

EUMETSAT Programmes and future plans

Alain Ratier

Director-General

30 September 2020

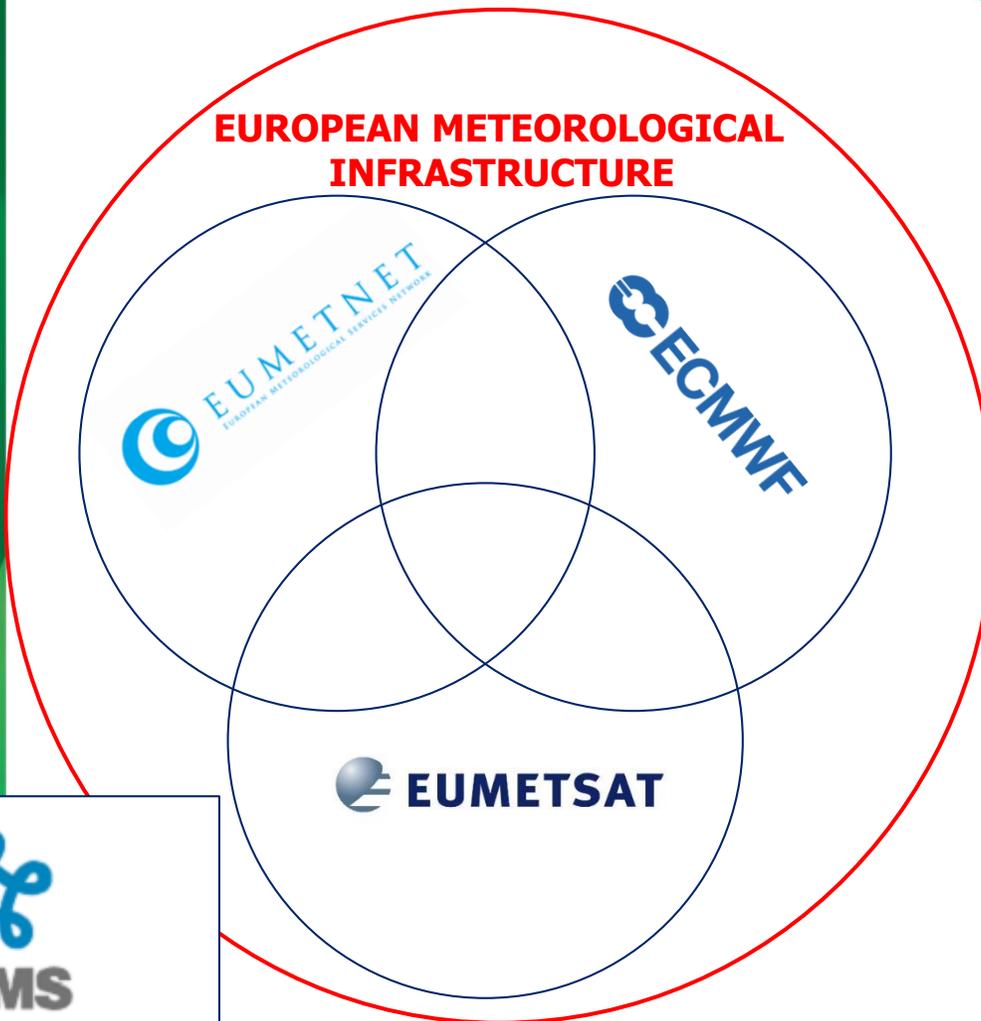


EUMETSAT: an intergovernmental organisation with 30 Member States

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AUSTRIA | 
BELGIUM | 
BULGARIA | 
CROATIA |
| 
CZECH REPUBLIC | 
DENMARK | 
ESTONIA | 
FINLAND |
| 
FRANCE | 
GERMANY | 
GREECE | 
HUNGARY |
| 
ICELAND | 
IRELAND | 
ITALY | 
LATVIA |
| 
LITHUANIA | 
LUXEMBOURG | 
THE NETHERLANDS | 
NORWAY |
| 
POLAND | 
PORTUGAL | 
ROMANIA | 
SLOVAK REPUBLIC |
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SLOVENIA | 
SPAIN | 
SWEDEN | 
SWITZERLAND |
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TURKEY | 
UNITED KINGDOM | | |



International cooperation framework



EUMETSAT

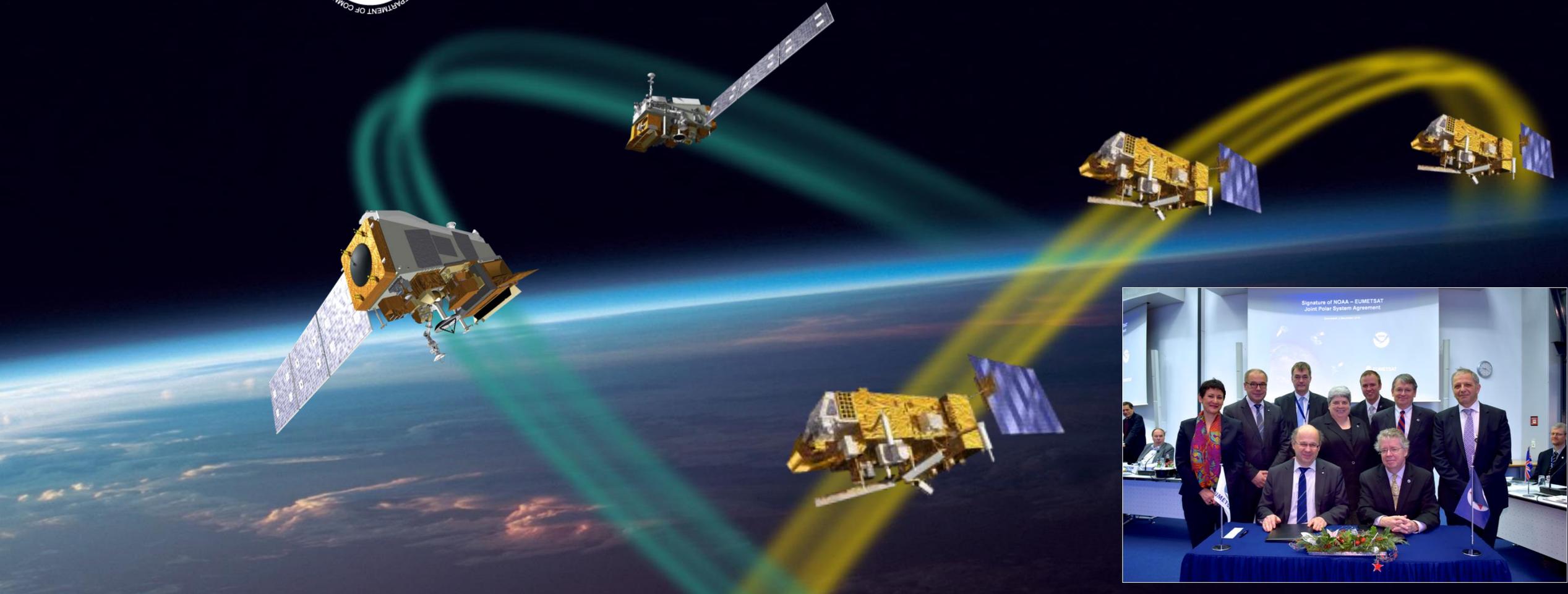
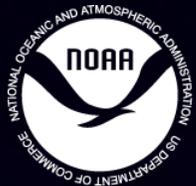
CAMS aerosol optical depth forecast 22 March 2018 00UTC
orange - dust, red - biomass burning, blue - sea salt, yellow - fires

Copernicus
Europe's eyes on Earth

MERCATOR OCEAN

Copernicus Marine Service

Shared systems with the United States: Joint Polar System



Relative contributions to Day 1 forecast errors (FSOI)

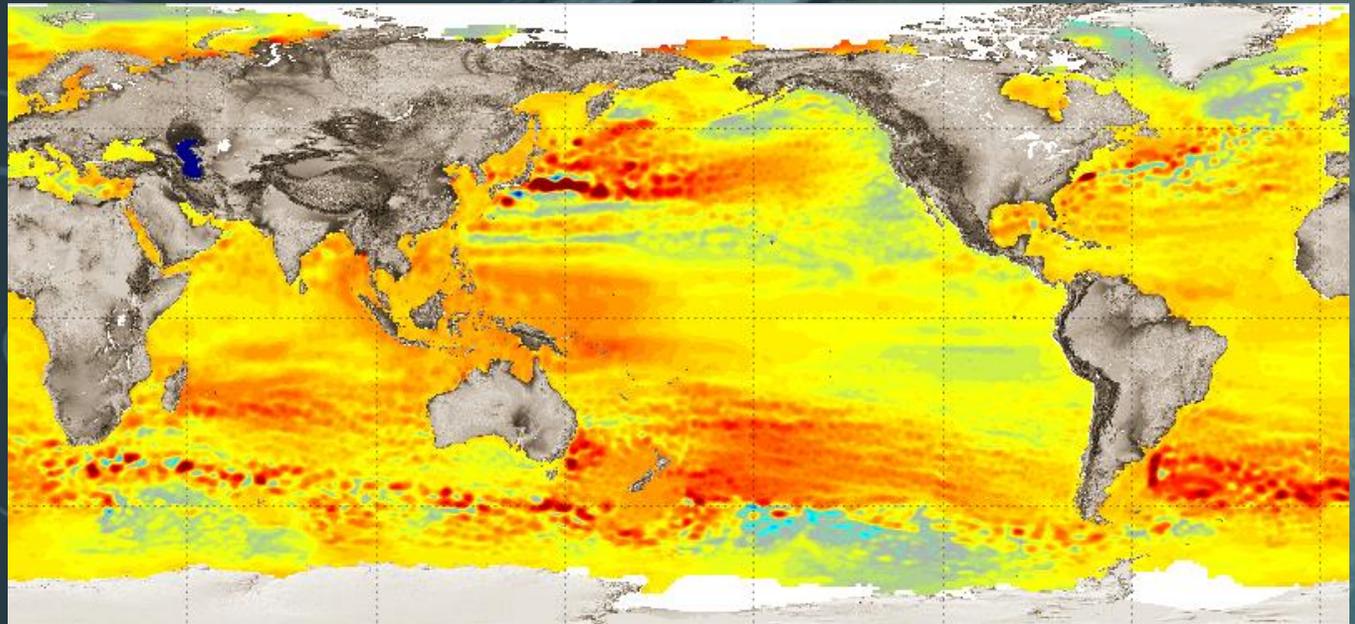


- Metop-A & -B
- Metop-C
- NOAA JPSS/S-NPP
- NOAA POES DMSP
- Other Satellite Observations
- In-Situ/Conventional Observations

Shared systems with the United States: Jason series



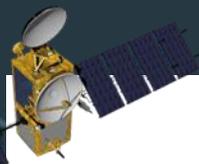
TOPEX-POSEIDON: 1992-2006



JASON: 2001-2013



OSTM/JASON-2: 2008-2019



JASON-3: 2016 -



SENTINEL-6A MICHAEL FREILICH:
Launch: November 2020



SENTINEL-6B:
Launch planned in 2026

EUMETSAT currently exploits 10 satellites

METOP-A, -B & -C (98.7° incl.)

LOW EARTH, SUN-SYNCHRONOUS ORBIT

EUMETSAT POLAR SYSTEM (EPS)

SENTINEL-3A & -3B (98.65° incl.)

LOW EARTH, SUN-SYNCHRONOUS ORBIT

COPERNICUS DUAL SATELLITE MARINE MISSION

METEOSAT-9, -10, -11

GEOSTATIONARY ORBIT

TWO-SATELLITE SYSTEM

METEOSAT 2ND GENERATION

FULL DISC IMAGERY MISSION (15 MINS) (METEOSAT-11 @0°)
 RAPID SCAN SERVICE OVER EUROPE (5 MINS) (METEOSAT-10 @9.5° E)
 BACKUP SATELLITE AND GAP FILLER FOR RSS (METEOSAT-9 @3.5°E)

JASON-3 (63° incl.)

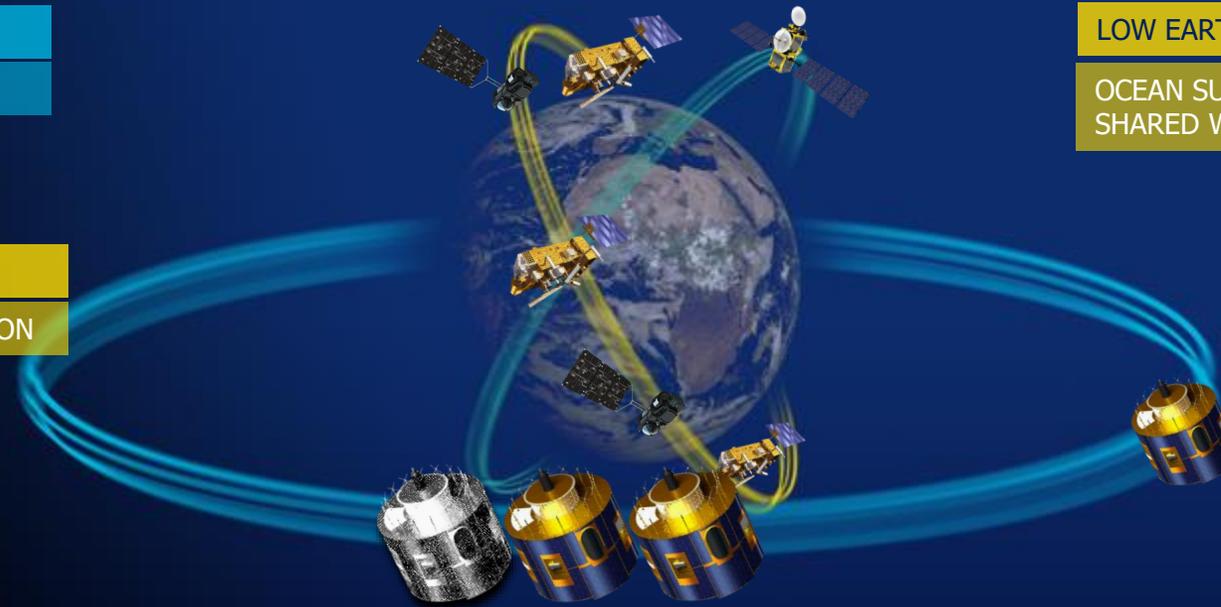
LOW EARTH, NON -SYNCHRONOUS ORBIT

OCEAN SURFACE TOPOGRAPHY MISSION,
 SHARED WITH CNES/NOAA/NASA/EU

METEOSAT-8 (41.5° E)

GEOSTATIONARY ORBIT

METEOSAT 2ND GENERATION
 PROVIDING IODC FROM
 UNTIL MID-2022



9 satellites in 2022: Metop-A & Met-8 de-orbited, Sentinel-6 MF in orbit

METOP-A, -B & -C (98.7° incl.)

LOW EARTH, SUN-SYNCHRONOUS ORBIT
 EUMETSAT POLAR SYSTEM (EPS)

SENTINEL-3A & -3B (98.65° incl.)

LOW EARTH, SUN-SYNCHRONOUS ORBIT
 COPERNICUS DUAL SATELLITE MARINE MISSION



JASON-3 & SENTINEL-6A MICHAEL FRELICH (63° incl.)

LOW EARTH, NON -SYNCHRONOUS ORBIT
 OCEAN SURFACE TOPOGRAPHY MISSION, SHARED WITH CNES/NOAA/NASA/EU

METEOSAT-9 (45.5° E)

GEOSTATIONARY ORBIT
 METEOSAT 2ND GENERATION PROVIDING IODC

METEOSAT -10, -11

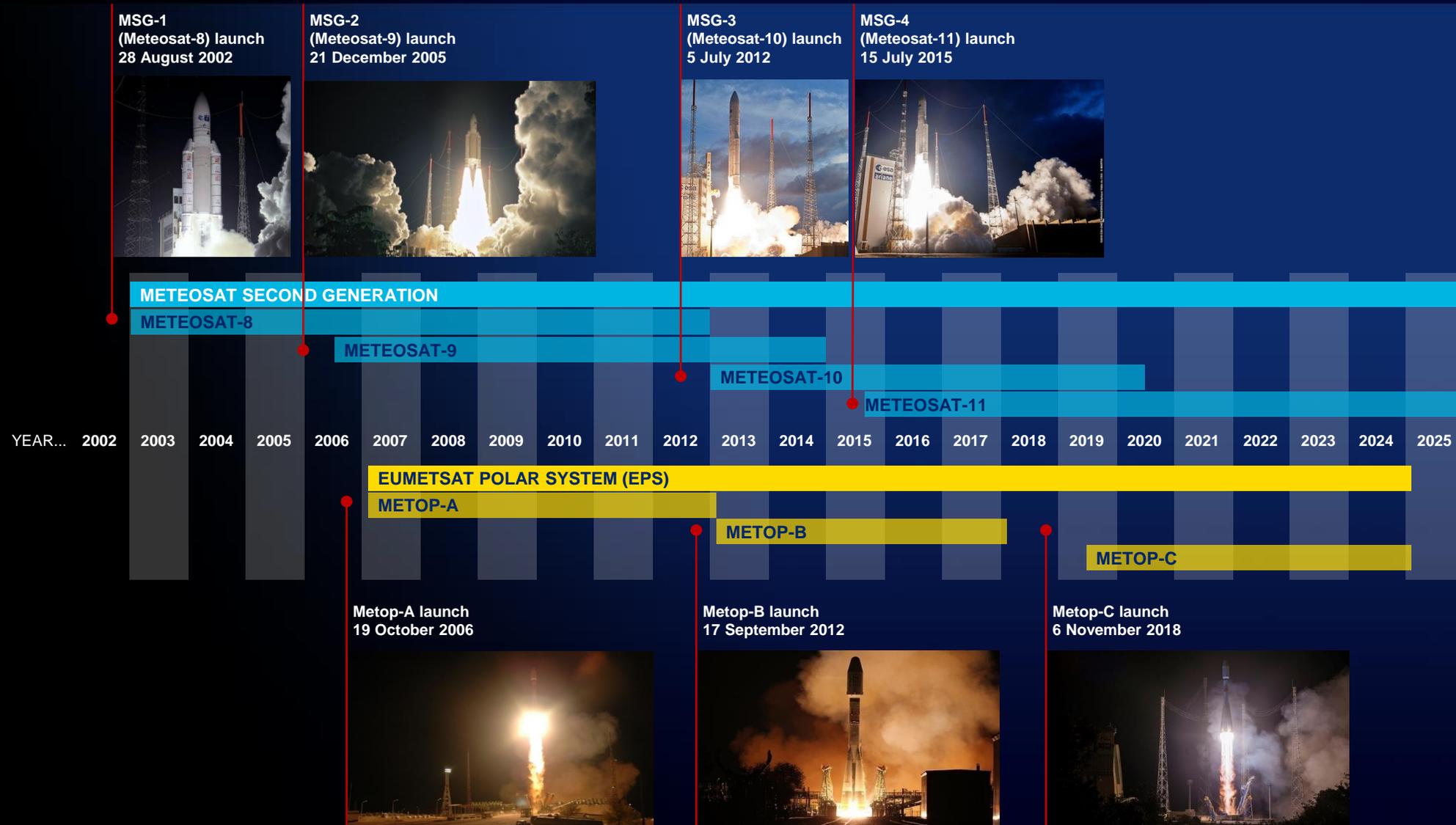
GEOSTATIONARY ORBIT	TWO-SATELLITE SYSTEM
METEOSAT 2 ND GENERATION	FULL DISC IMAGERY MISSION (15 MINS) (METEOSAT-11 @0°) RAPID SCAN SERVICE OVER EUROPE (5 MINS) (METEOSAT-10 @9.5° E)

EUMETSAT & NOAA programmes: phasing

- Meteosat SG: 2002 -
- GOES-R series: 2016 -
- MTG: 2022/2025 -
- GOES next gen: 2030
- M4G: 2040

- EPS/Metop: 2006 -
- Suomi-NPP/JPSS: 2011-
- EPS-SG/Metop-SG: 2023/2024 -

All MSG and Metop satellites are deployed and working



Launch of 1 next-generation satellite per year in 2020-2025



Meteosat Third Generation: two types of MTG satellites



- **Imagery mission: MTG-I satellites**

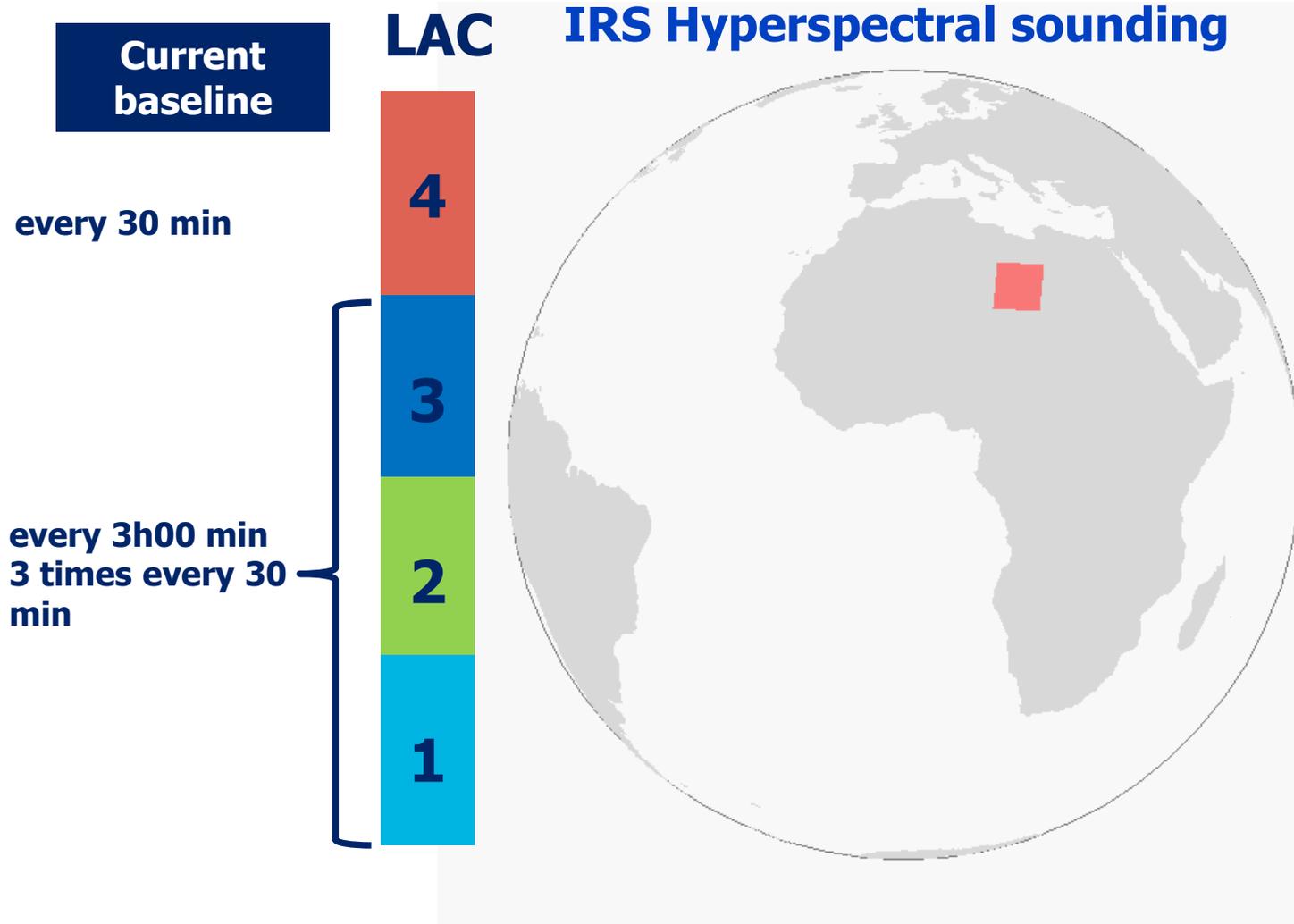
- Full disc every 10 minutes in 16 spectral bands (MTG-I1)
- Imagery of Europe every 2.5 minutes (MTG-I2)
- Full disc Lightning Imager

- **Sounding mission: MTG-S satellites**

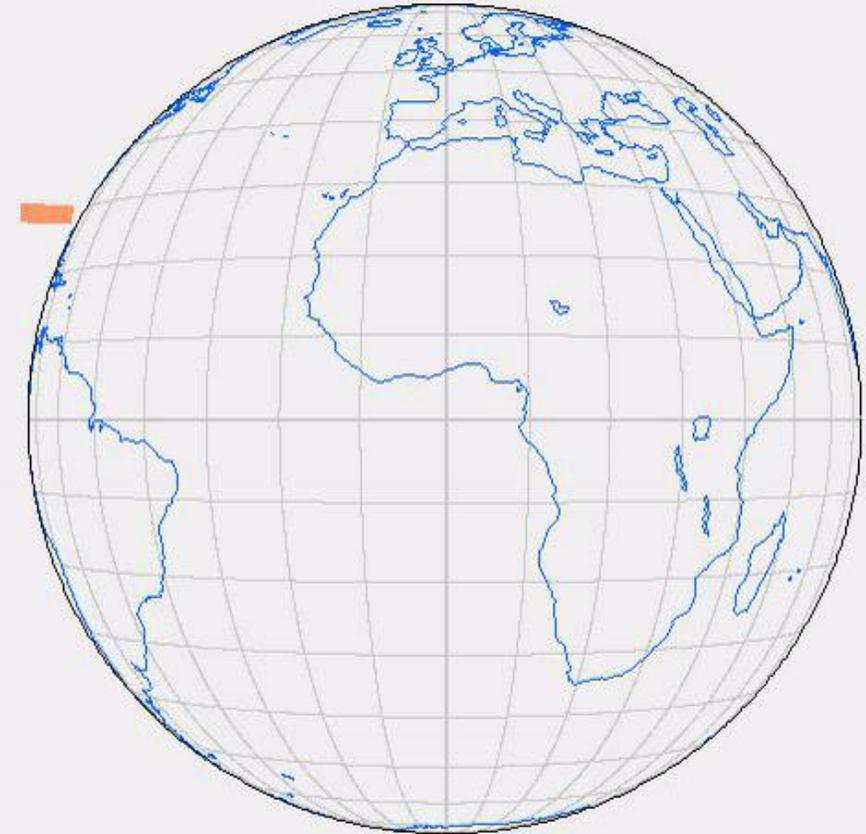
- IRS hyperspectral infrared sounder
 - Temperature, moisture profiles every 30 minutes (Europe)
- Atmospheric chemistry:
 - Synergy IRS - Copernicus Sentinel-4

- **Operational exploitation: 2022-2042**

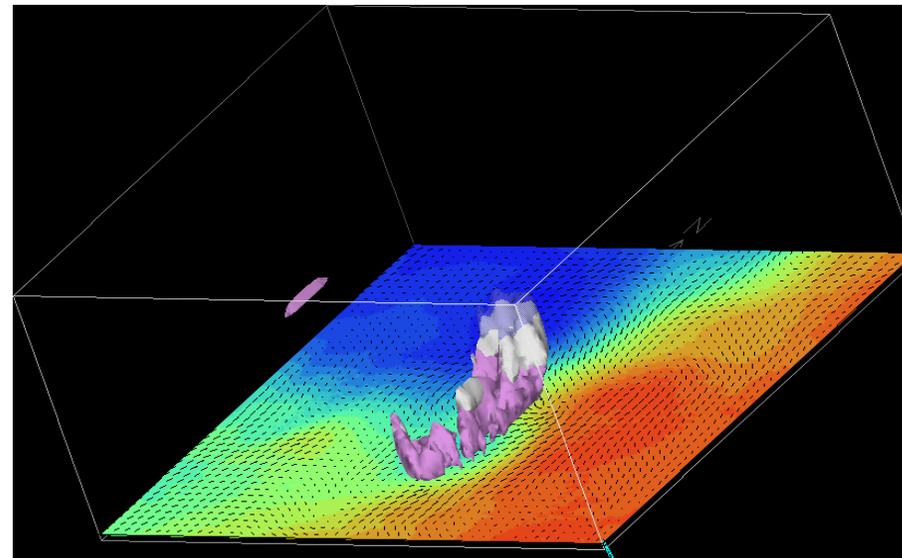
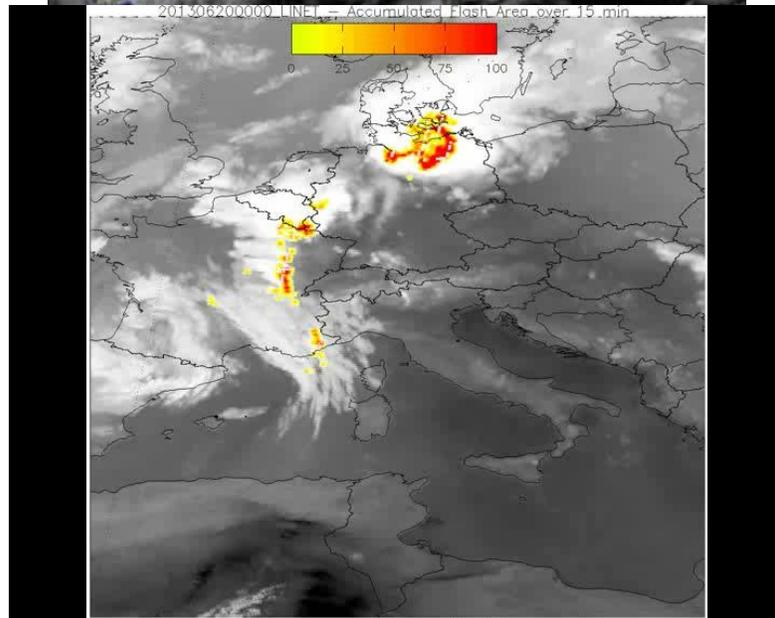
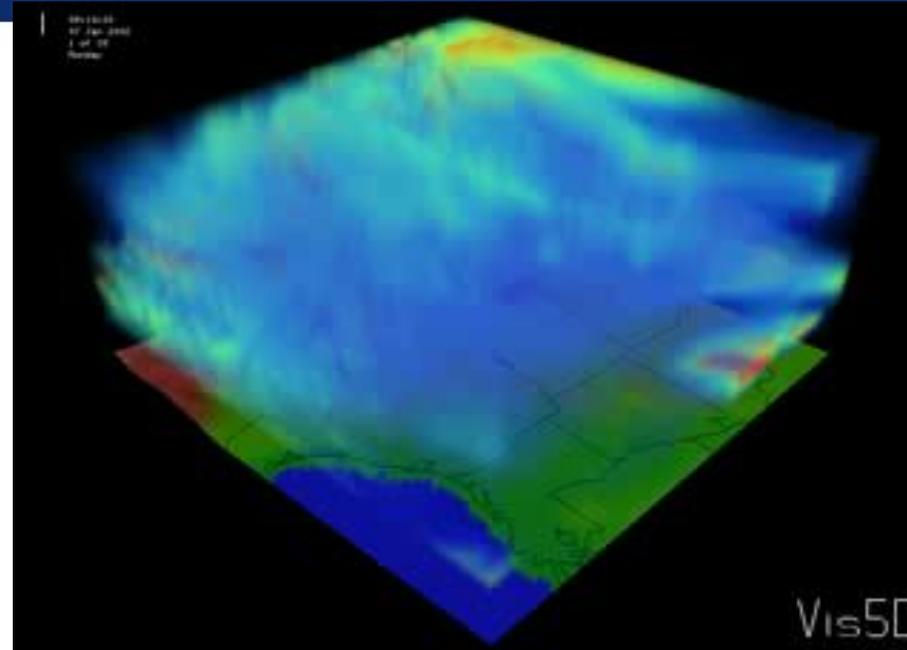
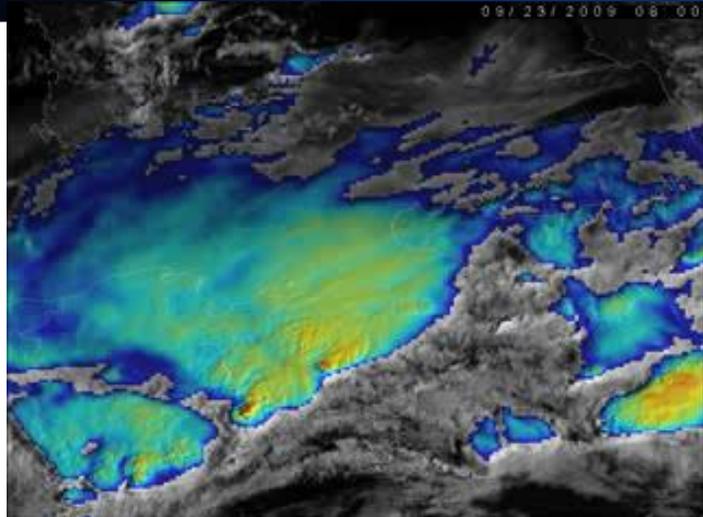
Fast repeat Infrared sounding and imagery over Europe



FCI Rapid-Scan Service: 2.5 mn

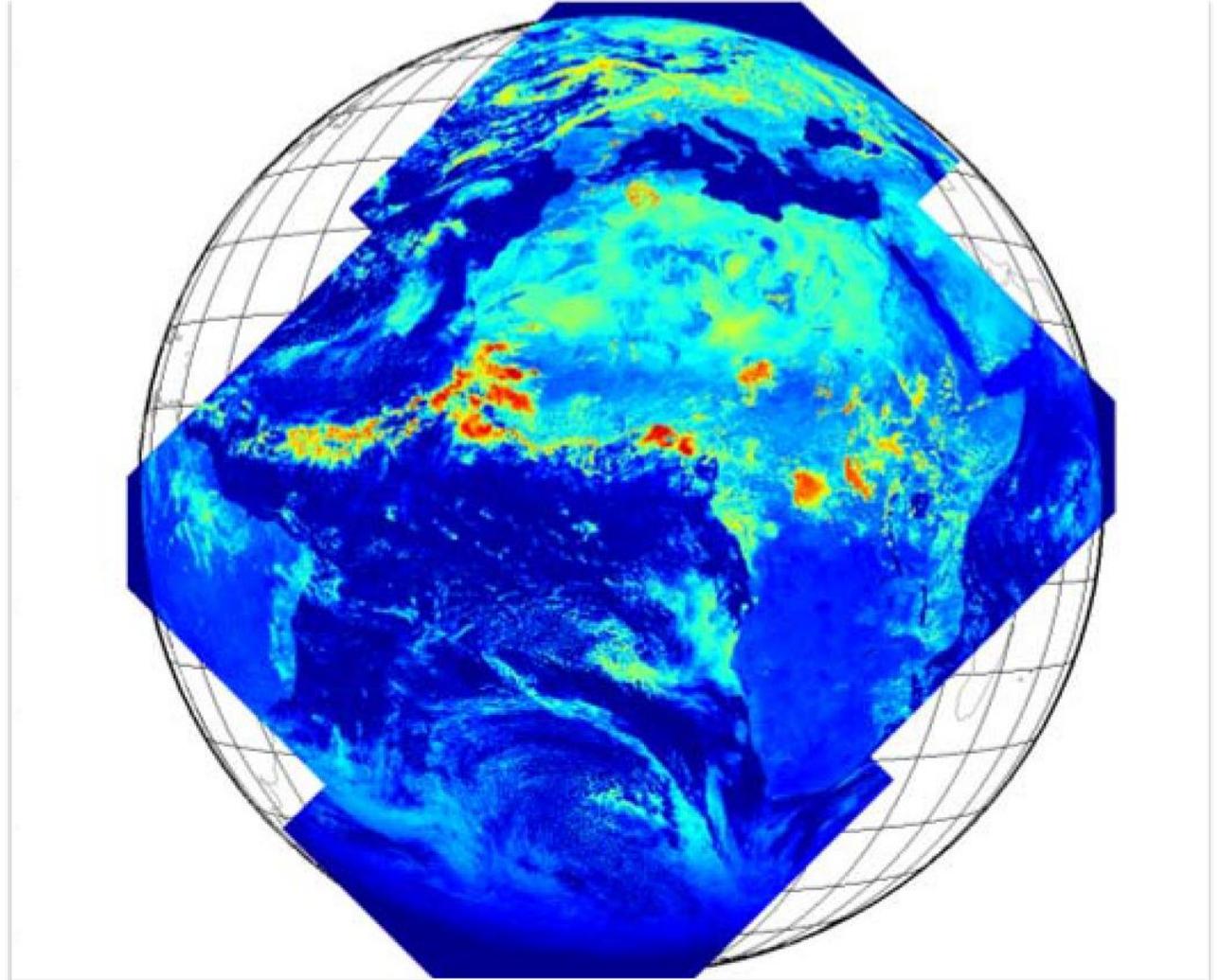
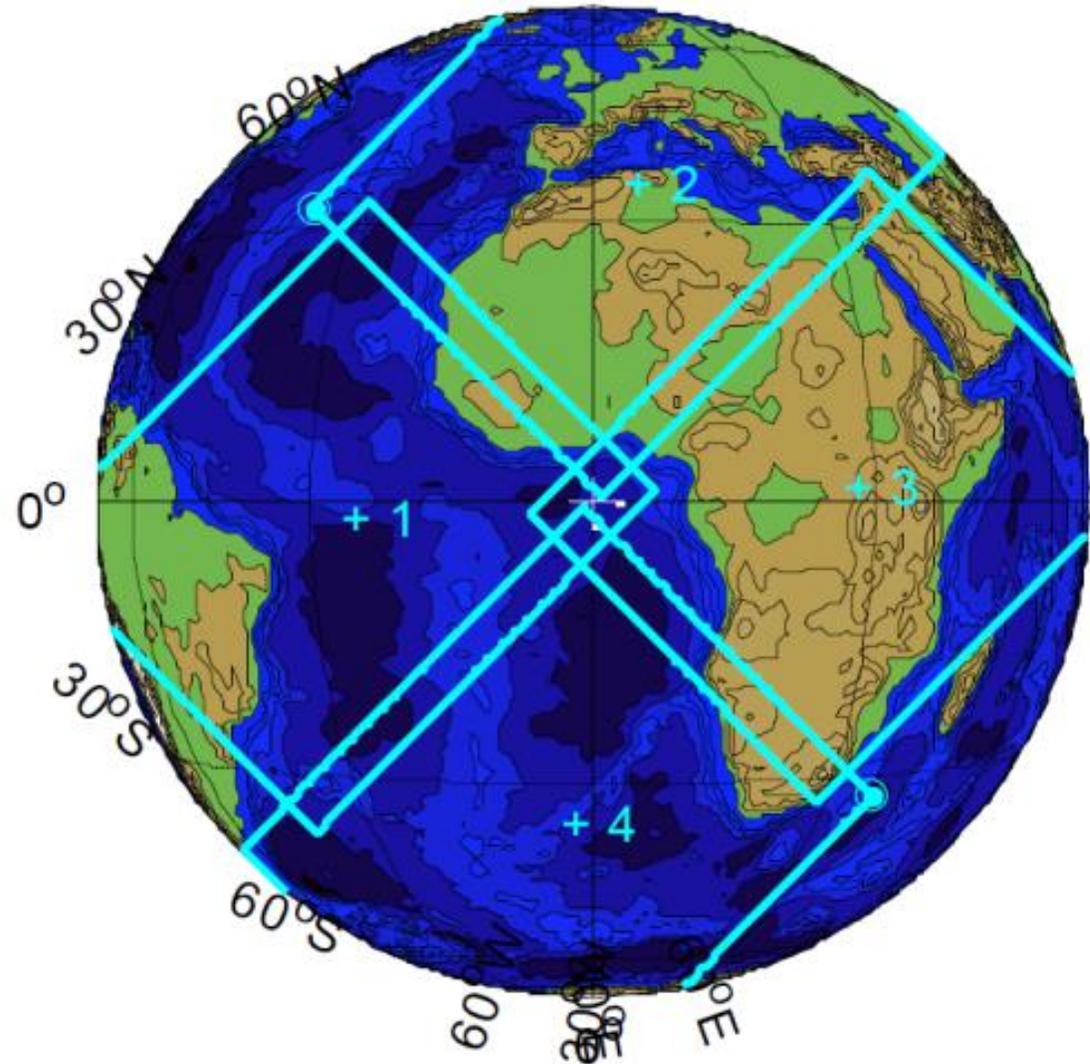


4D weather cube with MTG-I and MTG-S

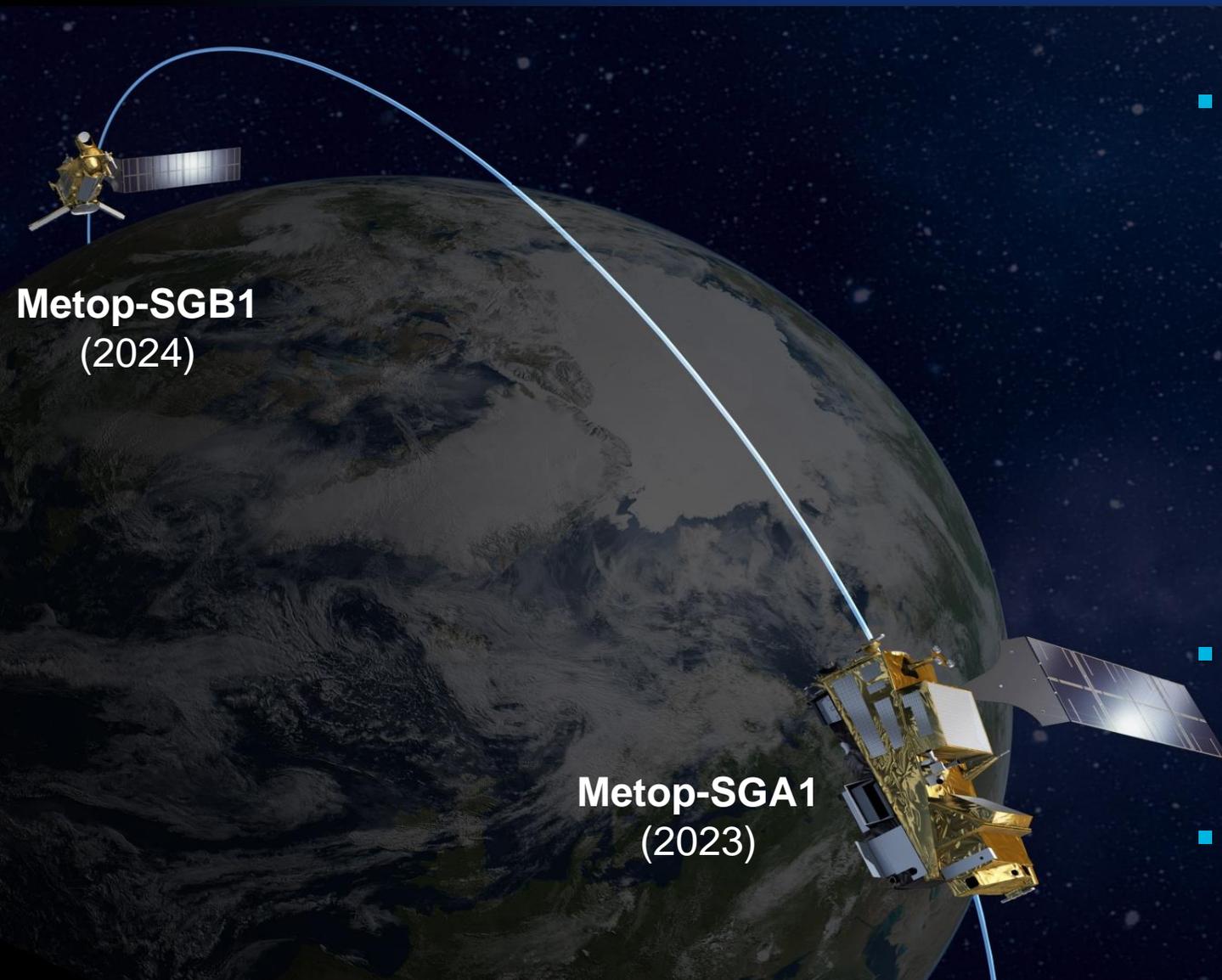


Full disc coverage of Lightning imagery

FOV projection



EPS Second Generation: a two-satellite system

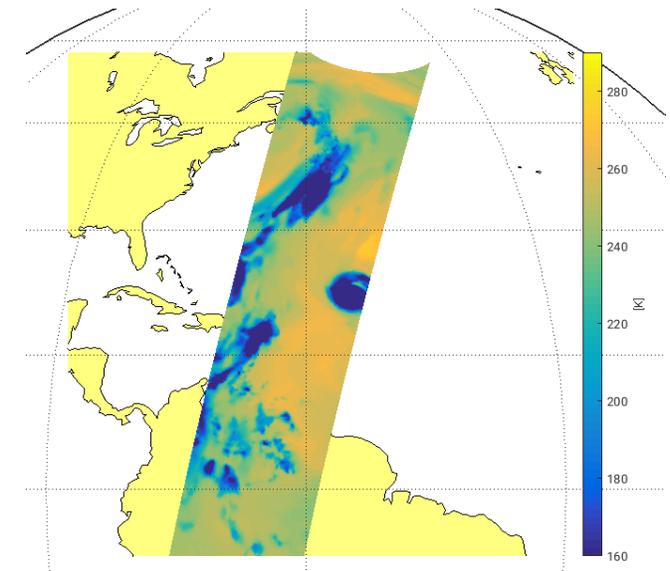
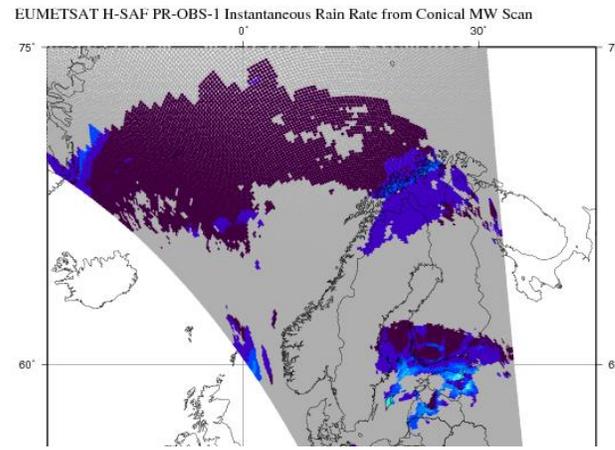
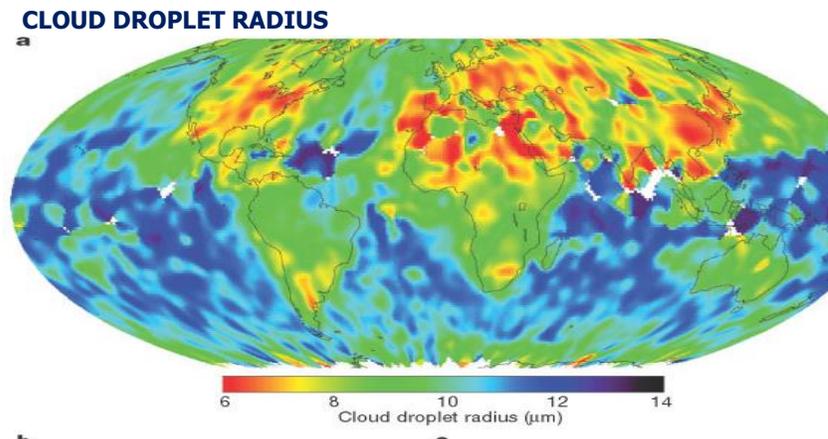
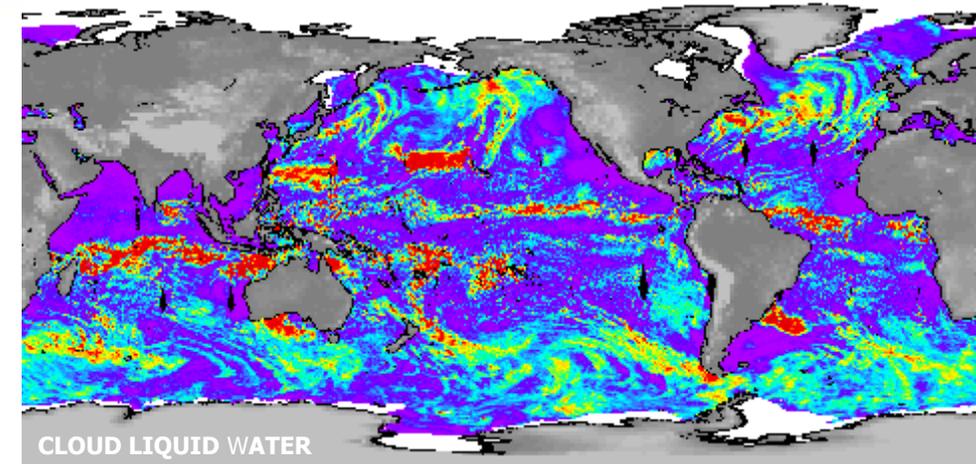
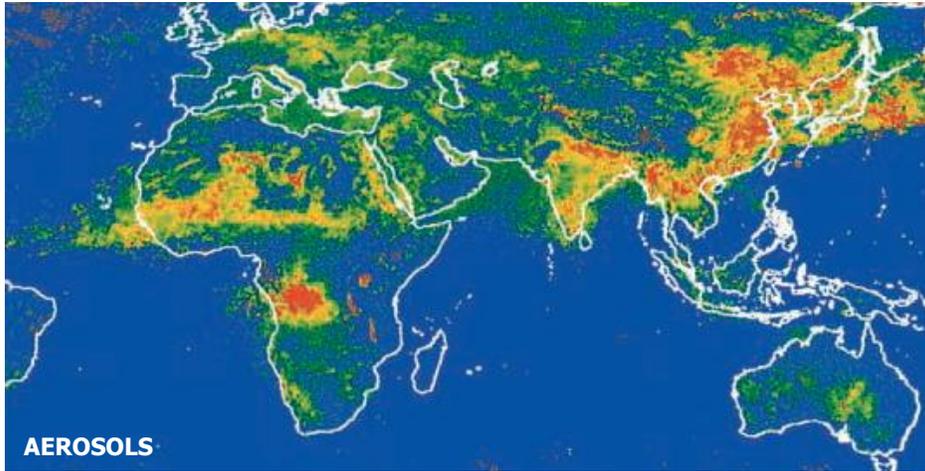


- Three successive pairs of satellites:
 - *Metop-SG A* for optical imagery and sounding
 - 6 instruments, including Sentinel-5 from Copernicus
 - *Metop-SG B* for microwave imagery
 - 5 instruments
- Contribution to the Joint Polar System (JPS) shared with NOAA
- Operational exploitation: 2023 – 2044

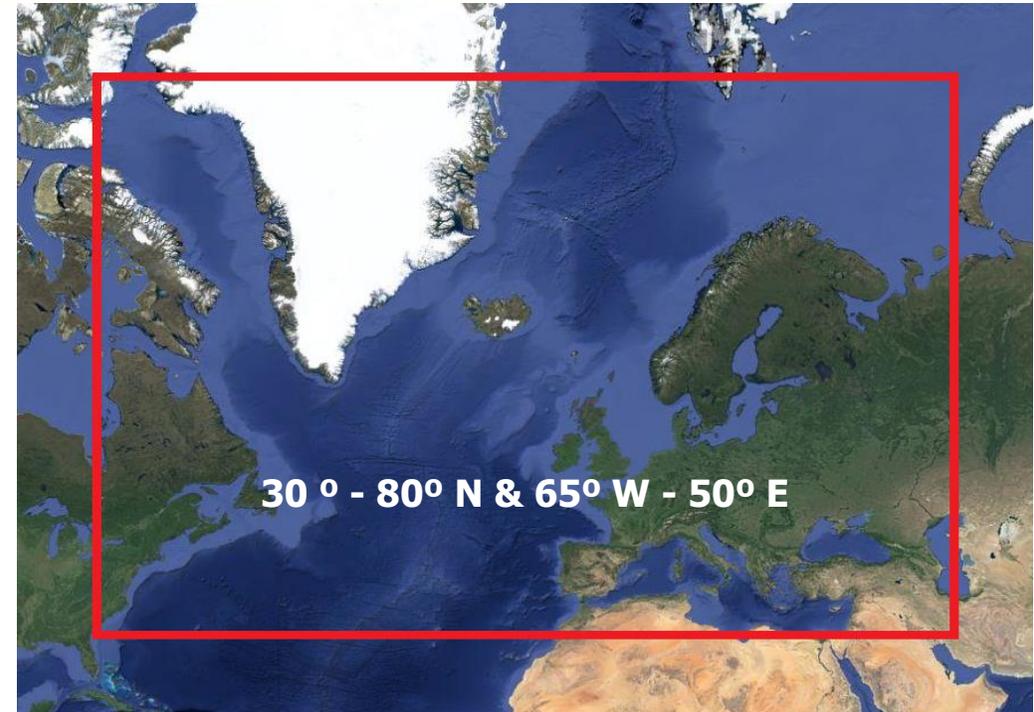
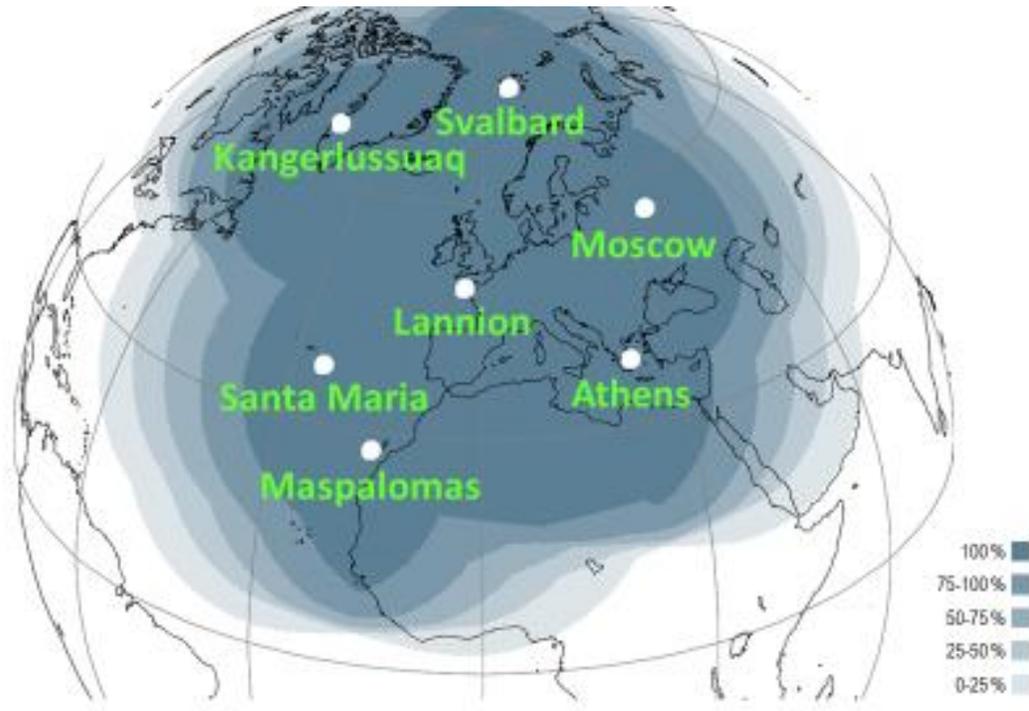
EPS-SG mission capabilities

- **Major improvements to all EPS observation missions**
 - Infrared and microwave sounding
 - Optical imagery
 - Scatterometer
 - Radio-occultation (2)
- **New imagery missions**
 - 3MI: first operational imaging polarimeter
 - Microwave imager (MWI): imagery of precipitation
 - Microwave Ice Cloud Imager (ICI): ice clouds

New measurements from EPS-SG



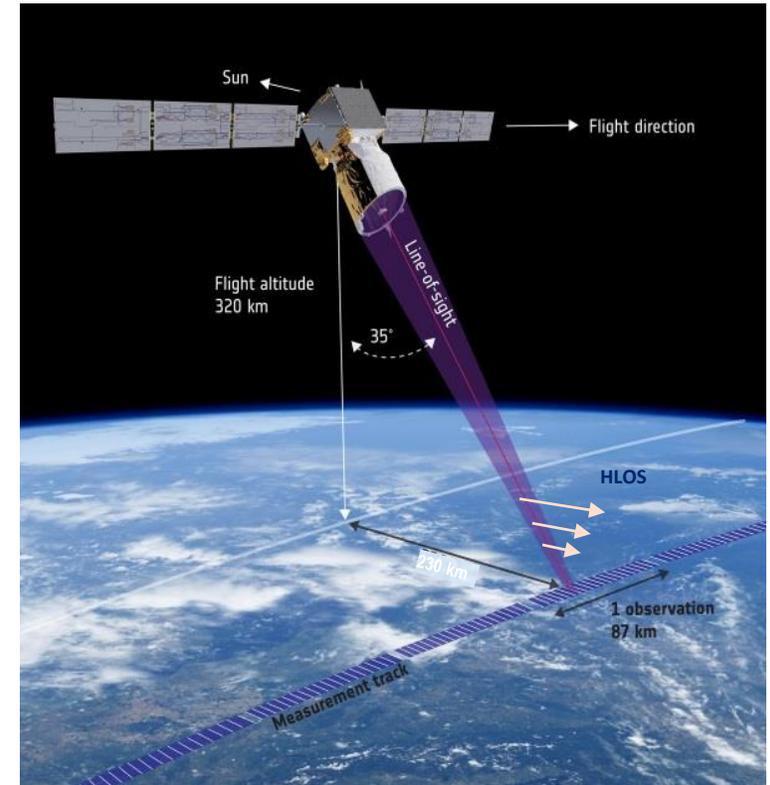
EPS-SG regional mission for Nowcasting



- Products disseminated within 15 to 30 minutes from sensing

Exploring further opportunities

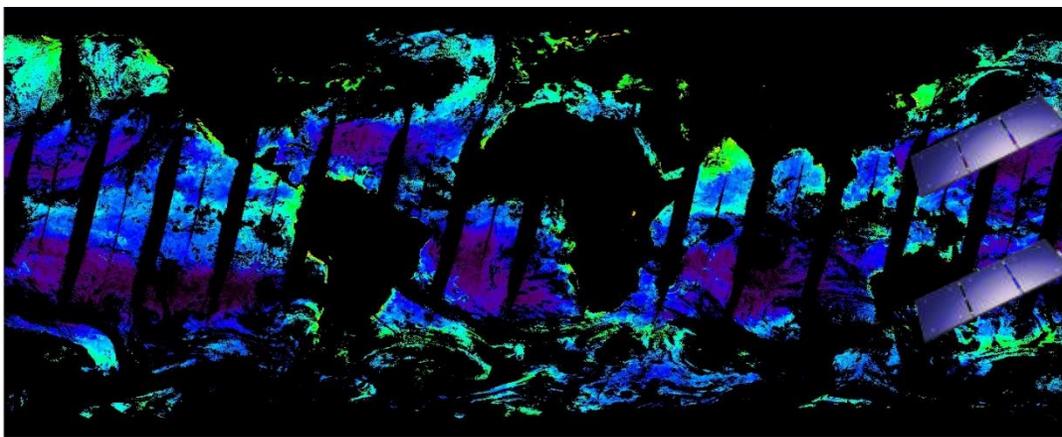
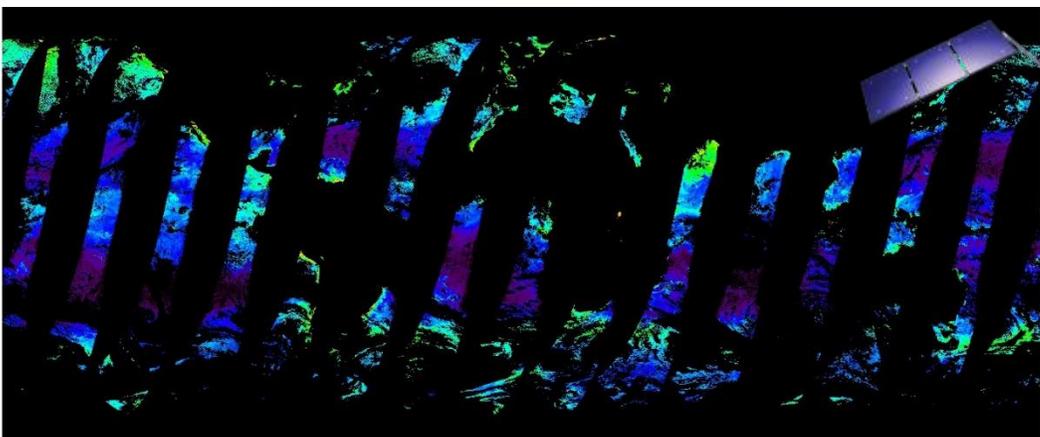
- Scope expansions of EPS-SG programme: 2030-2040
 - Additional *capability*
 - Doppler Lidar for wind profiling: post-Aeolus
 - 2-year study/design roadmap with ESA
 - Review end of 2022, programme proposal in 2023
 - Additional MW sounding *capacity*
 - Small constellation: Arctic NWC and global NWP
 - Complement to core capacity (ATMS, MWS, etc.)
 - AWS micro-satellite developed by ESA: launch in 2023
 - 5 Bands: 54 to 325 GHz
 - Constellation study with ESA, programme proposal in 2023
- Pilot procurement of additional commercial RO data



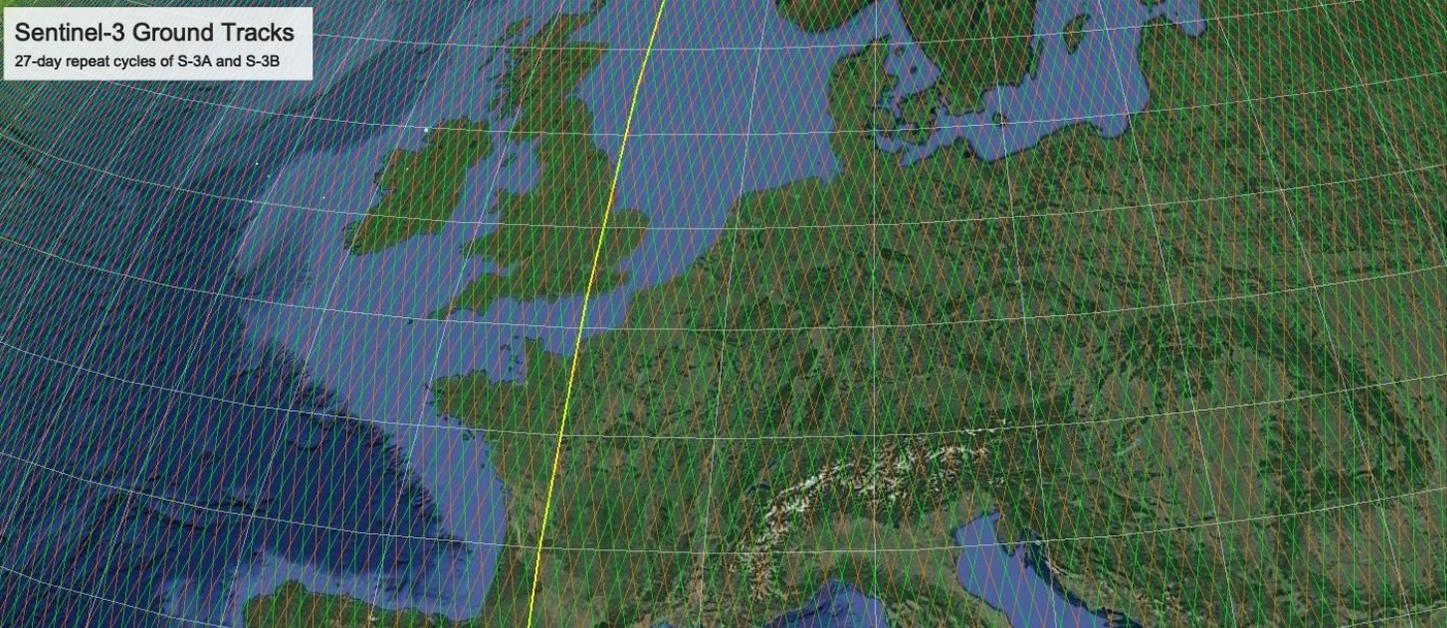
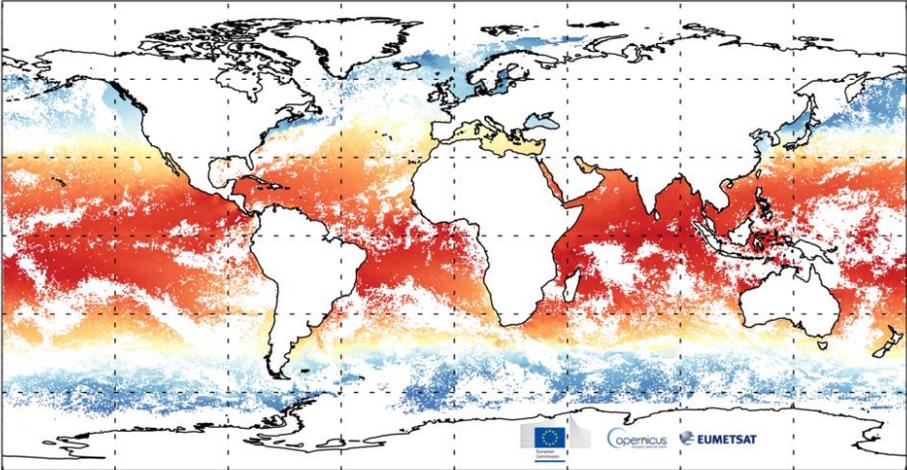
EUMETSAT in Copernicus

- Focus:
 - Ocean monitoring
 - Monitoring of atmospheric composition including GHG
 - Data access and support to users
- Cooperation with ESA on development and operations
- *Vision: deliver integrated data streams from Copernicus and EUMETSAT missions*

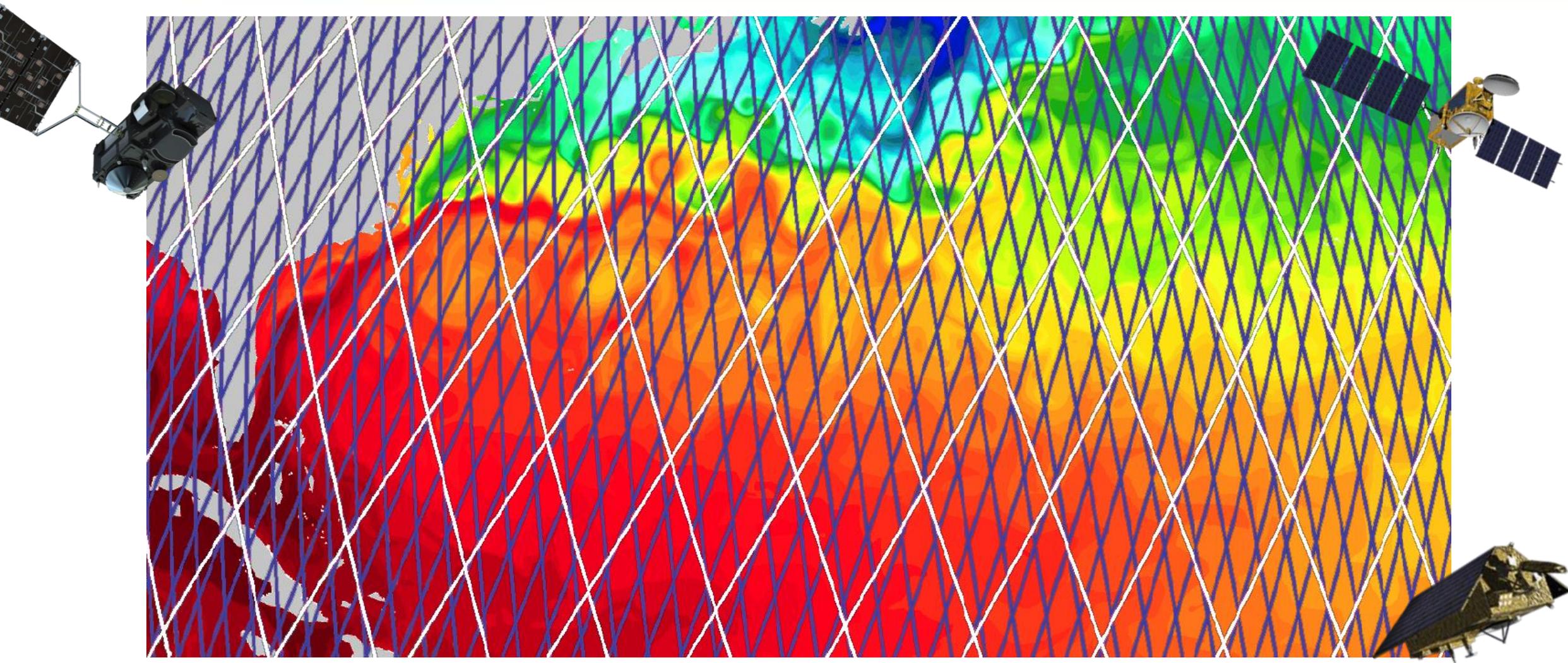
Dual Sentinel-3 marine mission



Copernicus Sentinel-3 SLSTR-A and SLSTR-B SST 18-19 Mar 2019



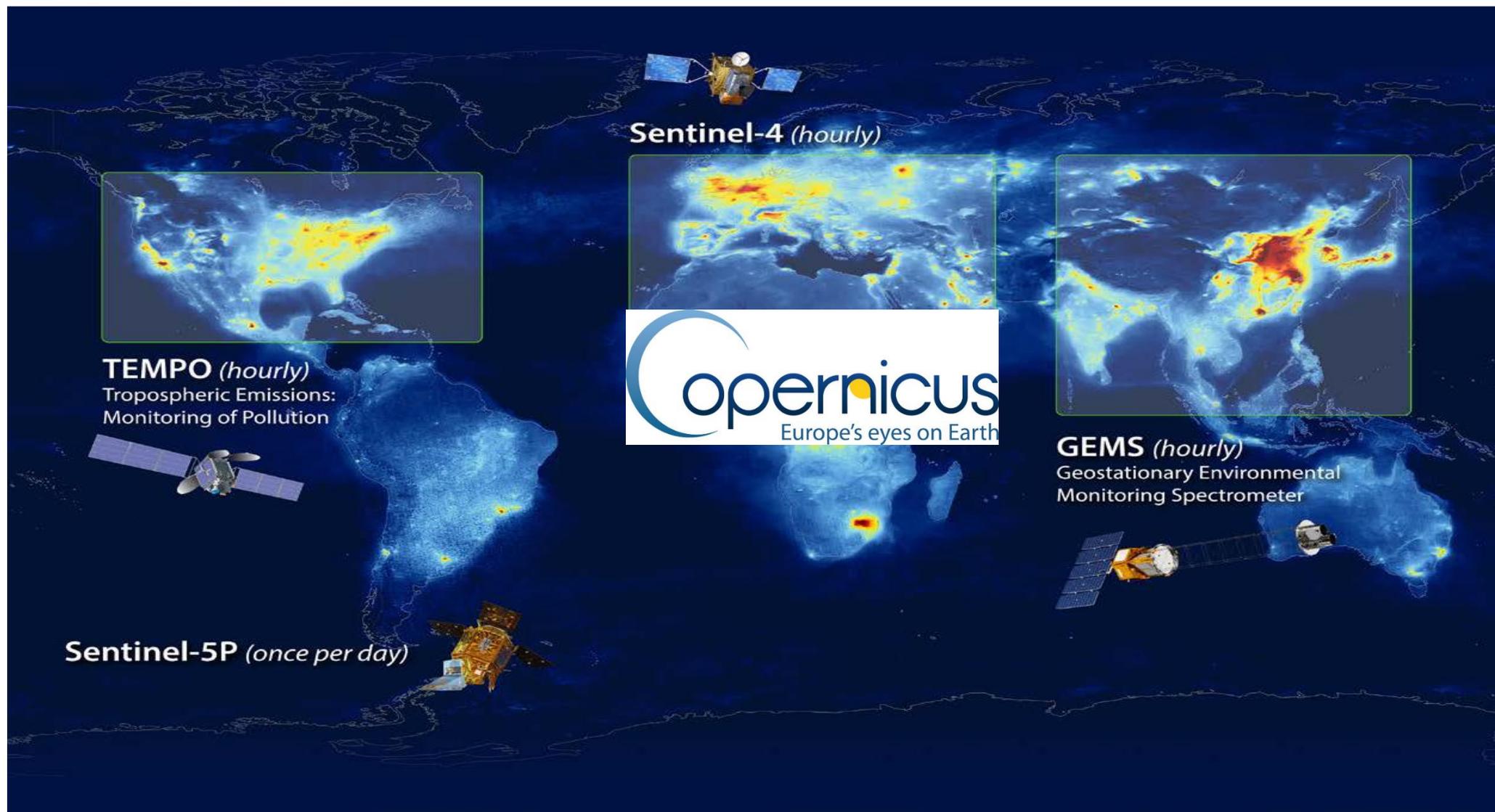
Combining Sentinel-3 and Jason for operational oceanography and climate change monitoring



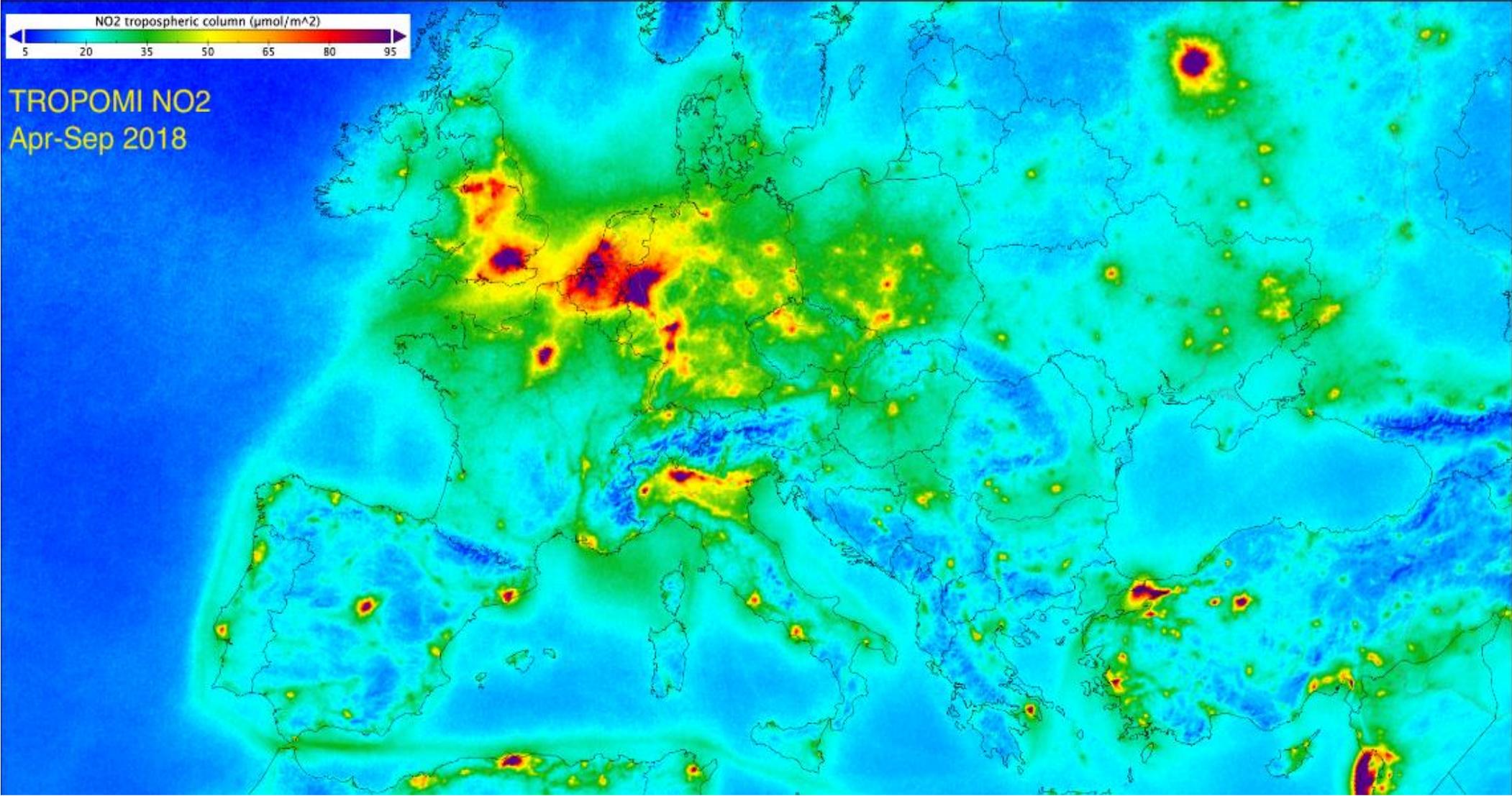
Copernicus Platform : a distributed, federative cloud platform



MTG-S/Sentinel-4 in GEO ring for air Quality



Copernicus Sentinel-5 on EPS-SG/Metop-SGA



Coming next: Copernicus CO2M GHG monitoring mission



Copernicus
Europe's eyes on Earth



Satellite Overview:

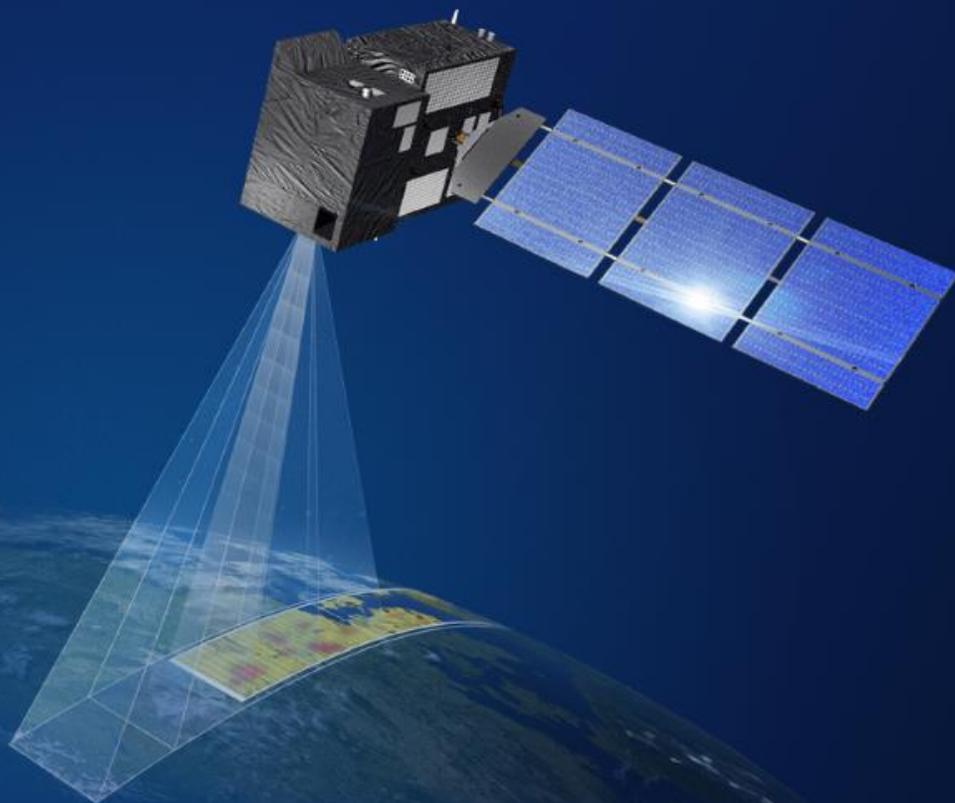
- Satellite mass: 1674 kg
- Satellite Power: < 2300W
- Payload data downlink: up to 1.8 Gbit/s (Ka-band)
- Baseline launcher: VEGA-C

Payload overview:

- CO₂ and CH₄ push-broom imaging spectrometer (CO₂I)
 - with embedded NO₂ visible channel (NO₂I)
- Multi-Angle Polarimeter (MAP) for aerosol and light path correction
- Cloud Imager (CLIM) for cloud and cirrus detection

Orbit:

- Type: SSO @ 11:30 LTDN
- Altitude: 735 km
- Repeat cycle: 11 days



Artist impression of a CO₂M-Satellite. © OHB