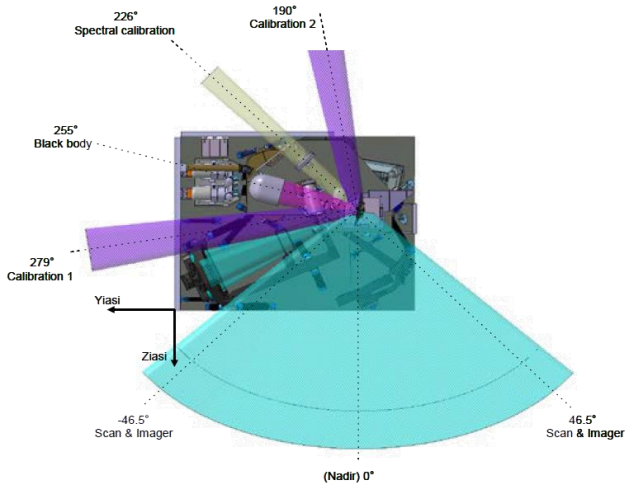
- The **first Mertz interferometer** in a space application: the heart of the instrument, using alternating moving pairs of **prisms** to induce the optical path difference causing interference, while limiting parasitic field effects.



- A **scan mirror**, working in a step-and-stare scheme, captures 14 measurements of 16 pixels per FOV along the swath, followed by **calibration views** of a blackbody, cold space and a Fabry Perot Interferometer



- The spectral data are detected simultaneously in four spectral bands (B1, B2, B3 and B4) from 3.6µm to 15.5µm by detectors kept at ~80K

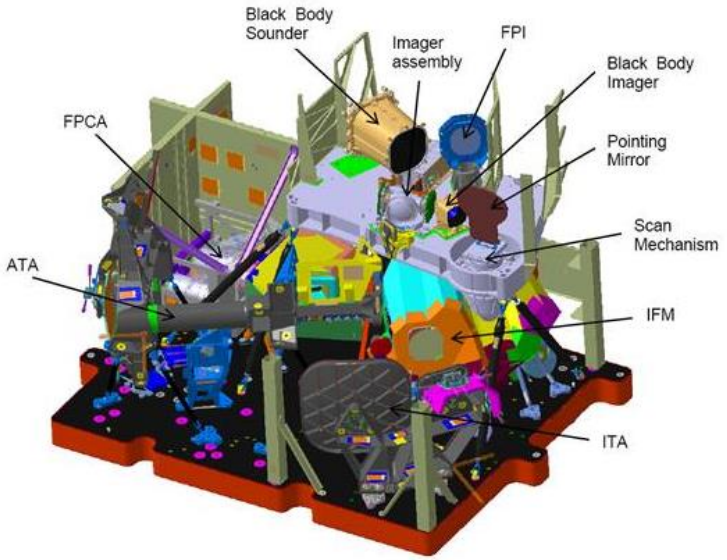
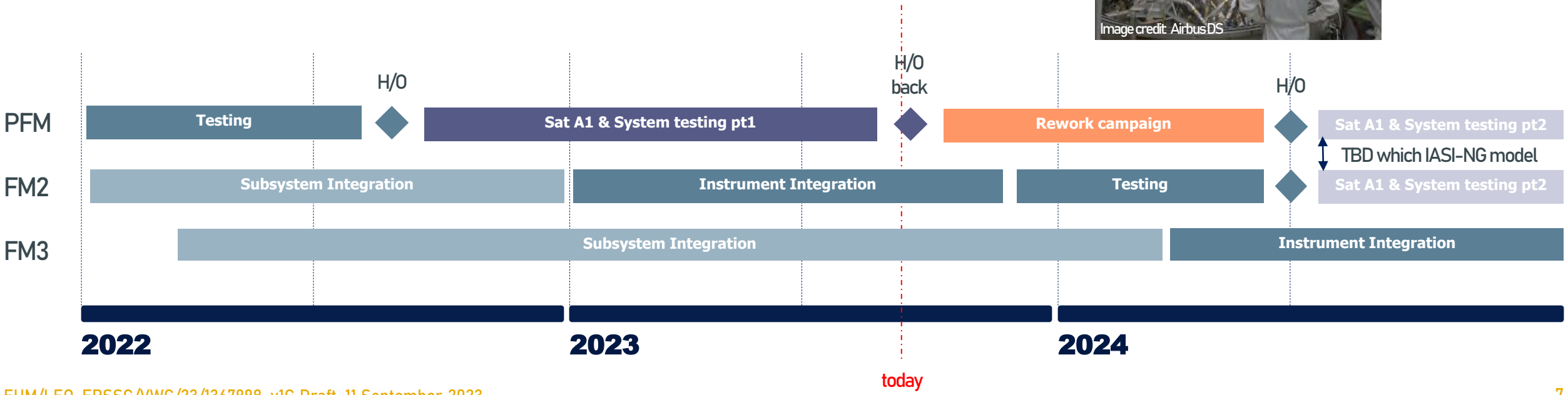


Image credit: Airbus DS

Development and Test Status

- Development phase completed
- PFM integrated, tested and delivered to satellite (however residual open work pending)
- FM2 instrument integration is ongoing
- FM3 subsystem integration and testing has started
- Sat A1 test campaign with IASI-NG PFM conducted successfully
- PFM to be disembarked from Sat A1 for rework, see next slides

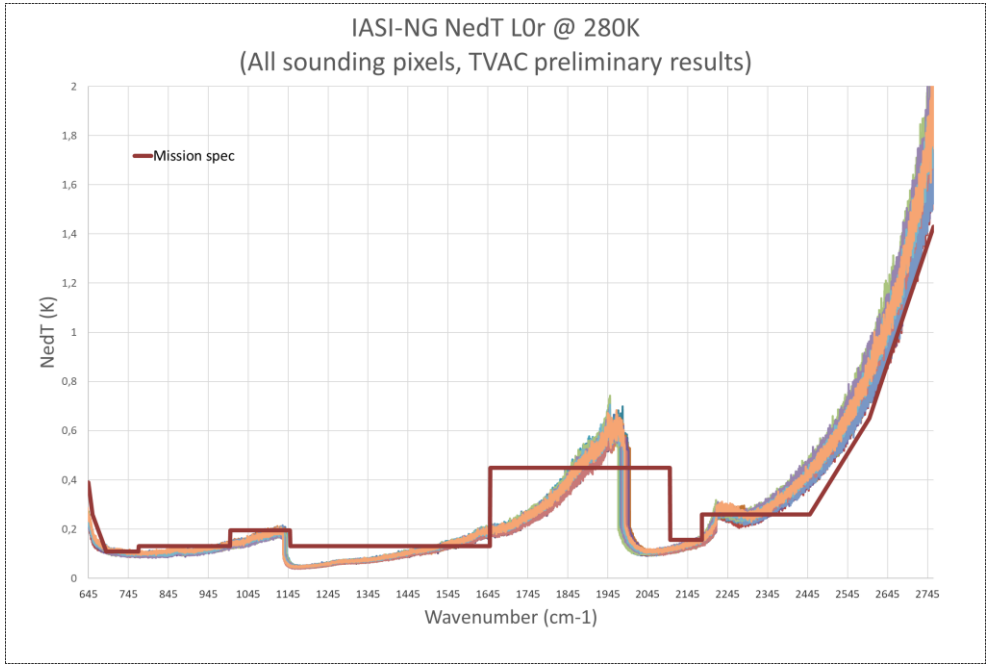
IASI-NG in TV Chamber



Measured Performances

First calibration tests in vacuum

- Spectral measurements to be repeated due to problems with the test setup, but preliminary results are very good
- Radiometric performance with 0.25 cm^{-1} resolution:
  - NedT improved by up to a factor of 2 compared to IASI first generation (scaled to the same spectral resolution), globally in line with the mission objective
  - Unexpected straylight increases the noise at the boundary between bands B2 and B3 (~1950 cm-1) as well as throughout B4 (2270 - 2760 cm-1) – no blocking points identified
  - Radiometric accuracy expected to be compliant – measured data being analysed



IASI-NG NedT performance

PFM will be disembarked from Metop-SG A1 satellite for a rework campaign:

- Final Flight SW implementation and qualification, EMC signature, Investigation on remaining non-linearity behaviour in B4 band , Completion of the spectral and radiometric performance characterisation & calibration
- Duration of PFM rework campaign may lead to a swap with the FM2 instrument for the Metop-SG A1 satellite

IASI-NG PFM on Metop-SG A1 Satellite

IASI-NG PFM has been integrated on MetOp-SG A1 in September 2022 – at 6 meter height – with strict cleanliness constraints




Images credit: Airbus DS

IASI-NG PFM on Metop-SG A1 Satellite

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09/22	Instrument **Hand-over**
09-10/22	Mechanical and electrical **integration**
12/22 – 01/23	**Mechanical tests** successfully completed → very sensitive prisms demonstrated launch robustness
04/23 – 06/23	**Thermal Vacuum test** successfully completed → Micro-vibrations very low - safeguard spectral performance → Performance results from instrument testing confirmed
08/23	**Functional test** on Satellite completed
08/23	First set of **EMC** tests conducted
09/23	Satellite System Validation Test (**SSVT**) to test IASI-NG commanding
09/23	Dismounting of IASI-NG PFM and H/O to instrument prime for rework campaign

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Sat-A1 on shaker

Sat-A1 in front of TV chamber

Future Planning

All next steps focus on the timely readiness of the instrument and satellite for launch:

IASI-NG PFM

- Completion of the rework campaign activities
- Consolidation of spectral and radiometric performance characterisation & calibration

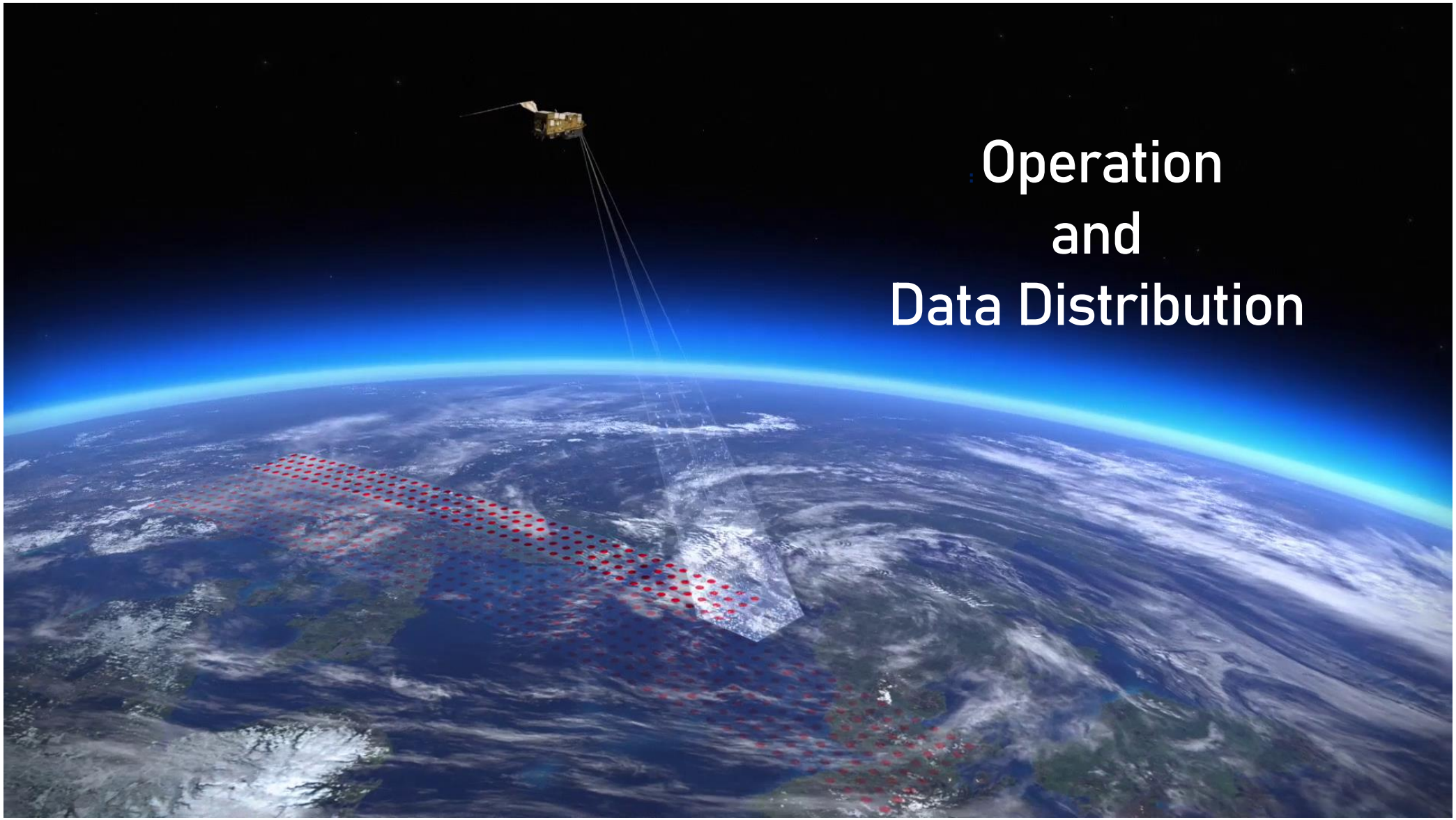
IASI-NG FM2

- Completion of instrument integration
- Conduct instrument environmental & performance tests

Satellite / System level

- June 2024 re-delivery and re-integration of the first IASI-NG flight model (either PFM or FM2)
- Completion of satellite test campaign
- Completion of SSVT
- Launch campaign and launch from Guyana Space Centre with Ariane 6
- SIOV & Cal/Val

Future Planning



Thank you!

Questions are welcome.