



CNES MISSIONS ON GHG MEASUREMENTS MICROCARB(2020)/MERLIN(2021)/IASI-NG(2022)

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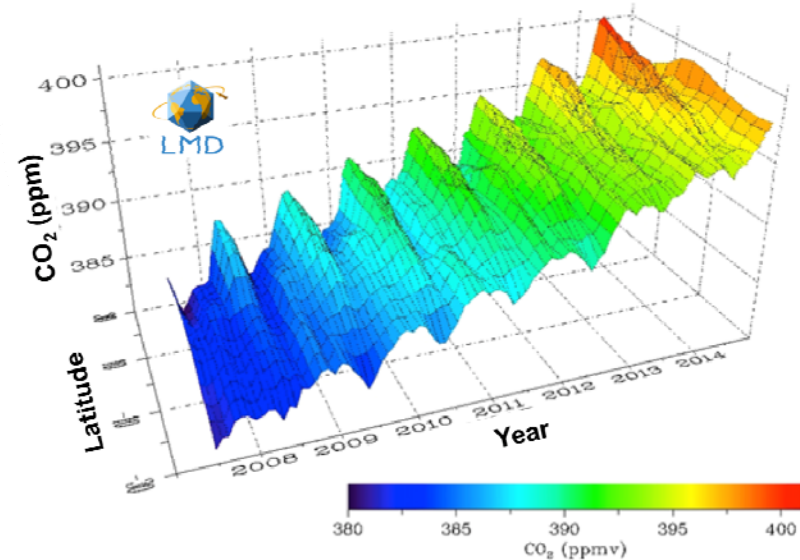
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COP22|2016|CMP12
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IASI 1, 2, 3 instruments: a unique climate serie

- 3 IASI instruments (FTS) developed by CNES for Eumetsat
- IASI provides information for Numerical Weather Prediction (T° & Water Vapor) and is the unique opportunity to retrieve **simultaneously** various **climate and chemical variables** (O_3 , CO , GHG, aerosols, surface characteristics, etc.) using the **full IR spectrum at a resolution of 0.5 cm^{-1}** .

Mid-tropospheric CO_2 from IASI/Metop-A
Monthly evolution over July 2007-December 2014



2006

2012

2018

2023



IASI/MetOp-A

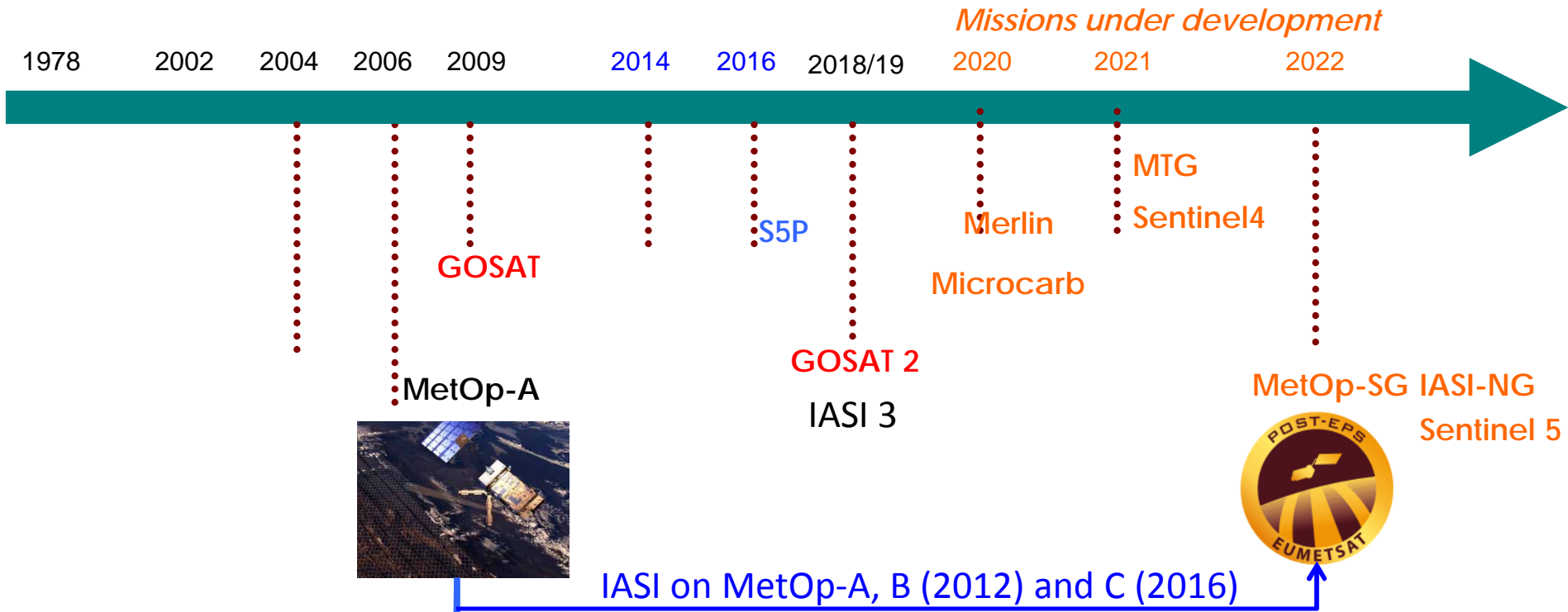


IASI/MetOp-B



IASI/MetOp-C

FROM IASI TO IASI-NG

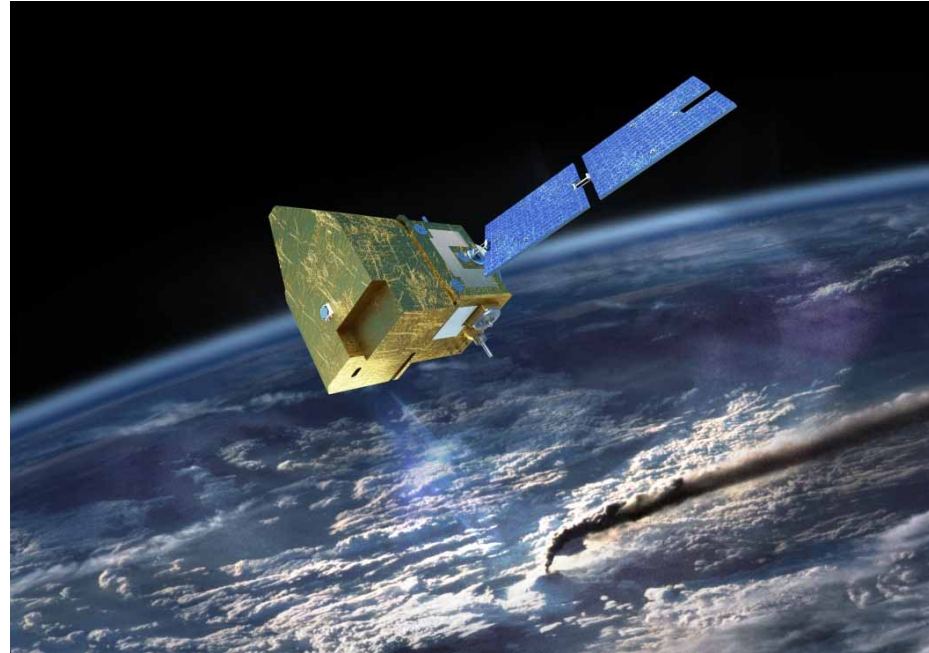
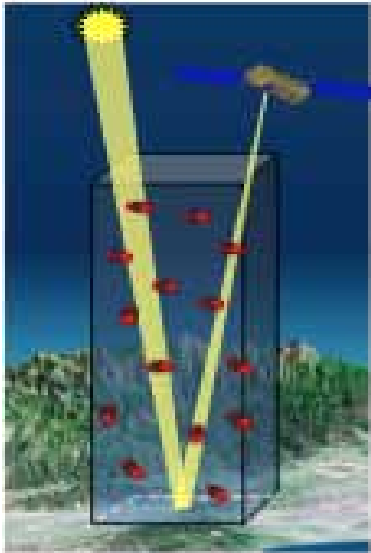


IASI-NG :

➡ factor of 2 on the spectral resolution, sampling and the radiometric noise

To improve the characterization of the lower part of the troposphere, the UT/LS region and, more generally, of the full atmospheric column.

MICROCARB



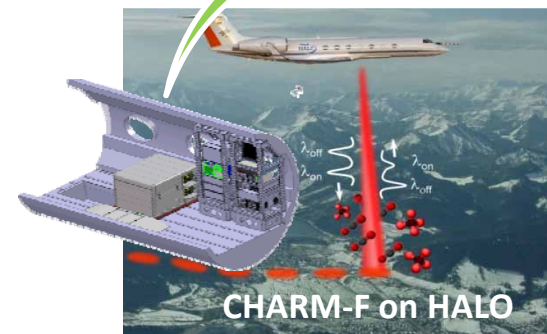
MICROCARB : CO2 Passive measurement

Accuracy < 1 ppm Bias < 0,1 ppm

- XCO2 spatial gradients are small (< 10 ppm)
- Error on measurement (regional bias) implies wrong flux computation
- To be launched in 2020

MERLIN

- Franco-German (CNES/DLR) cooperation on a climate satellite mission
- first space-borne methane Integrated Path Differential Absorption (IPDA) LIDAR
- **MERLIN will allow:**
 - global measurements of XCH₄ at day and night on a country scale
 - improvement of inverse modelling accuracy
- **Status:**
 - Early Phase C
 - successful airborne demonstrator CHARM-F test flight May 2015 (CO₂ & CH₄ measurements)
- **upcoming major milestones:**
 - final design in 2018
 - ready for launch in 2021
 - 3 years of operation



<https://merlin.cnes.fr>

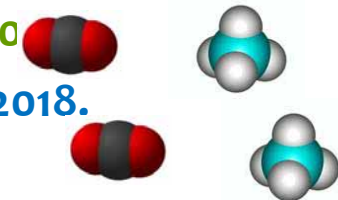
http://www.dlr.de/rd/en/desktopdefault.aspx/tabid-2440/3586_read-31672

Growing interest in CO₂ and CH₄ Observations from space



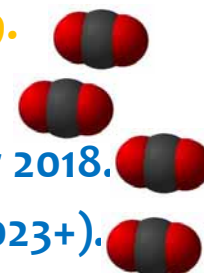
○ Japan:

- GOSAT (JAXA/NIES/MoE), launched in 2009
- GOSAT-2 (JAXA/NIES/MoE), planned for 2018.



○ USA:

- OCO (NASA), failed launch in 2009.
- OCO-2 (NASA), launched in 2014.
- OCO-3 (NASA), planned in or after 2018.
- ASCENDS (NASA), under study (2023+).



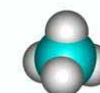
○ China:

- TanSat (CAS, MOST, CMA) planned for 2016.



○ Europe:

- Sciamachy (ESA), 2002-2012.
- Sentinel 5P (ESA/UE) & 5, planned for 2017 and & 2021.
- MICROCARB (CNES), planned for 2020.
- MERLIN (CNES-DLR), planned for 2021.
- Sentinel 7 (ESA/UE), planned for 2025 (TBC)



International Cooperation on GHG

- New Delhi Declaration
- Discussion with NASA on OCO₂ and Microcarb
- Discussion with UKSA on Microcarb
- Discussion with Jaxa :
 - continue analyses on calibration and validation of GOSAT & IASI 1 & IASI 2 in the frame of extended CNES-JAXA MOU from 2011
 - Develop new cooperation towards new GHG related mission, ie, GOSAT 2 & MICROCARB & MERLIN & IASI-NG by:
- Strengthen dialogue on between GHG observation providers at international level (CEOS, GEO,..) & contribute to facilitate application of Paris Agreement



HEADS OF SPACE AGENCIES
DECIDE TO JOIN EFFORTS
IN SUPPORT OF COP 21 DECISIONS

— MAY 2016 —