

MONITORING WEATHER AND CLIMATE FROM SPACE



EUMETSAT Presentation

NOAA Satellite Conference
27 April – 1 May 2015



Current EUMETSAT satellites

METOP A-B

(LOW-EARTH, SUN – SYNCHRONOUS ORBIT)

EUMETSAT POLAR SYSTEM/INITIAL JOINT POLAR SYSTEM

JASON-2 (shared with CNES, NOAA)

(LOW-EARTH, 63° INCL. NON SYNCHRONOUS ORBIT)

OCEAN SURFACE TOPOGRAPHY MISSION

METEOSAT 8-9-10 (2nd GENERATION)

(GEOSTATIONARY ORBIT)

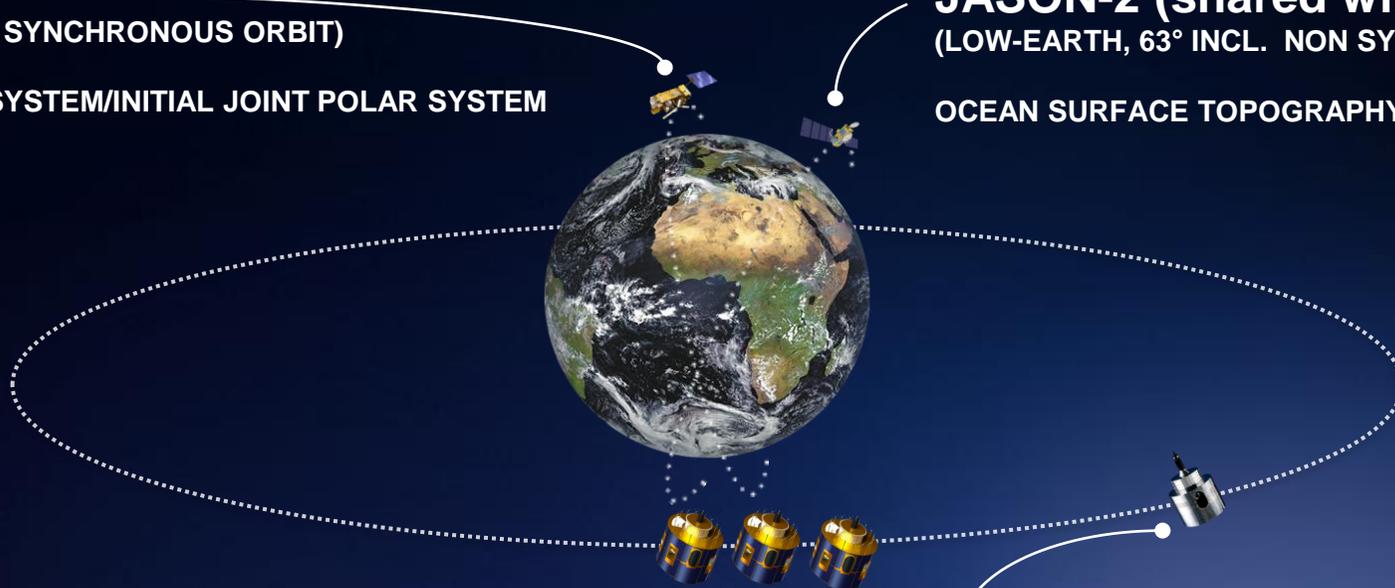
TWO-SATELLITE SYSTEM:

- METEOSAT-10: FULL DISK IMAGERY MISSION AT 0° (15 MN)
- METEOSAT-9: RAPID SCAN SERVICE OVER EUROPE AT 9.5°E (5 MN)
- METEOSAT- 8: BACK UP AT 3.5°E

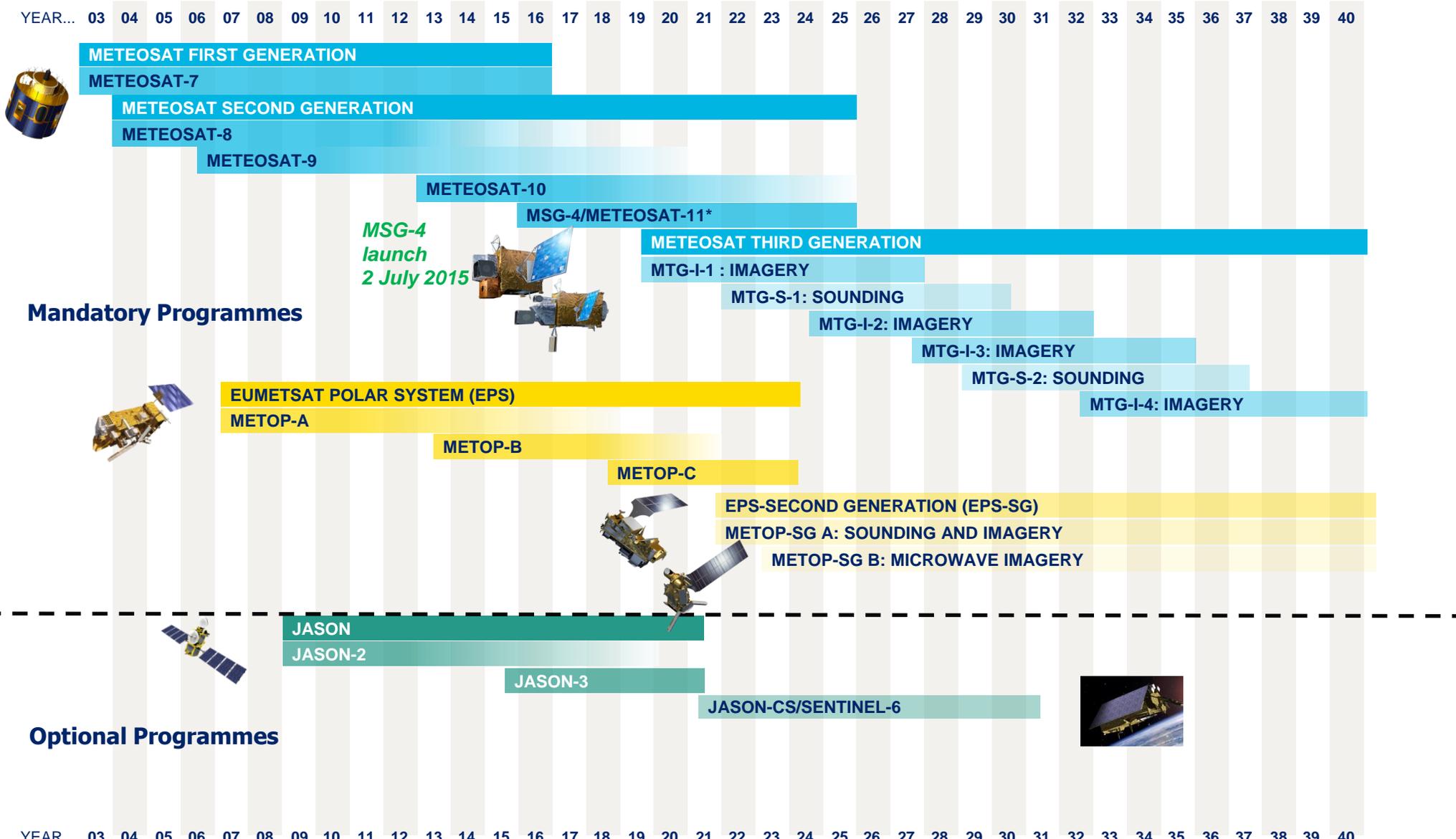
METEOSAT – 7 (1st GENERATION)

(GEOSTATIONARY ORBIT)

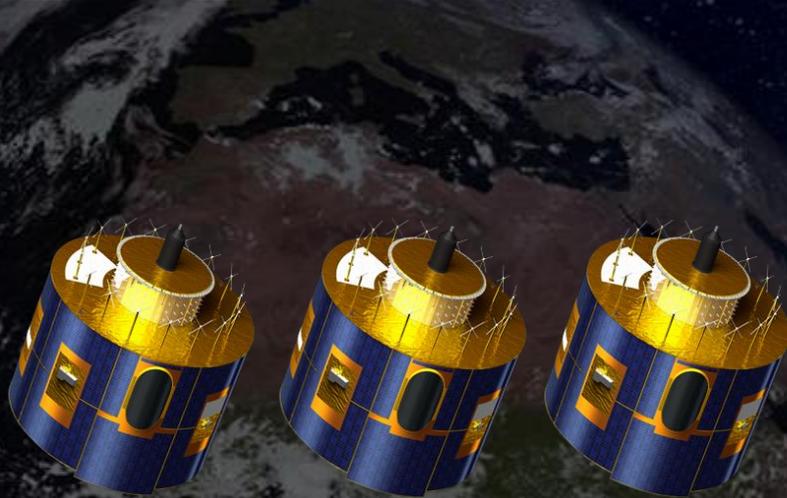
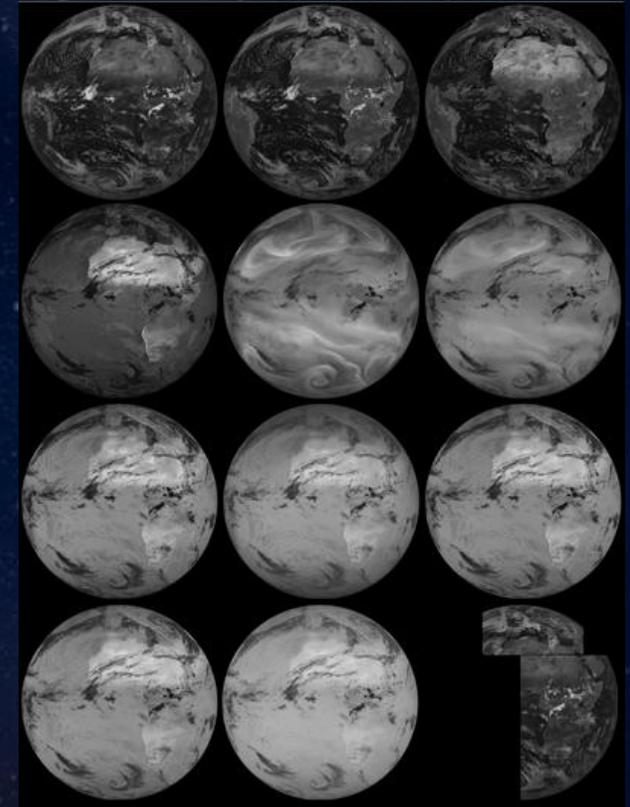
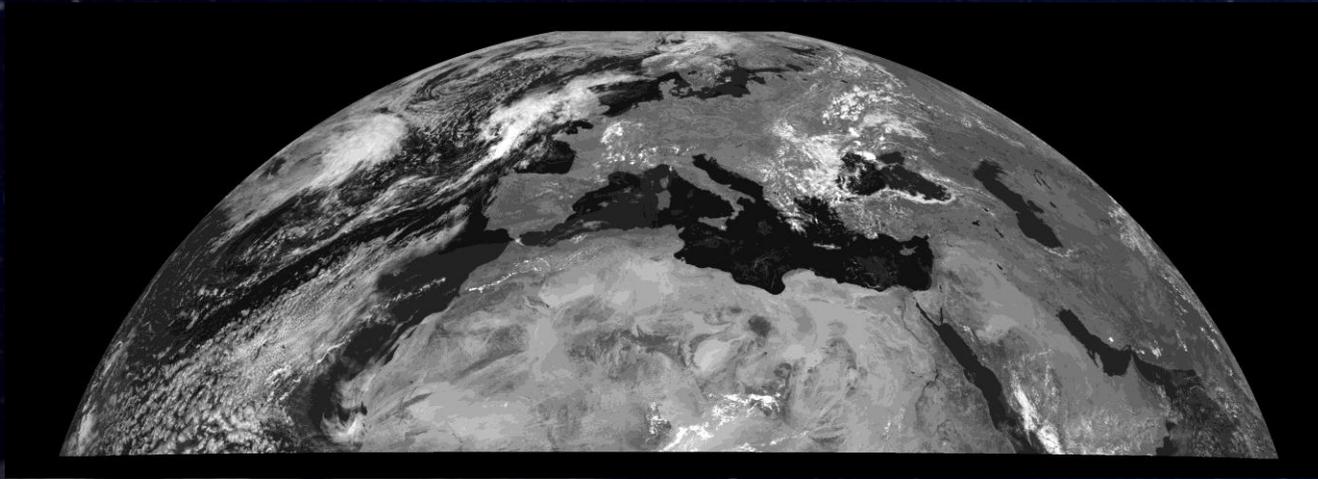
INDIAN OCEAN DATA COVERAGE MISSION AT 57°5 E
(UNTILL END 2016)



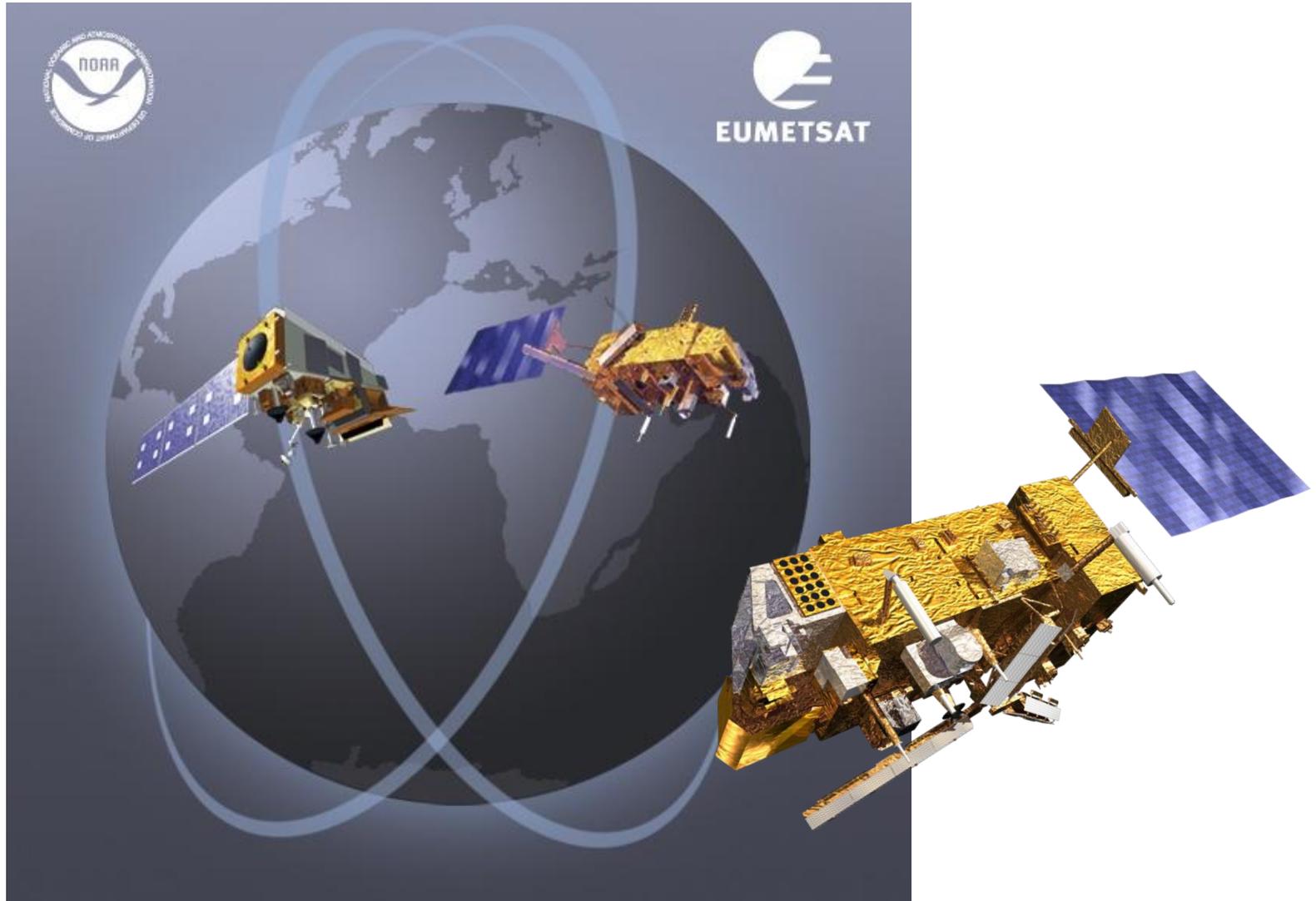
Current and Future Operational Services



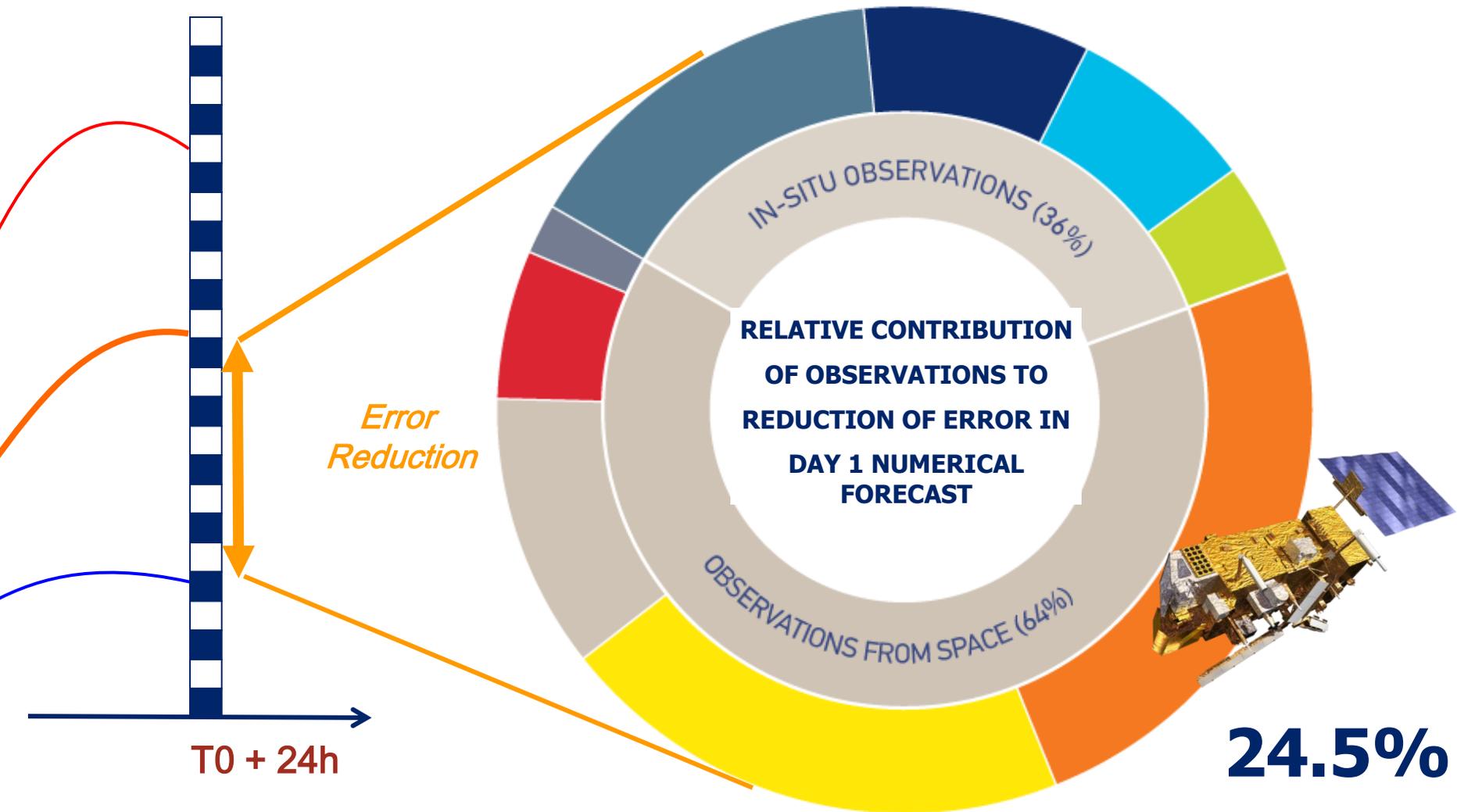
Meteosat Second Generation: an operational satellite system with two satellites



The EUMETSAT Polar System is part of the Initial Joint Polar System shared with the US

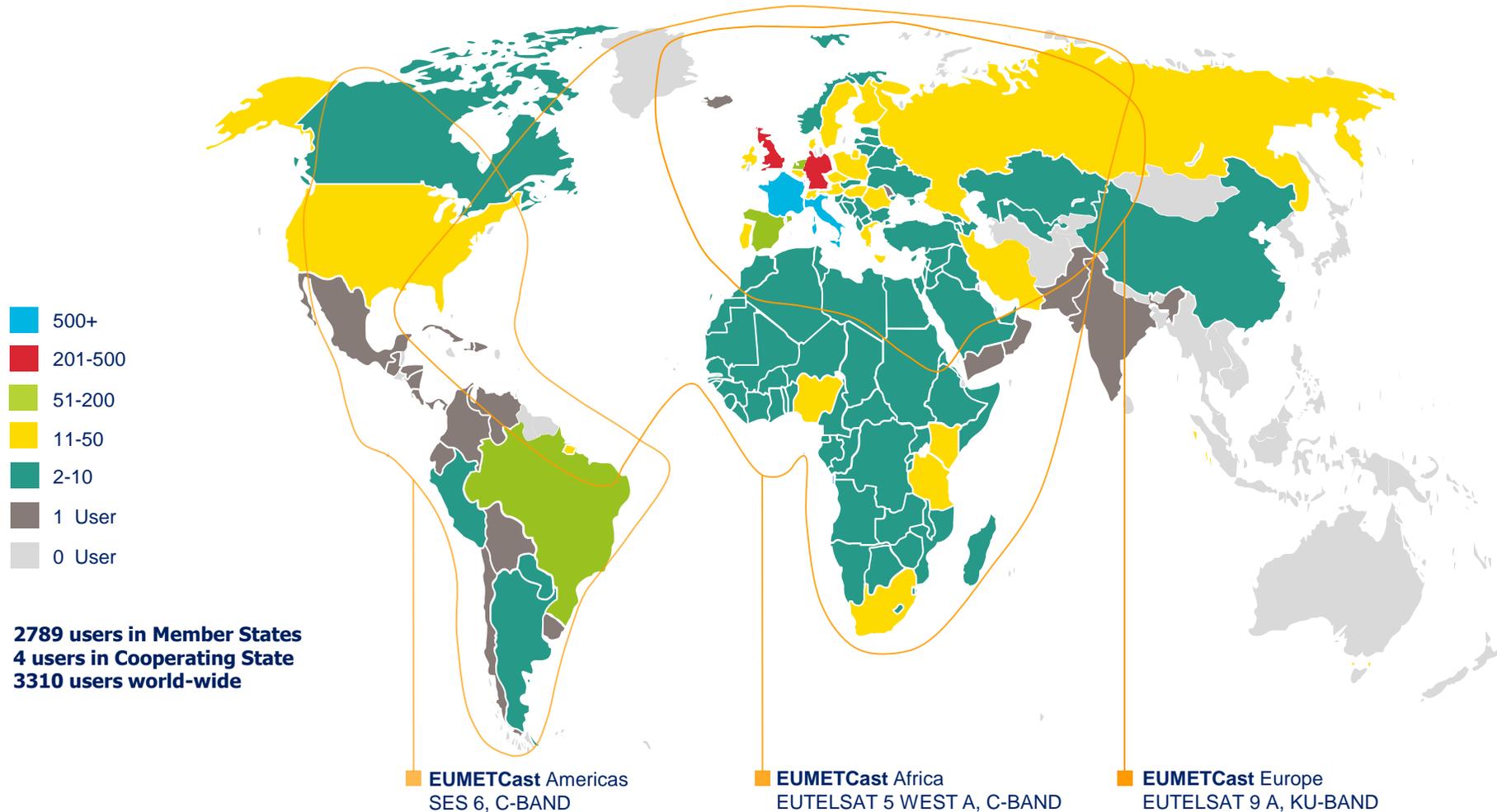


Major impact of Metop-B on Day 1 forecast

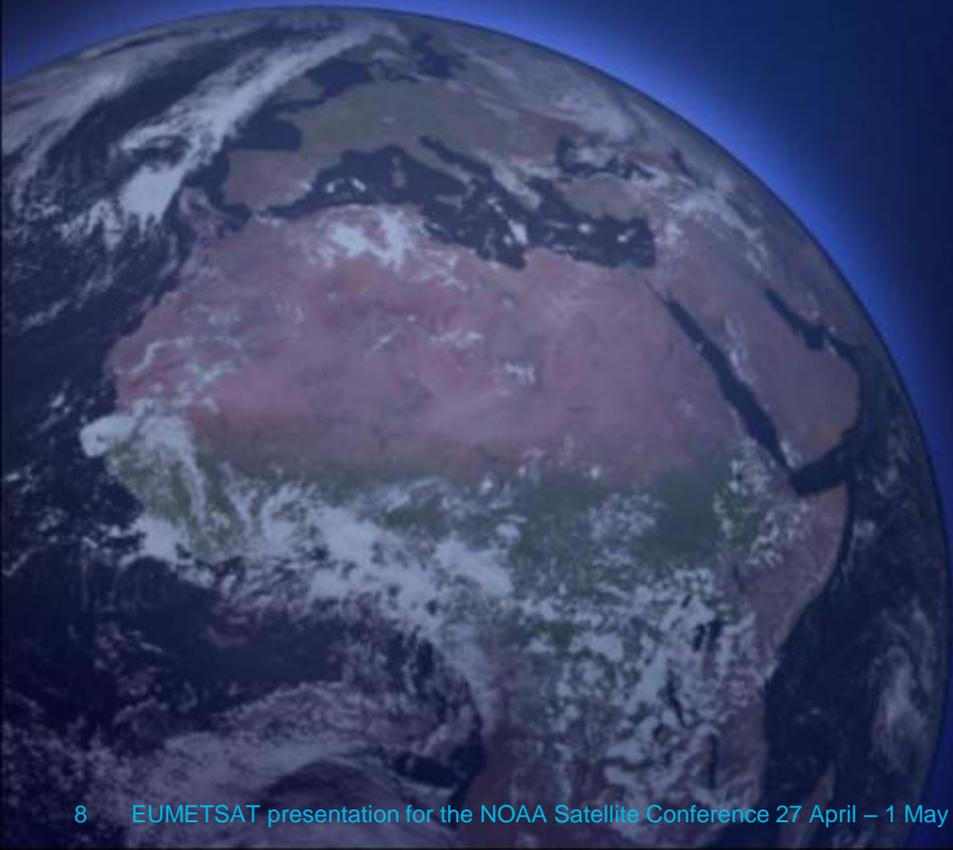


Delivering to users worldwide in real time

EUMETCast Users Worldwide as of 30 June 2014



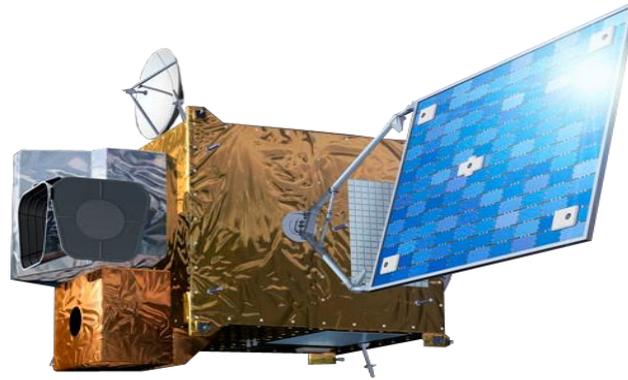
FUTURE EUMETSAT PROGRAMMES



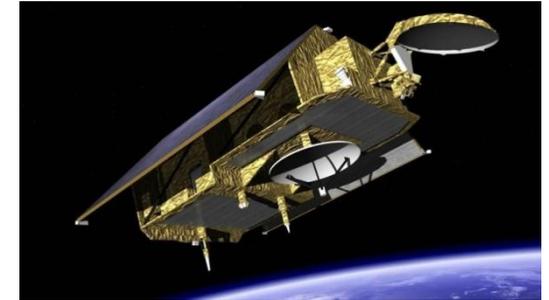
Future programmes shape the 2018 – 2040 timeframe



MTG: Approved, under development
Sentinel-4 approved (2 instruments funded by ESA)



Jason-CS : Proposed, *open to subscription in Nov. 2014*
Satellite development approved at ESA CMIN14
Recurrent satellite co-funded by European Union/Copernicus



EPS-SG : *approval process started in July 2014*
Metop-SG programme approved at ESA Council
Sentinel-5 development approved at ESA Council
Recurrent Sentinel-5 instruments funded by European Union/Copernicus

Meteosat Third Generation

- Primary mission: support nowcasting of high impact weather
 - Continuity and enhancement of MSG imagery services
 - Addition of a new lightning imaging capability
 - Introduction of an innovative infrared hyper-spectral sounding mission: world premiere
- Secondary mission: air quality monitoring over Europe
 - Synergy between Sentinel-4, IRS and imagery
- 6-satellite programme (4 MTG-I and 2 MTG-S) to cover 2019-40



Meteosat Third Generation: MTG-I and MTG-S missions

- MTG-I imagery mission implemented by a two-satellite system:
 - Advanced imager (FCI)
 - Full disk imagery every 10 minutes in 16 spectral bands
 - Fast imaging of European weather every 2.5 minutes
 - New Lightning Imager (LI)
- MTG-S sounding mission:
 - Hyperspectral infrared (IRS):
 - 3D mapping of water vapour, temperature, O₃ every 30 minutes over Europe
 - Will carry the Copernicus Sentinel-4 Ultraviolet sounder
 - Air quality monitoring, in synergy with IRS instrument



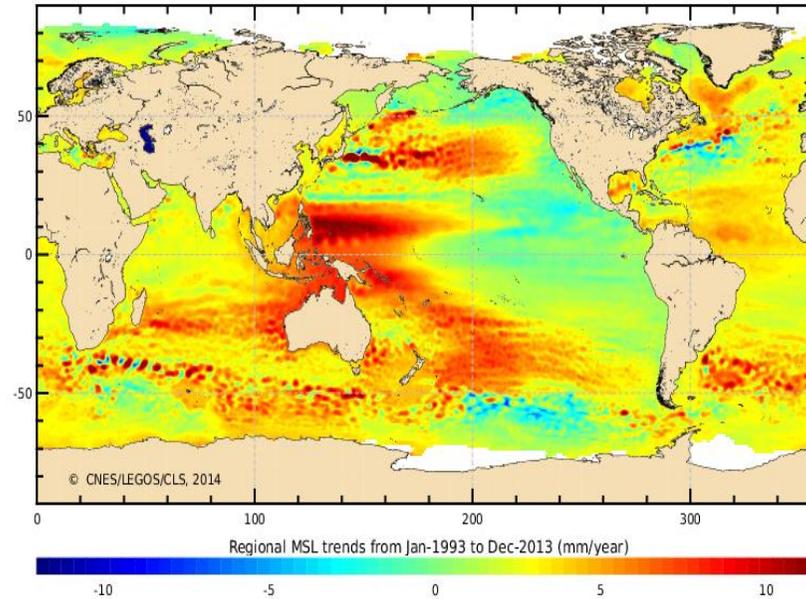
EPS Second Generation

- Primary mission: further improve observational inputs to Numerical Weather Prediction models
- Significant contributions to other real time applications
 - Nowcasting at high latitudes
 - Marine meteorology and operational oceanography
 - Operational hydrology
 - Air quality monitoring
- Climate monitoring: expand by 20+ years the climate data records initiated in 2006 with EPS

EPS Second Generation

- Continuation and enhancement of service from mid morning polar orbit in 2021 – 2040
- Twin satellite in-orbit configuration:
 - **Metop-SG A**: optical imagery and sounding mission
 - Flies the Copernicus Sentinel-5 instrument
 - **Metop-SG B**: microwave imaging mission
- Two series of 3 successive satellites for 21 years of operations
- European contribution to the Joint Polar System (JPS) shared with the US/NOAA

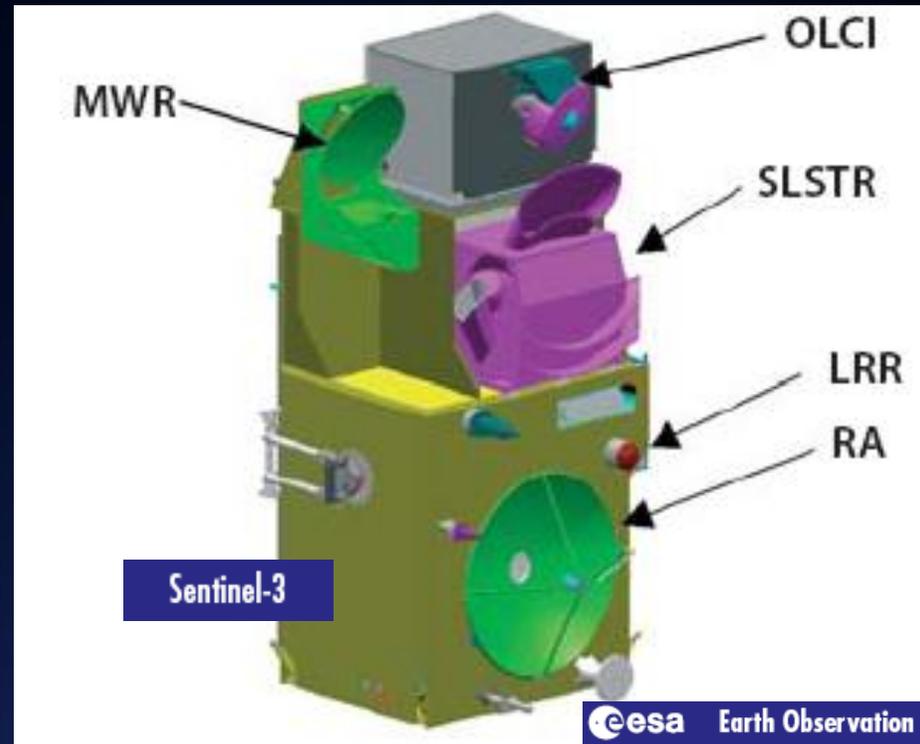
Climate/sea level monitoring and operational oceanography



Jason-3 and Jason-CS/Sentinel-6

Continuation and enhancement of the Jason mission in the 2015-2035 period

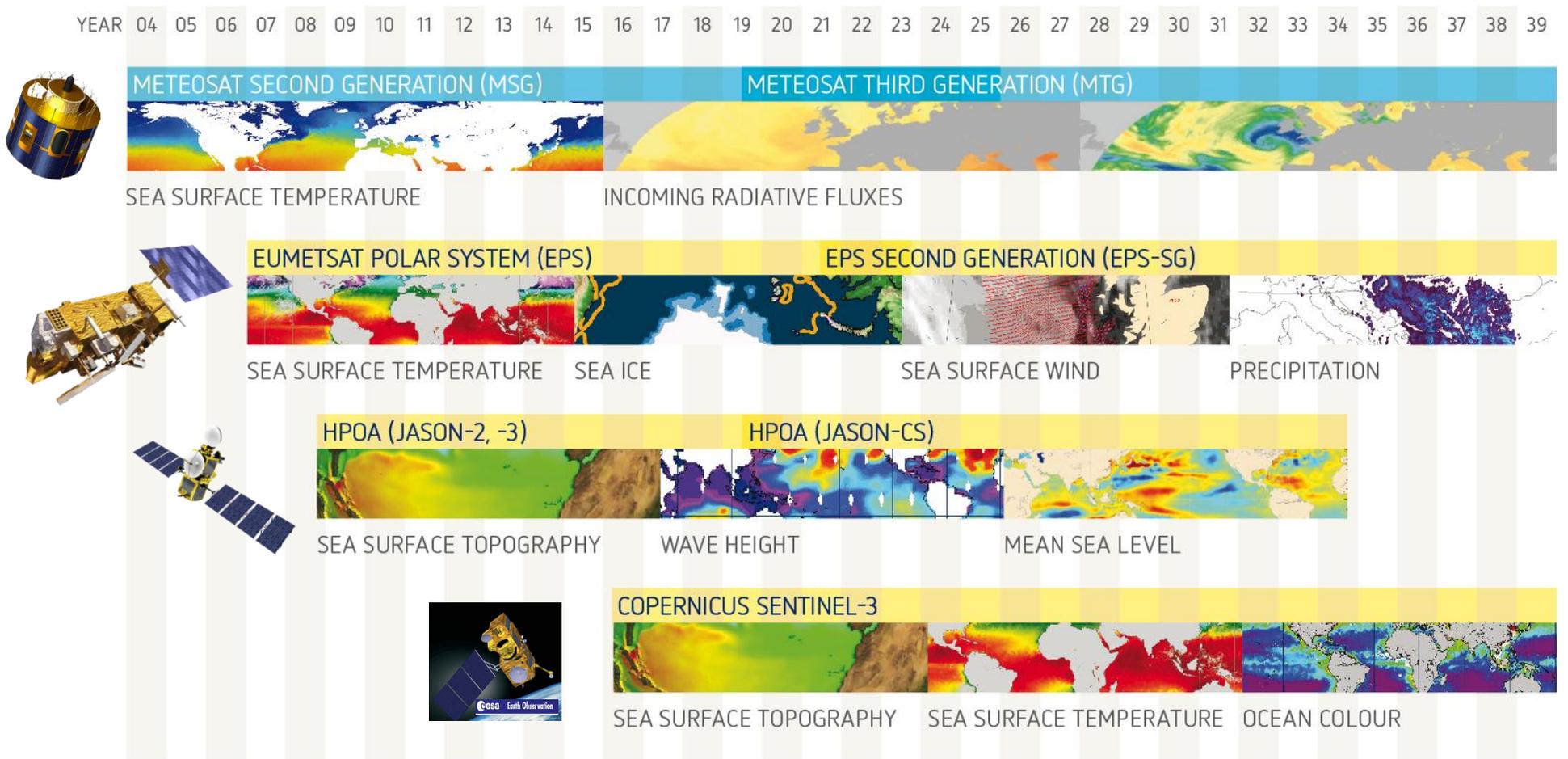
Oceanography: EUMETSAT to operate the marine mission of GMES/Copernicus Sentinel-3 (2015-)



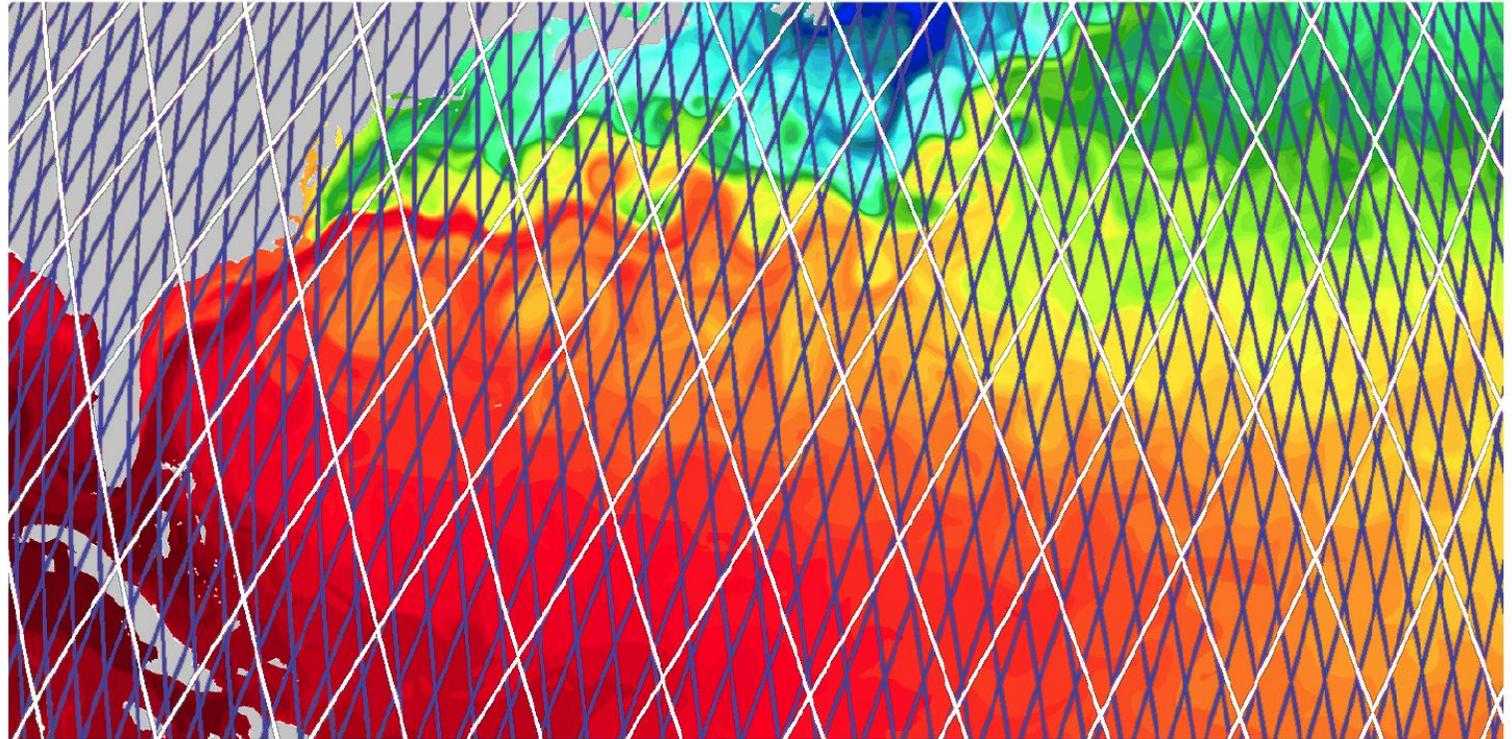
- SLSTR: Sea and Land Surface Temperature Radiometer
- OLCI: Ocean (and Land) Colour Instrument
- SRAL: Synthetic Aperture Radar Altimeter
- MWR: MicroWave Radiometer
- LRR: Laser Retro-Reflector

Ground Segment under integration at EUMETSAT premises

EUMETSAT Mission Planning: ocean monitoring

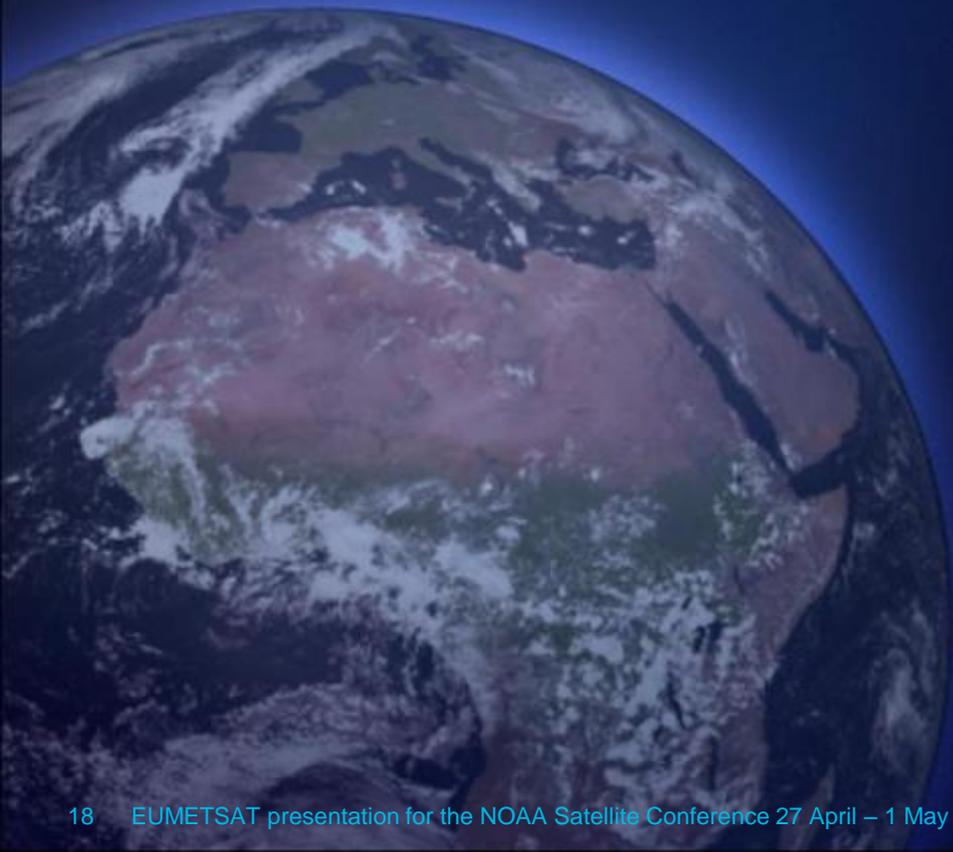


Jason-3/CS + Sentinel-3: an integrated Copernicus capability



Sentinel-3 (in blue) and Jason-3/-CS (white) orbital paths, superimposed on a MyOcean sea surface temperature image.

NOAA EUMETSAT Co-operation



NOAA EUMETSAT Co-operation 1/4

- 1985:** Temporary responsibility for the Data Collection System (DCS) which Meteosat-1 had provided following the failure of the DCS on Meteosat-2 was assumed by a US satellite, GOES-4, over the western Atlantic
- 1992:** Exchange of letters between NOAA and EUMETSAT regarding the **Atlantic Data Coverage** (ADC). At that time, a European geostationary satellite (*METEOSAT-3*) started operations from a new position at 50°W to cover the Atlantic upon request of NOAA
- 1993:** Formalisation in a **Backup Agreement** and an Agreement on **General Cooperation**, including training, scientific research
- 1995:** Agreement on **Access to images**, covering exchange of data, data distribution (NOAA is EUMETSAT data distributor for U.S. Territory). Development of operational European – U.S. infrastructures to enable these exchanges. Updated in 2003 to cover MSG.

NOAA EUMETSAT Co-operation 2/4

- 1998:** Agreement on the development of an **Initial Joint-Polar System (IJPS)** covering the exchange of instruments between Europe and U.S for 2 NOAA POES satellites and 2 EUMETSAT Metop satellites.
- 2003:** IJPS complemented by a **Joint Transition Agreement** to cover a third EUMETSAT Metop satellite and paving the way for the development of a **Joint Polar System Agreement** by **2015**.
- 2004:** Cooperation Agreement on **training** related to polar-orbiting satellite meteorology
- 2006:** IJPS complemented by a **Data Denial Implementation Plan** enabling U.S. to deny access to data from its instruments flown on European satellites in case of crisis or war.

NOAA EUMETSAT Co-operation 3/4

IJPS now includes **Metop Data Acquisition from McMurdo** and also Data acquisition from Fairbanks in case of problems at Svalbard

The impact of Metop Antarctic Data Acquisition on forecasting has been significant

EUMETSAT cooperates with NOAA, CNES, NASA for Jason 2, and Jason 3

Currently EUMETSAT and NOAA are working closely on the consolidation of common communications infrastructure

Direct Broadcast Network (DBNet) – interconnecting polar orbiting satellite data received by USA and European direct broadcast reception stations

JPS Agreement text is now agreed on both sides and will be signed once the EPS-SG Programme is approved in EUMETSAT

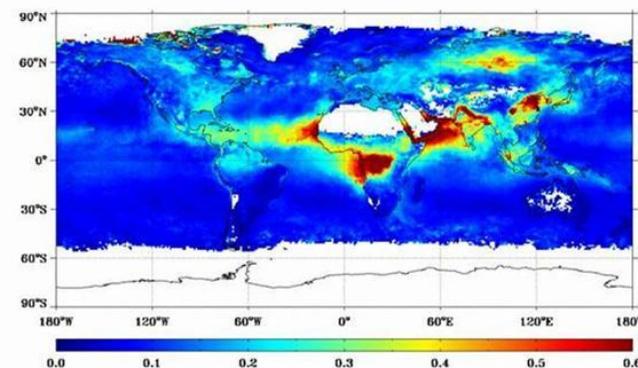
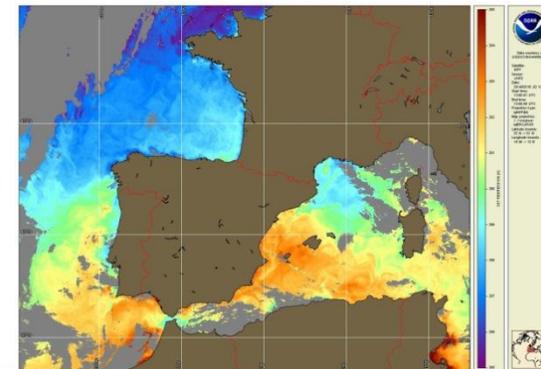
Real time U.S. S-NPP data service to MyOcean2 and MACC-II Copernicus projects

The European Commission's GMES Initial Operations 2013 Work Programme includes an action provide data to the marine and atmosphere services (MyOcean2 and MACC-II) in gap resulting from the loss of ENVISAT until the start of Sentinel-3 operations. These data are provided from Suomi-NPP

EUMETSAT's existing relationship with NOAA has enabled EUMETSAT to access and redistribute Suomi-NPP data to Copernicus users on behalf of the European Commission

MyOcean2 and EUMETSAT have identified the need for **sea surface temperature (SST)** and **ocean colour products from VIIRS** on Suomi-NPP. These products are acquired from NOAA and tailored to the precise user requirements before being made available in near real time via EUMETCast.

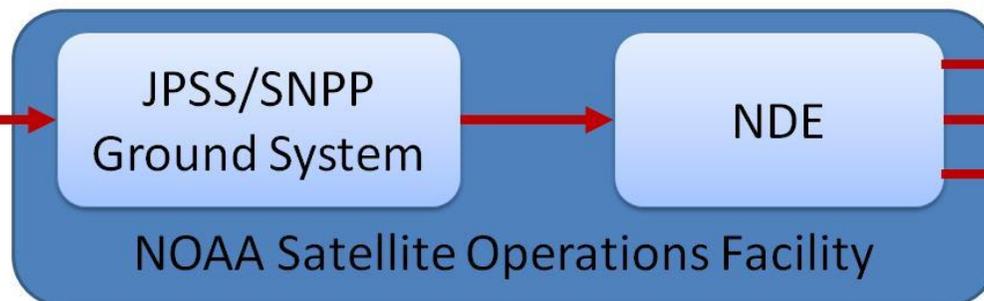
Together with the MACC-II, the requirements for **atmospheric composition products** from S-NPP have also been defined and dissemination of these products via EUMETCast has been put in place.



S-NPP



Svalbard



Users including



NOAA EUMETSAT Co-operation 4/4

Cooperation in international Fora:

- Global Earth Observation System of Systems (GEOSS) (i.e. GEONETCast)
- Committee on Earth Observation Satellites (CEOS) (i.e. Constellation on Oceanography)
- Coordination Group of Meteorological Satellites (CGMS)

Future cooperation

- **Continuation of the long and fruitful cooperation!**
- In particular in operational oceanography (Jason follow-on and long term strategy for operational oceanography measurements)