

EUMETSAT Programmes and future plans

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Director-General

30 September 2020

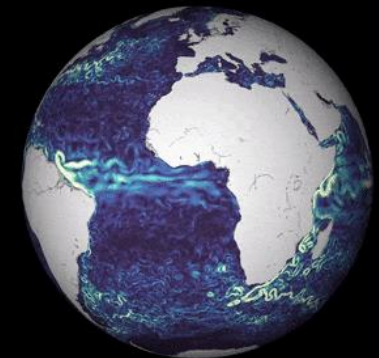
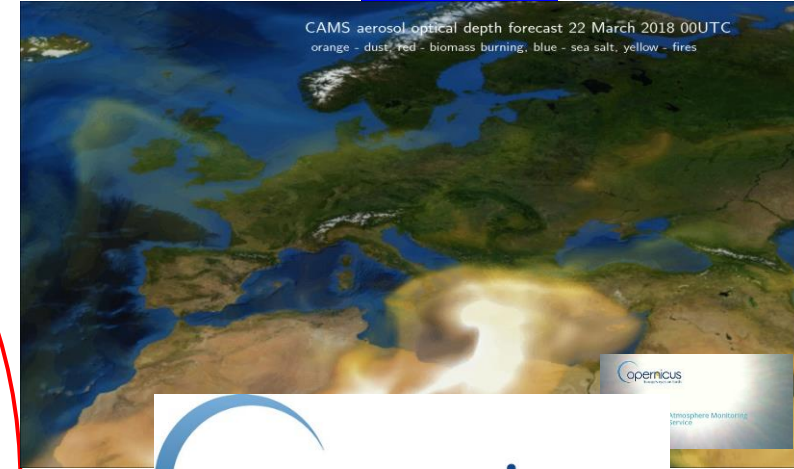
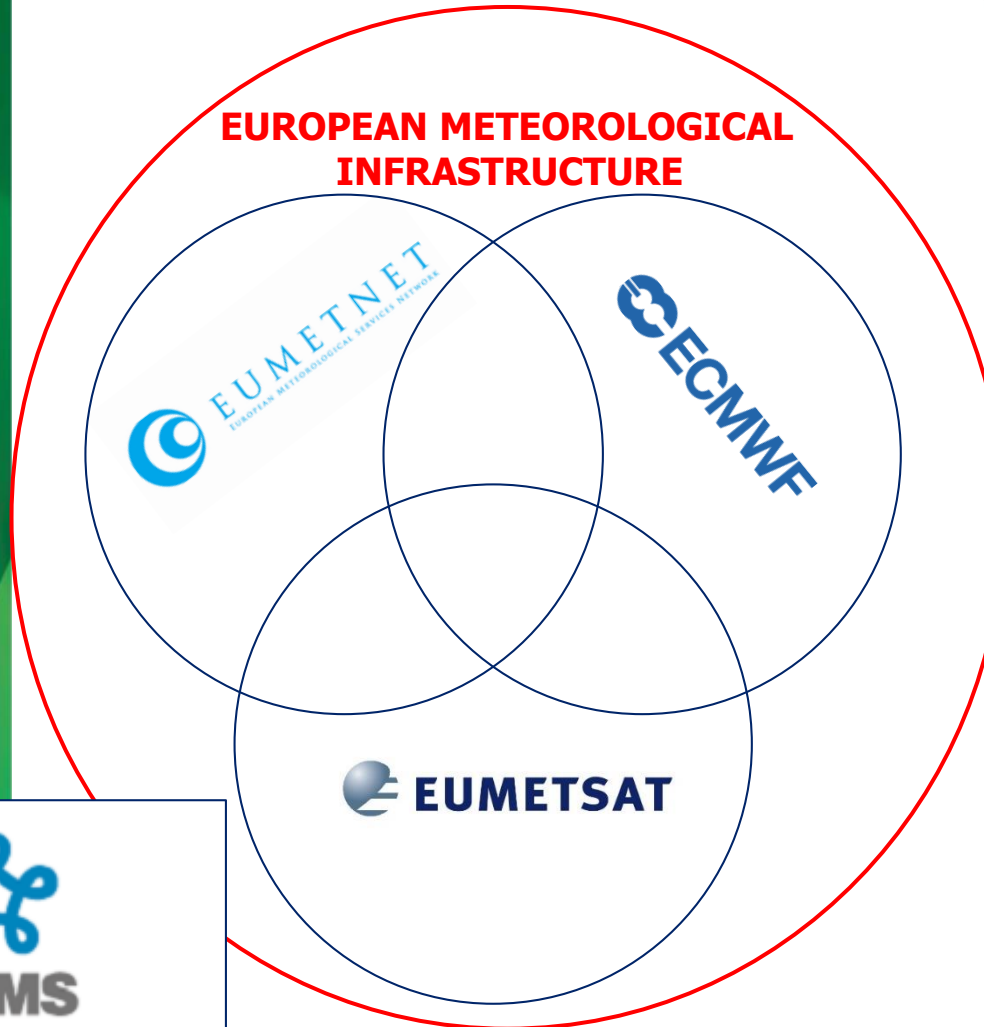


EUMETSAT: an intergovernmental organisation with 30 Member States

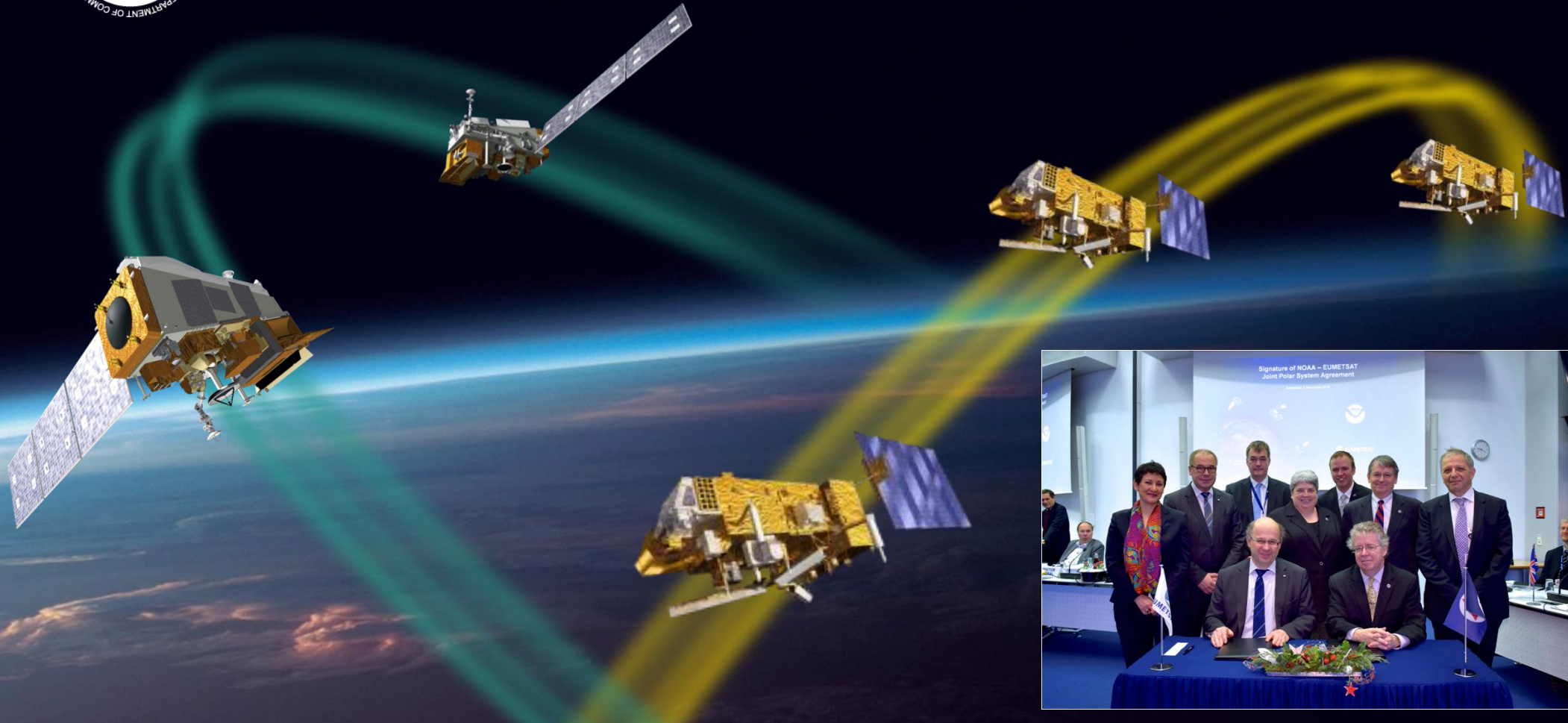
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 CZECH REPUBLIC	 DENMARK	 ESTONIA	 FINLAND
 FRANCE	 GERMANY	 GREECE	 HUNGARY
 ICELAND	 IRELAND	 ITALY	 LATVIA
 LITHUANIA	 LUXEMBOURG	 THE NETHERLANDS	 NORWAY
 POLAND	 PORTUGAL	 ROMANIA	 SLOVAK REPUBLIC
 SLOVENIA	 SPAIN	 SWEDEN	 SWITZERLAND
 TURKEY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



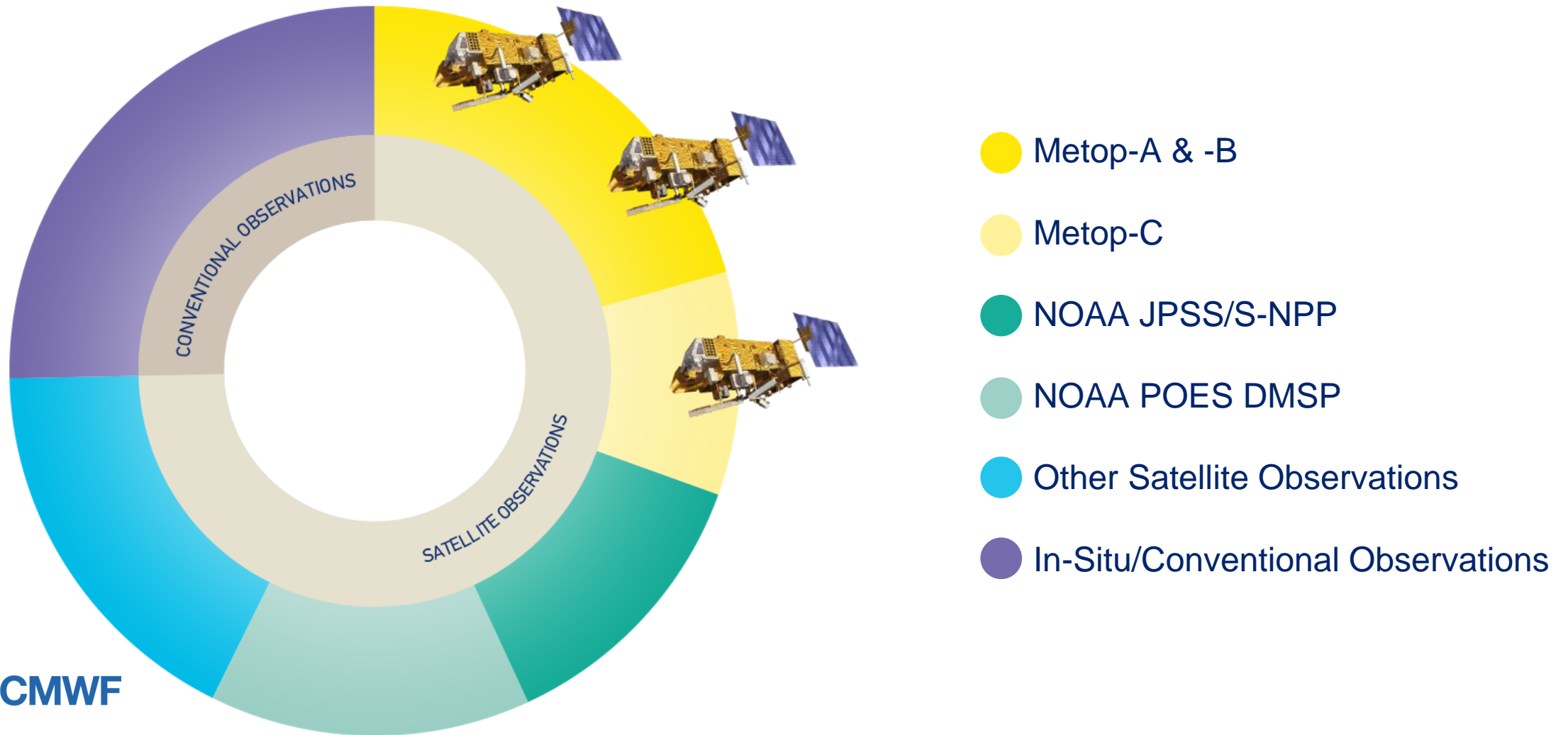
International cooperation framework



Shared systems with the United States: Joint Polar System

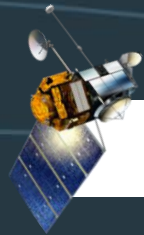


Relative contributions to Day 1 forecast errors (FSOI)

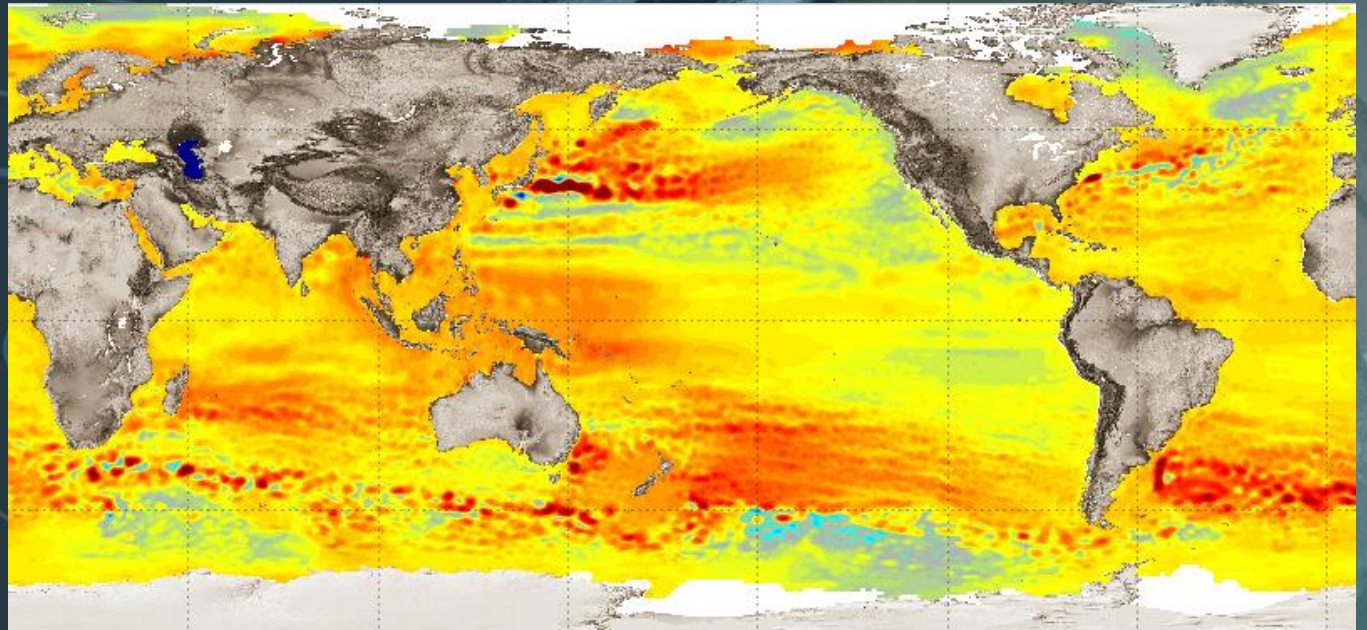


Source: ECMWF

Shared systems with the United States: Jason series



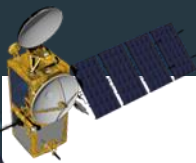
TOPEX-POSEIDON:1992-2006



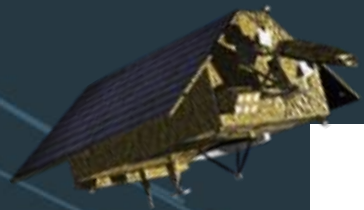
JASON: 2001-2013



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

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

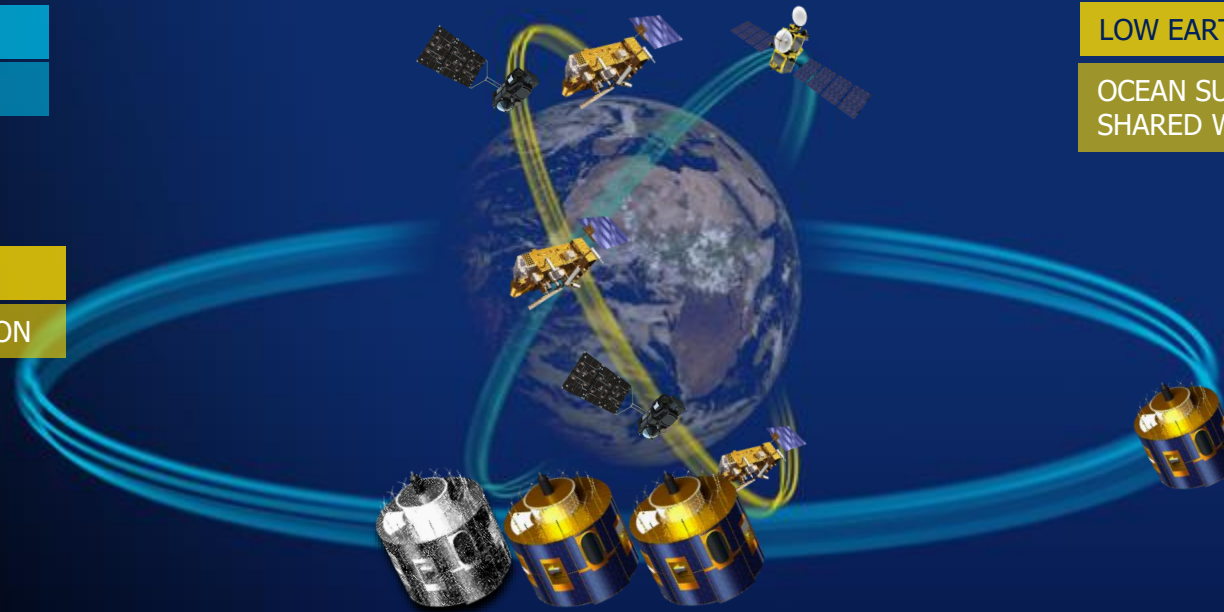
METEOSAT-9, -10, -11

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)



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

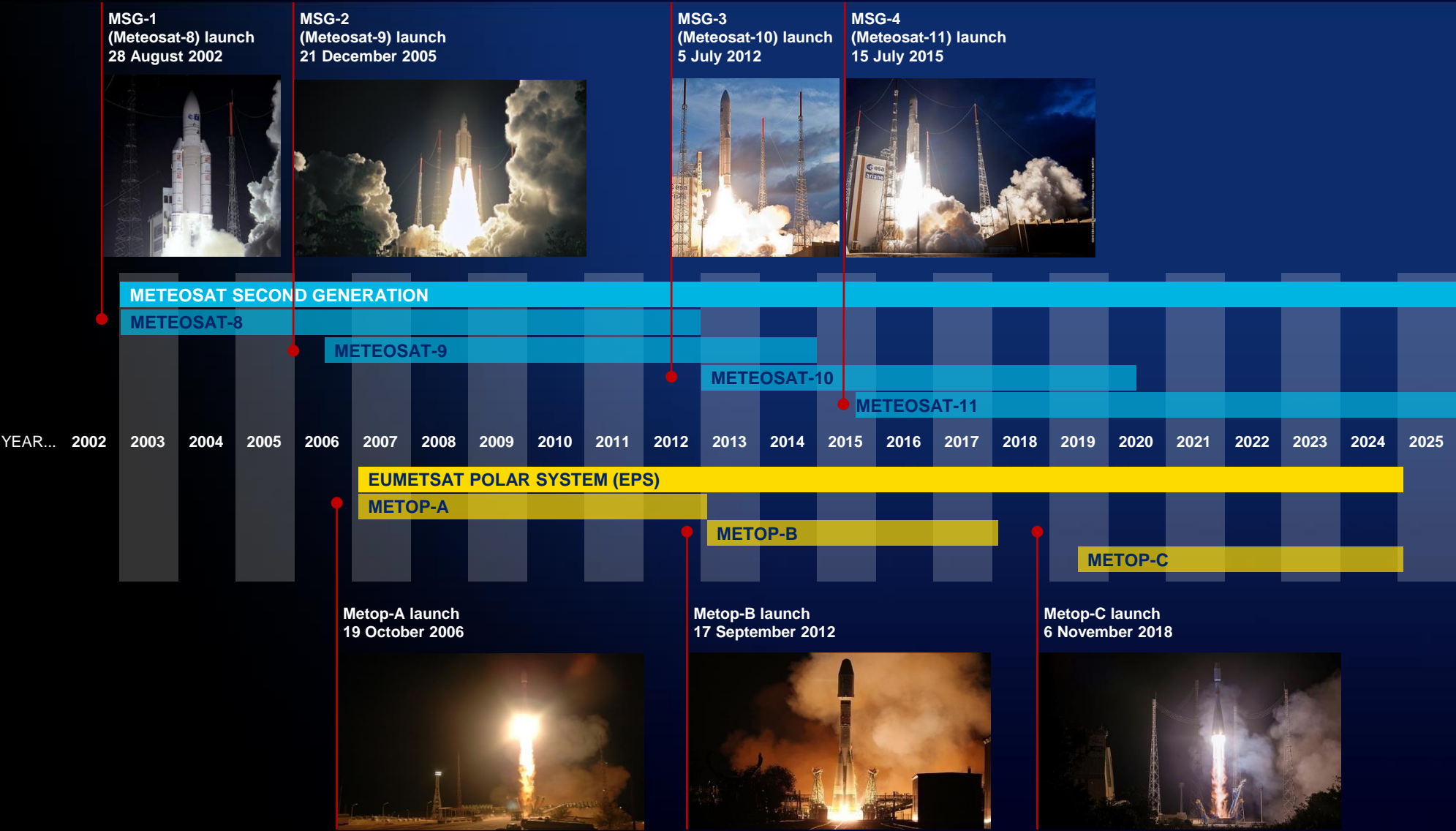
METEOSAT 2ND GENERATION

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

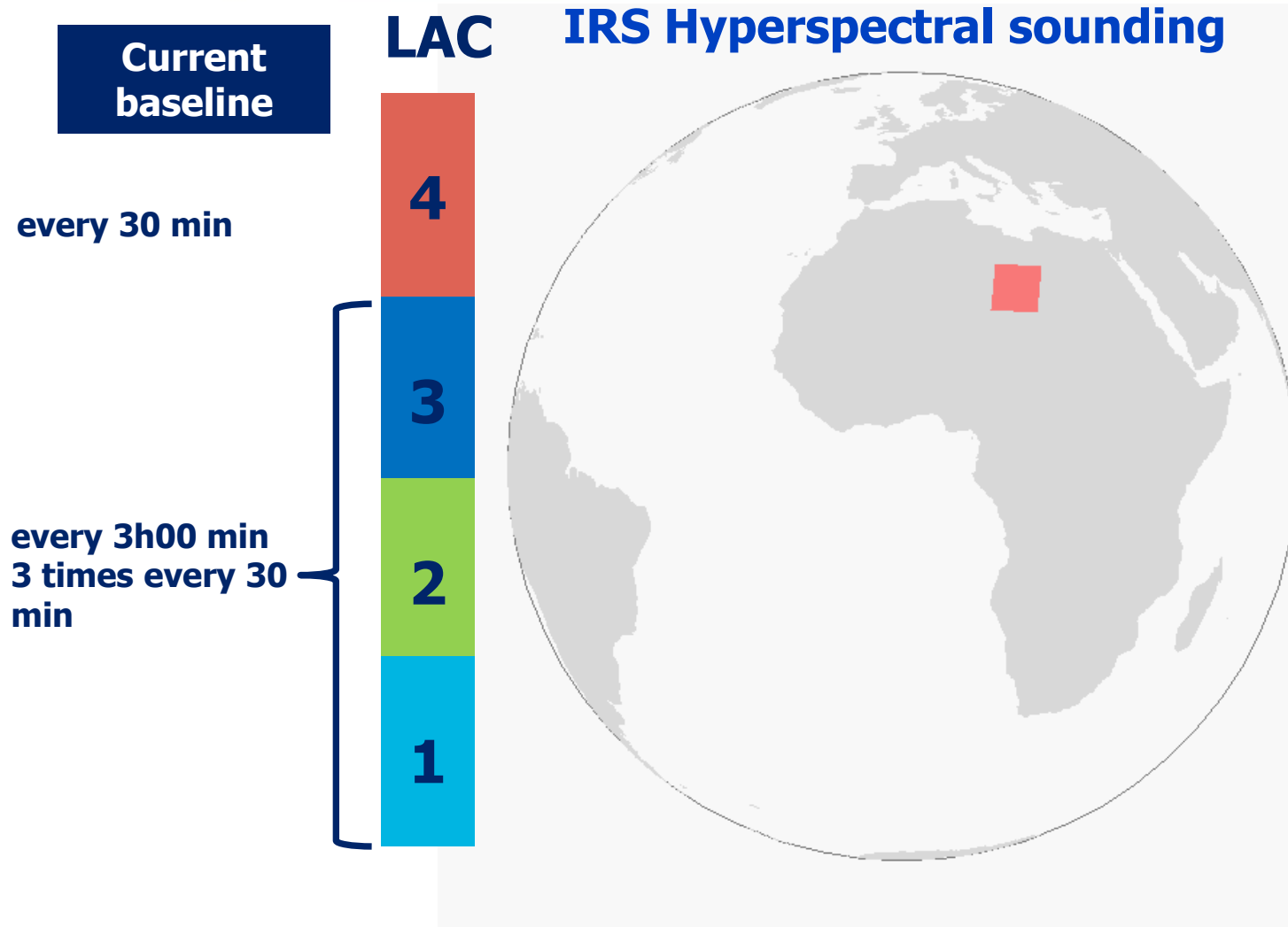
- Full disc every 10 minutes in 16 spectral bands (MTG-I1)
- Imagery of Europe every 2.5 minutes (MTG-I2)
- Full disc Lightning Imager

■ Sounding mission: MTG-S satellites

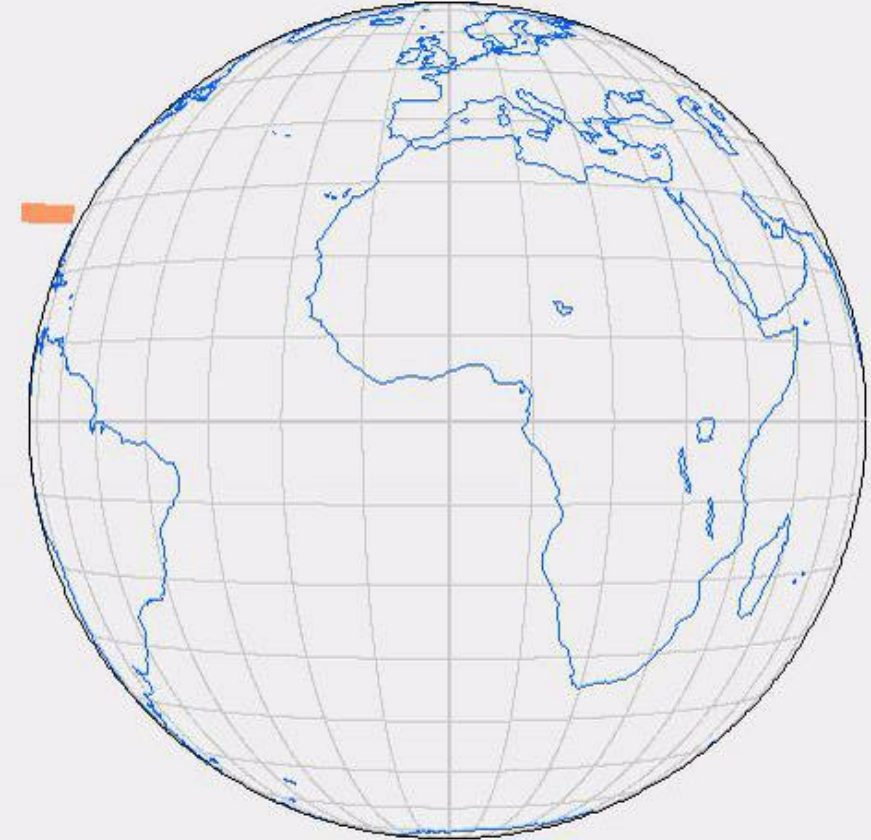
- IRS hyperspectral infrared sounder
 - Temperature, moisture profiles every 30 minutes (Europe)
- Atmospheric chemistry:
 - Synergy IRS - Copernicus Sentinel-4

■ Operational exploitation: 2022-2042

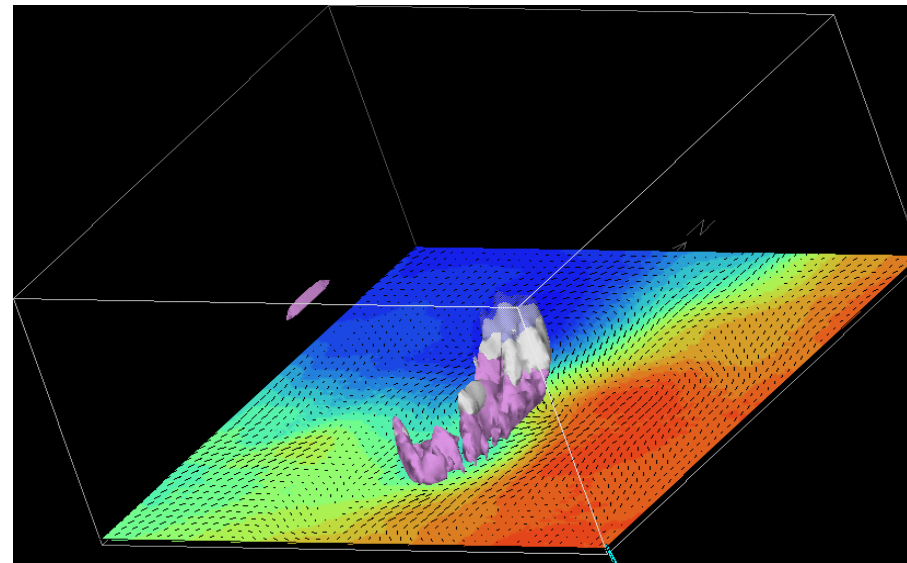
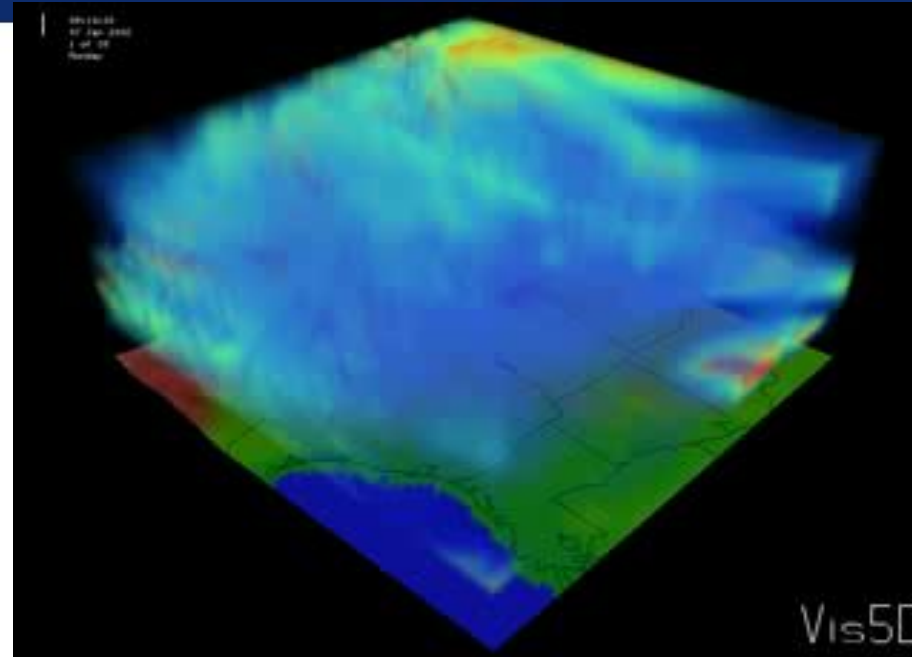
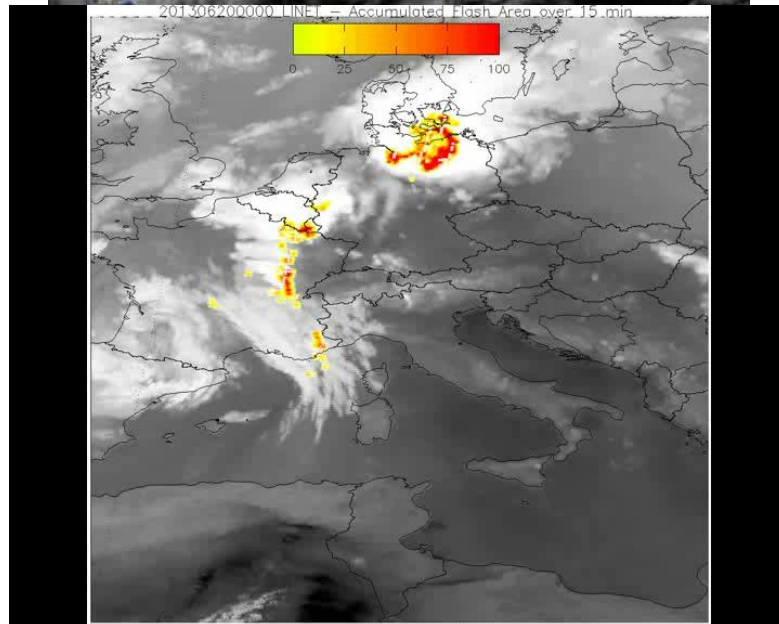
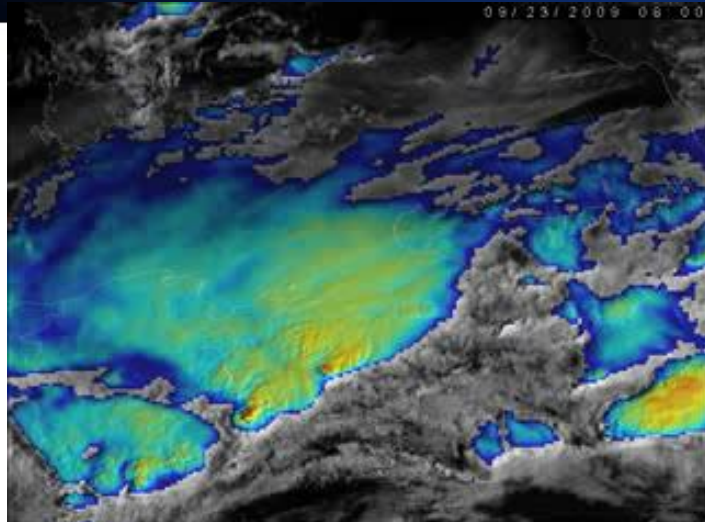
Fast repeat Infrared sounding and imagery over Europe



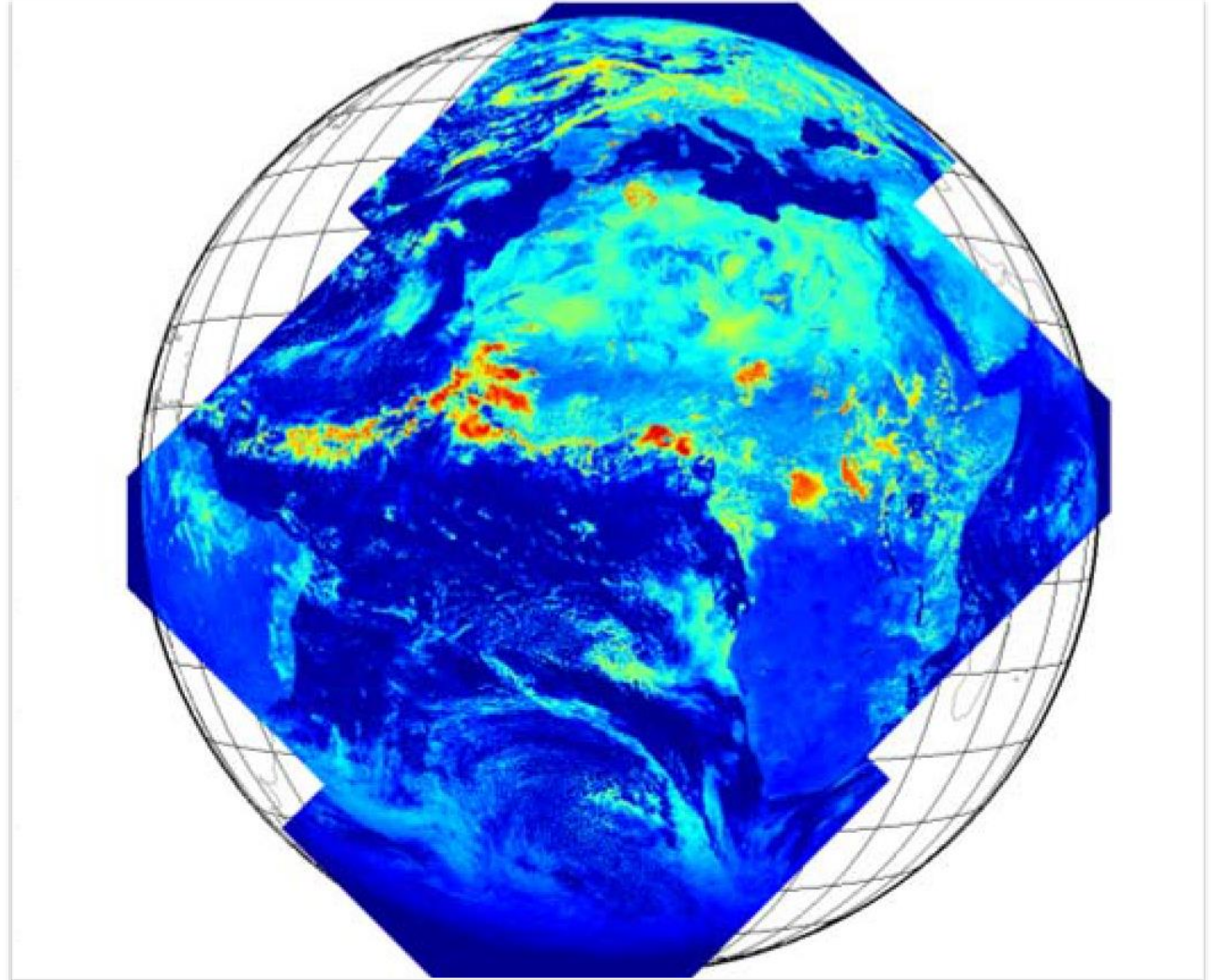
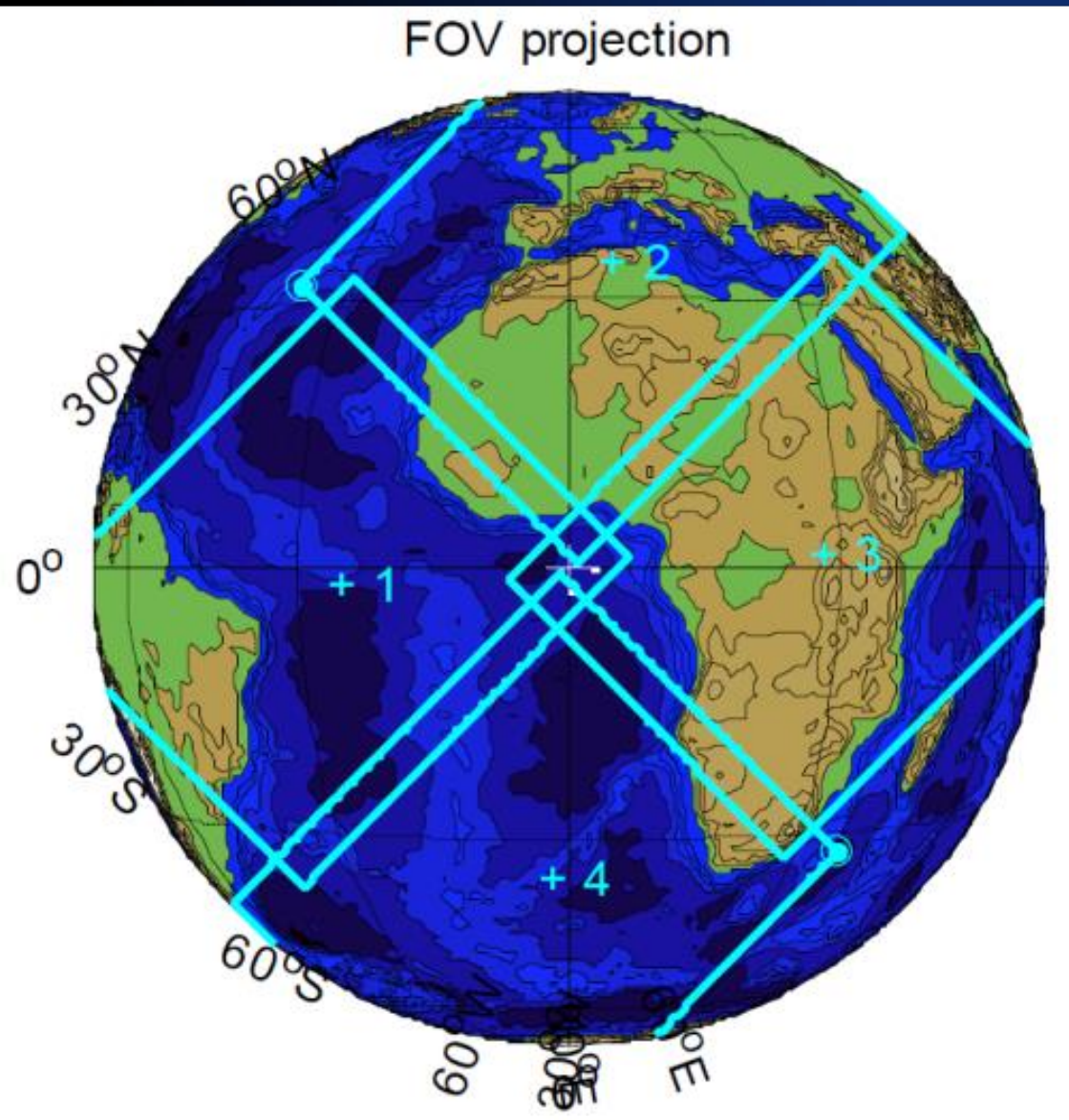
FCI Rapid-Scan Service: 2.5 mn



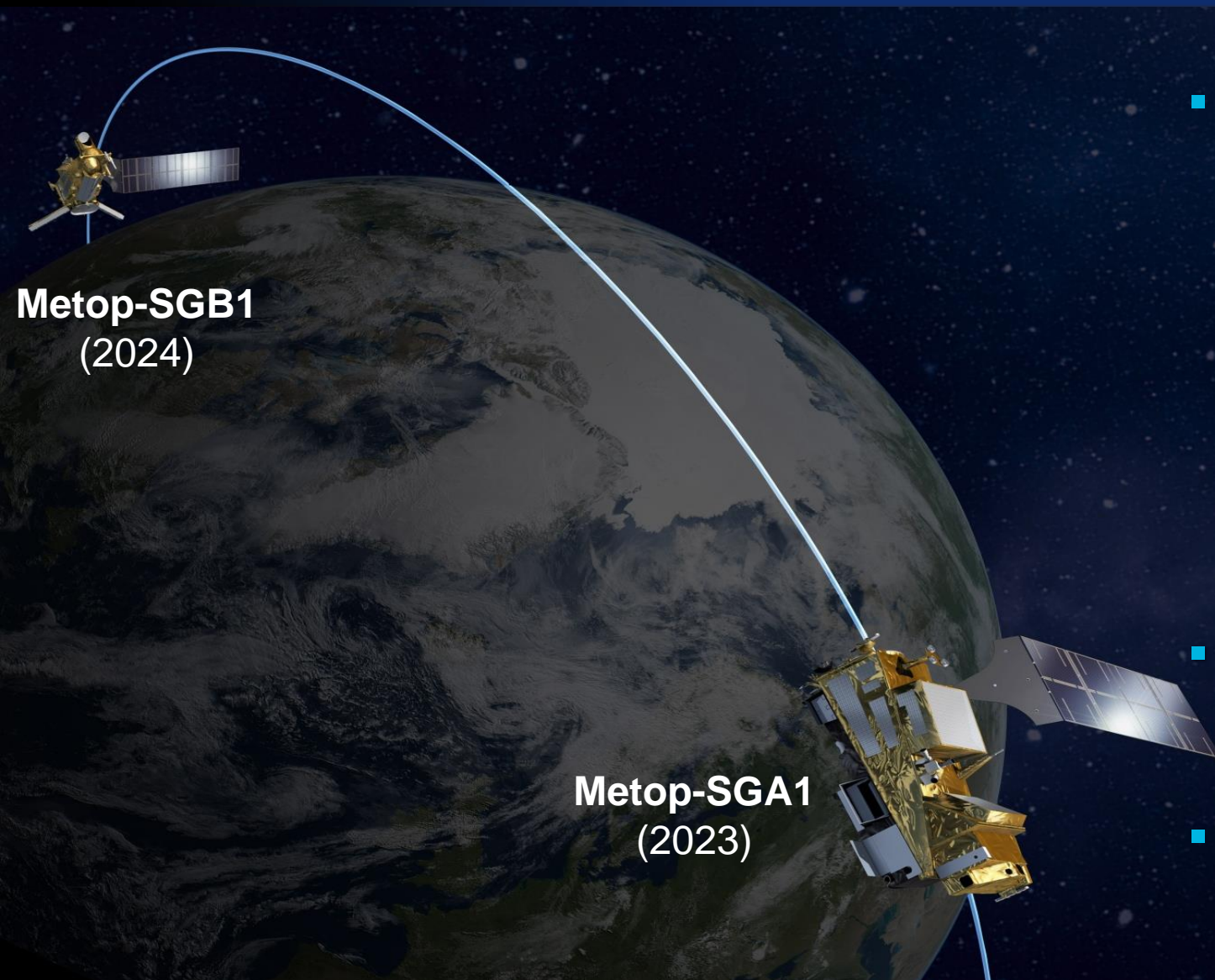
4D weather cube with MTG-I and MTG-S



Full disc coverage of Lightning imagery



EPS Second Generation: a two-satellite system

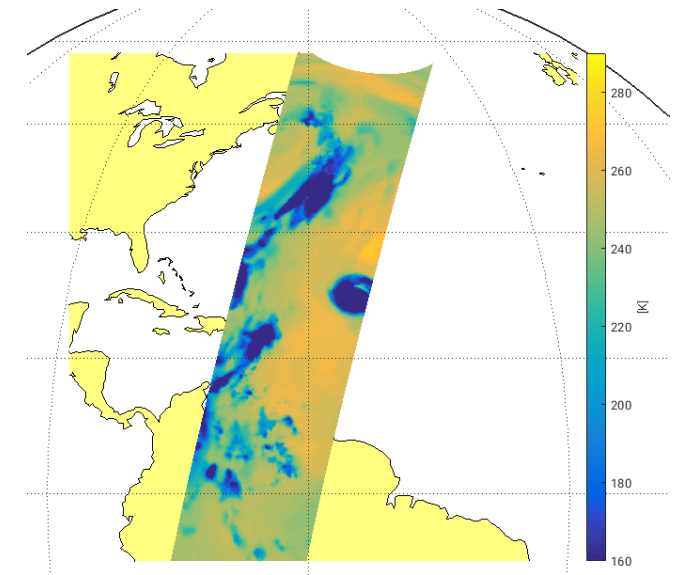
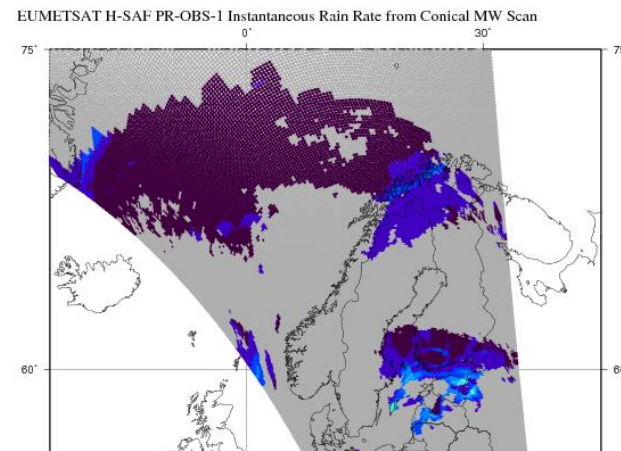
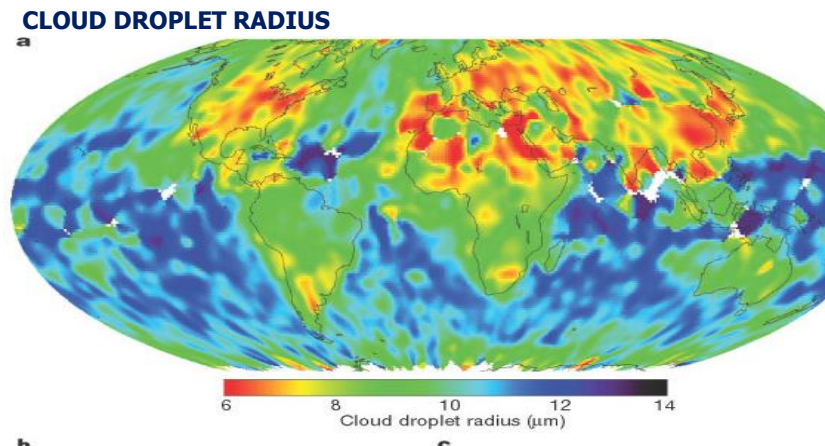
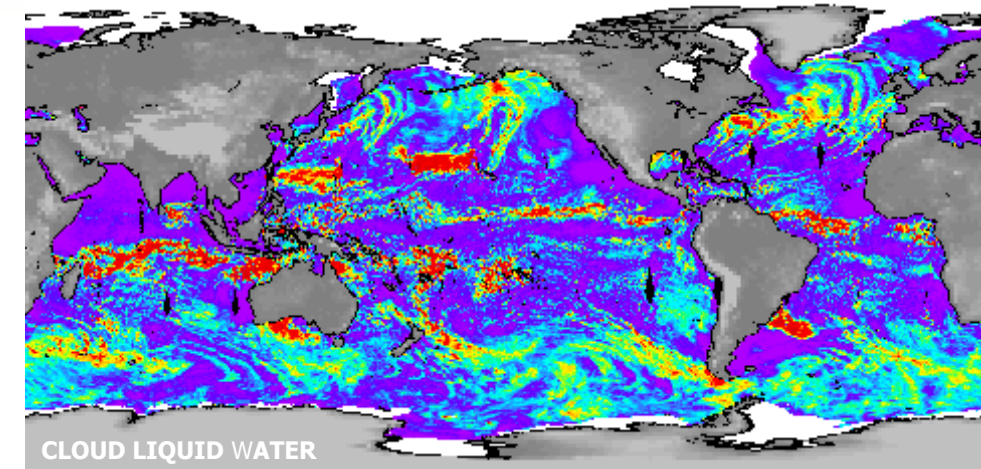
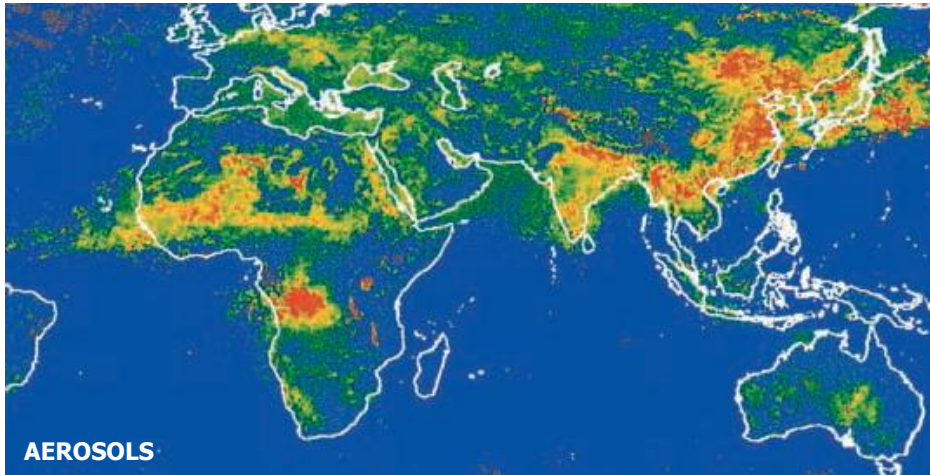


- Three successive pairs of satellites:
 - *Metop-SG A* for optical imagery and sounding
 - 6 instruments, including Sentinel-5 from Copernicus
 - *Metop-SG B* for microwave imagery
 - 5 instruments
- Contribution to the Joint Polar System (JPS) shared with NOAA
- Operational exploitation: 2023 – 2044

EPS-SG mission capabilities

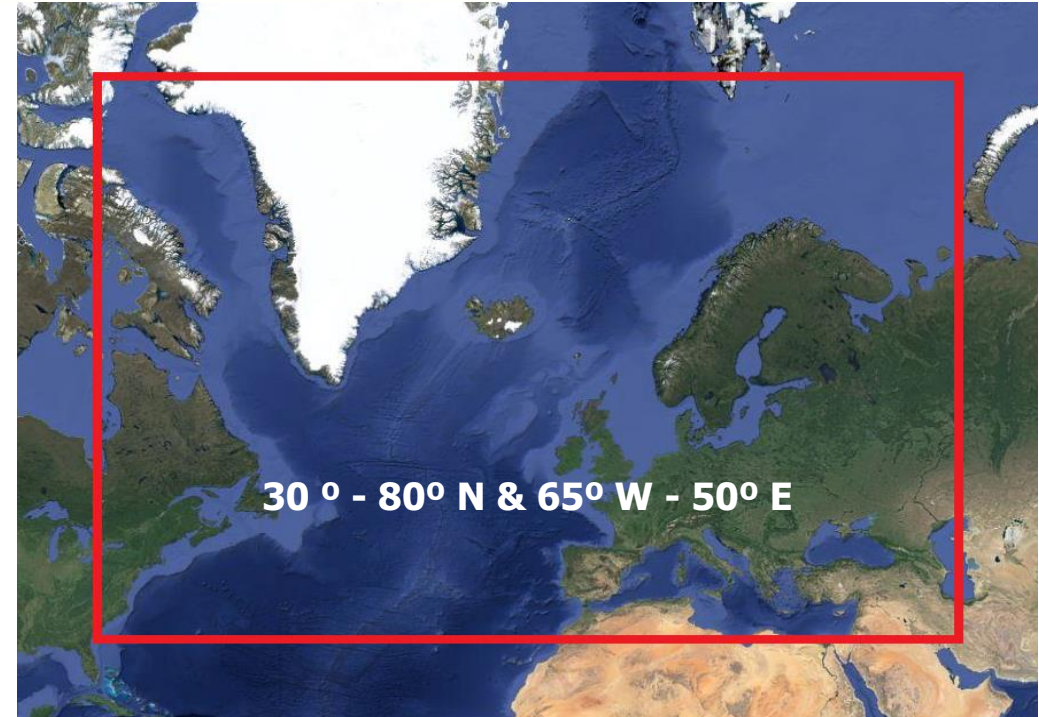
- **Major improvements to all EPS observation missions**
 - Infrared and microwave sounding
 - Optical imagery
 - Scatterometer
 - Radio-occultation (2)
- **New imagery missions**
 - 3MI: first operational imaging polarimeter
 - Microwave imager (MWI): imagery of precipitation
 - Microwave Ice Cloud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

New measurements from EPS-SG



ICE CLOUD IMAGING (664 GHz)

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

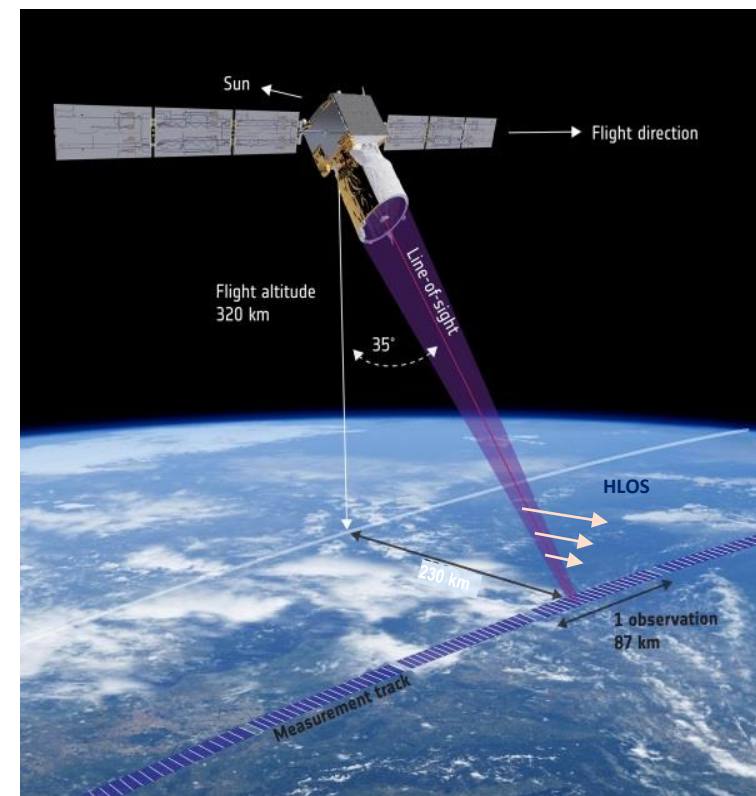
- Additional *capability*

- 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

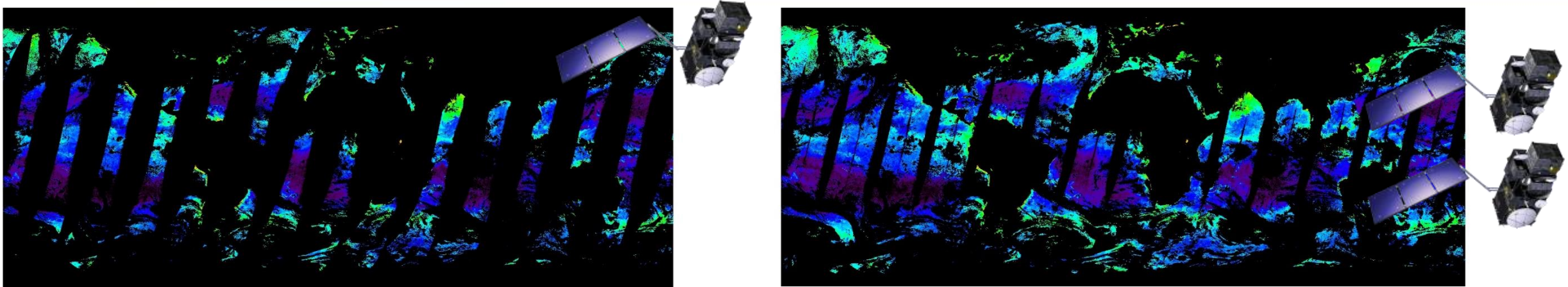
- Pilot procurement of additional commercial RO data



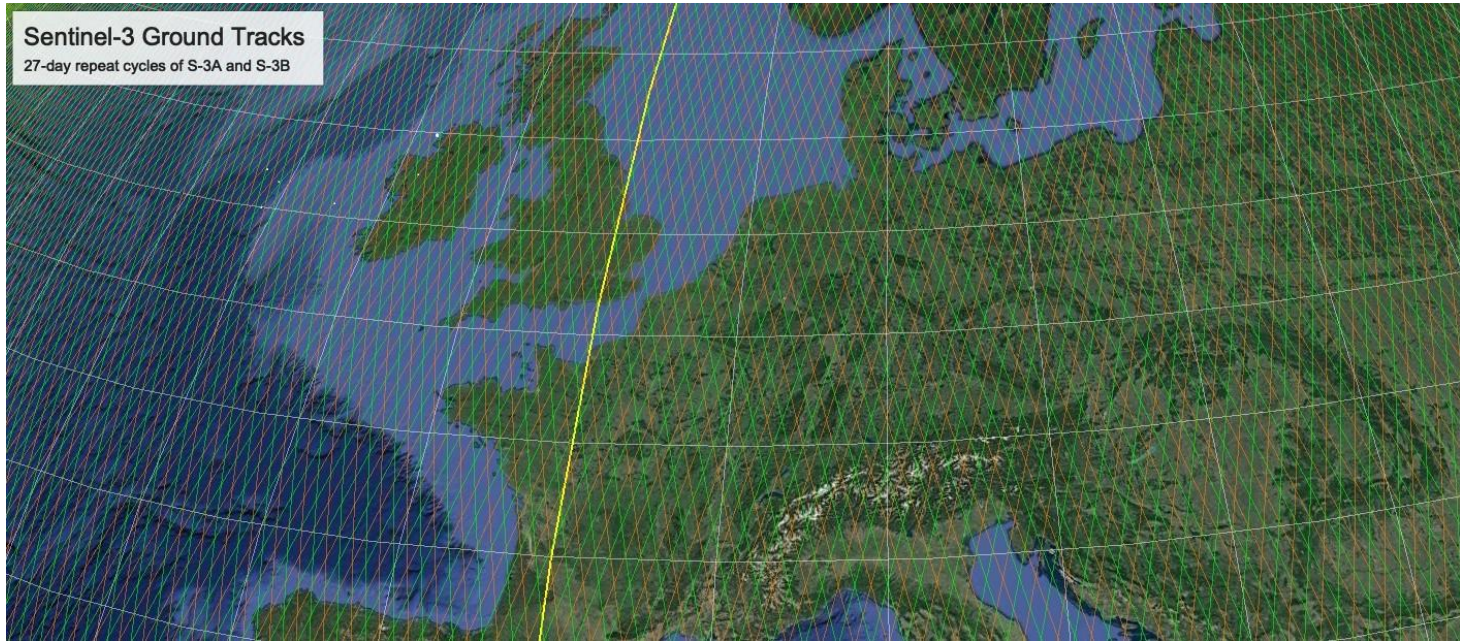
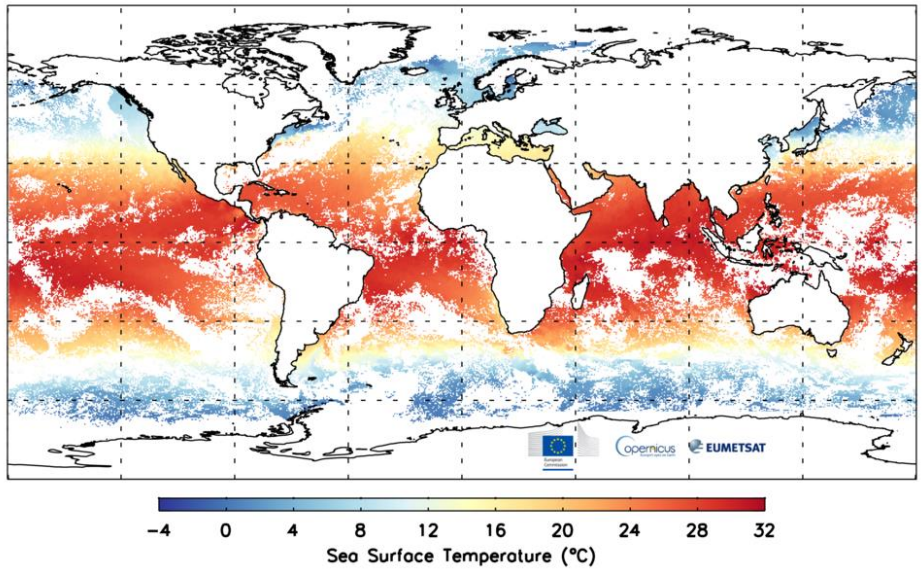
EUMETSAT in Copernicus

- 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*

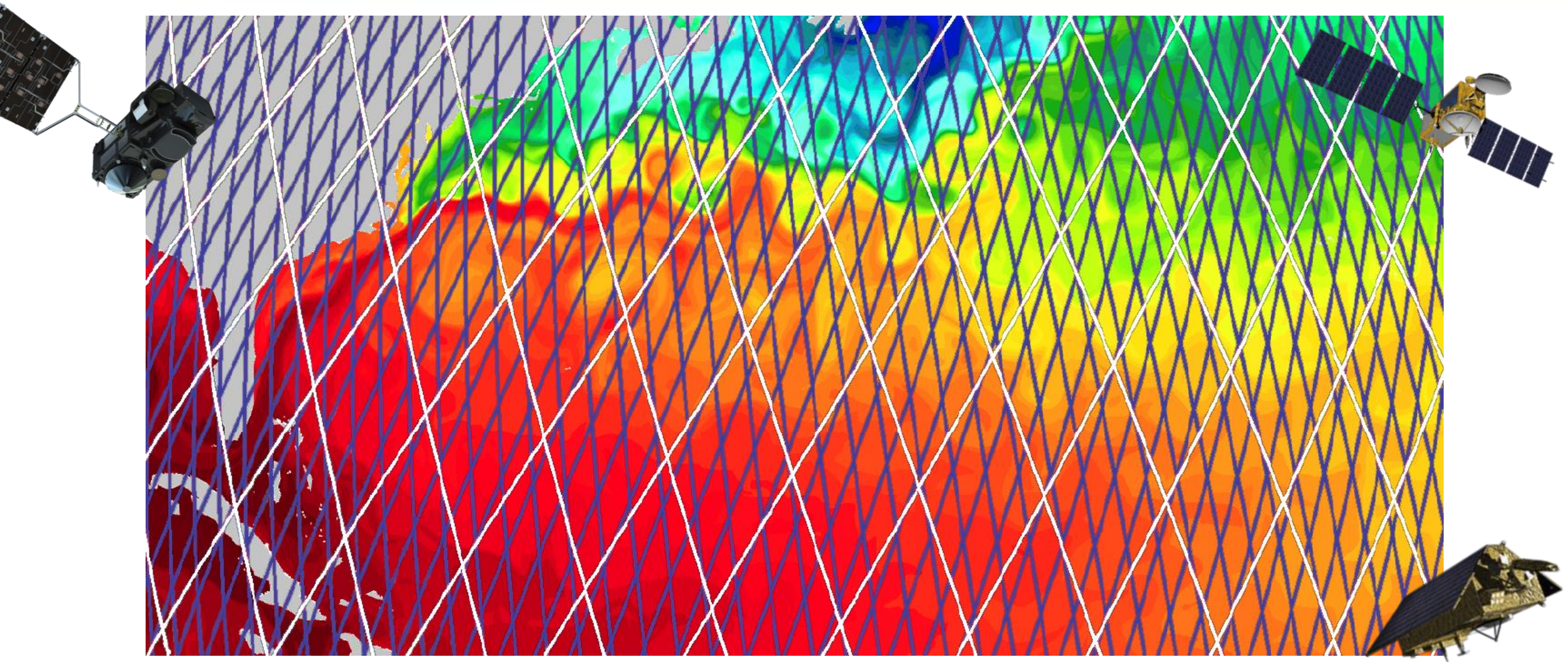
Dual Sentinel-3 marine mission



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



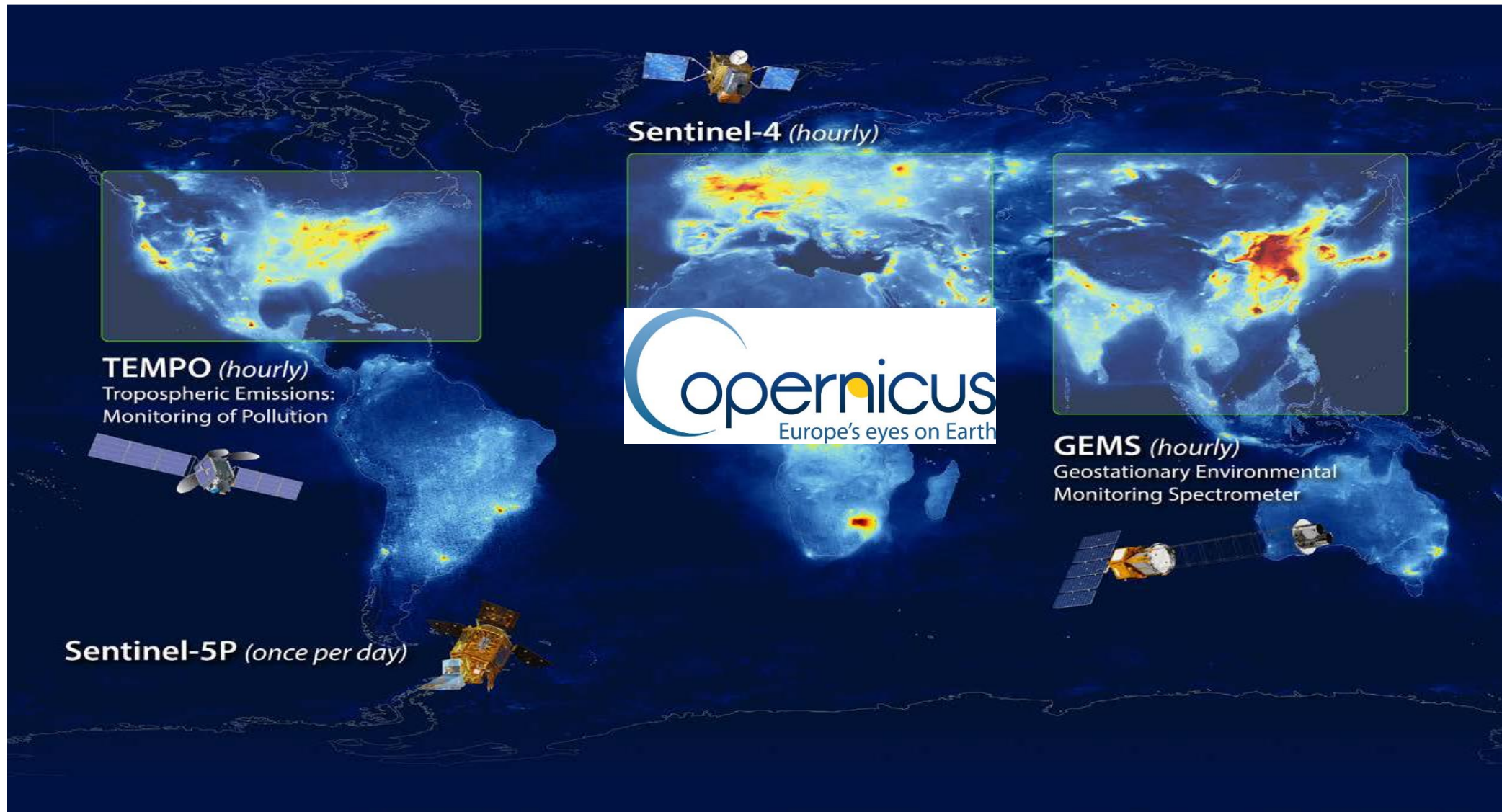
Combining Sentinel-3 and Jason for operational oceanography and climate change monitoring



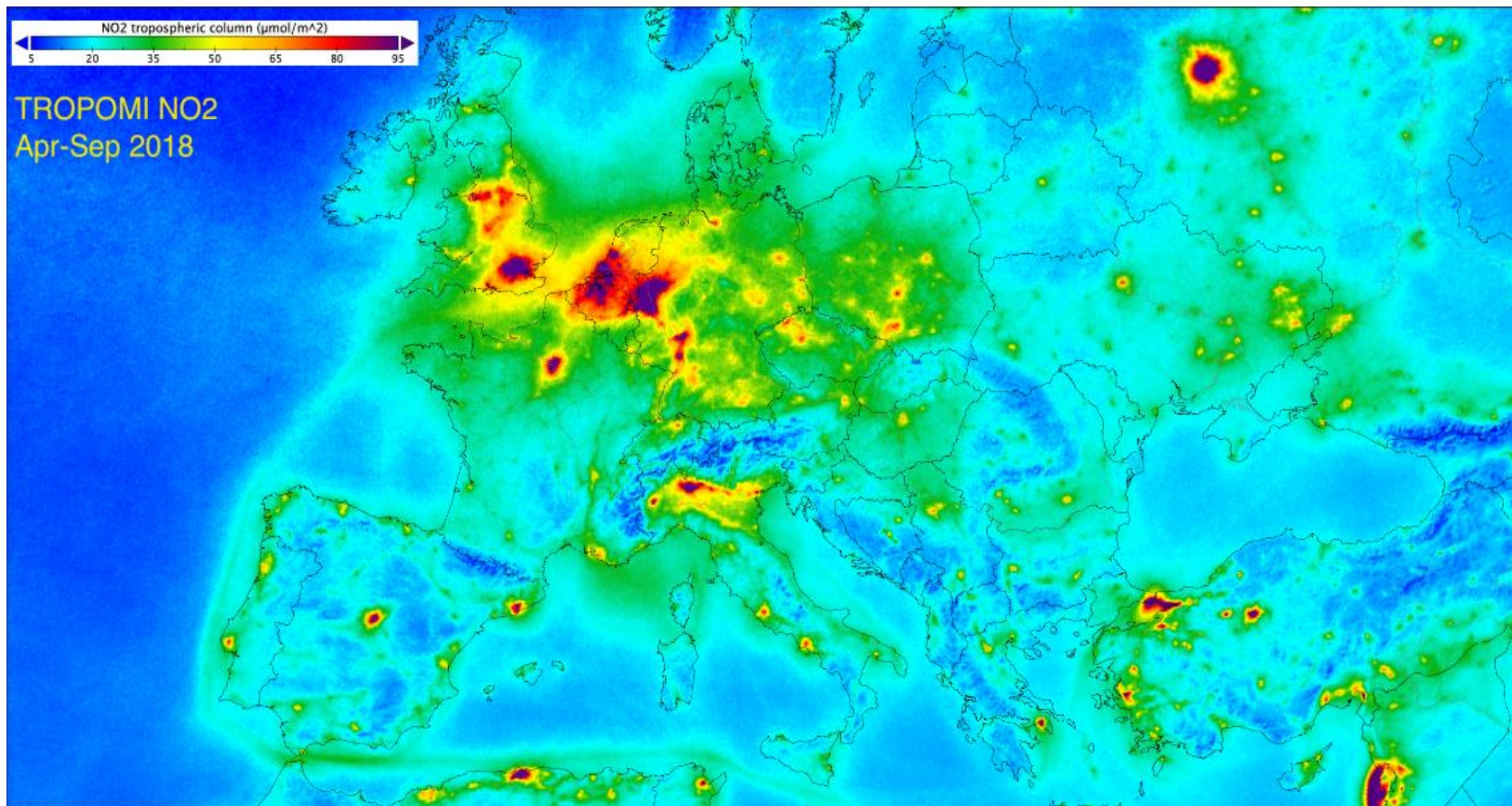
Copernicus Platform : a distributed, federative cloud platform



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



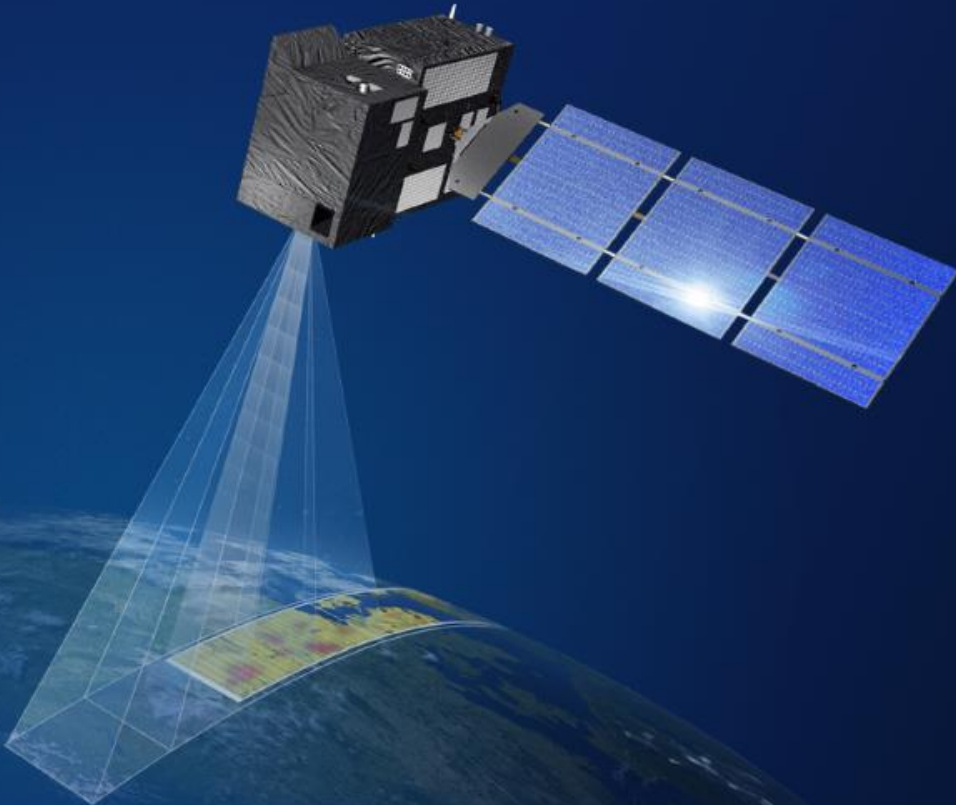
Copernicus Sentinel-5 on EPS-SG/Metop-SGA



Coming next: Copernicus CO2M GHG monitoring mission



Copernicus
Europe's eyes on Earth



Artist impression of a CO2M-Satellite. © OHB

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