EUMETSAT: Preparation of Users for Future Missions

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EUMETSAT

41st EWGLAM and 26th SRNWP Meeting
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Outline

- Part 1: Overview of future EUMETSAT missions
- Part 2: User Preparation – MTG and EPS-SG

Part 1: EUMETSAT FUTURE MISSIONS

Current EUMETSAT satellites

METOP-A, -B & -C (98.7° incl.)

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

SENTINEL-3A & -3B (98.65° incl.)

LOW EARTH, SUN-SYNCHRONOUS ORBIT
COPERNICUS SATELLITES DELIVERING MARINE AND LAND OBSERVATIONS

JASON-2 & -3 (63° incl.)

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

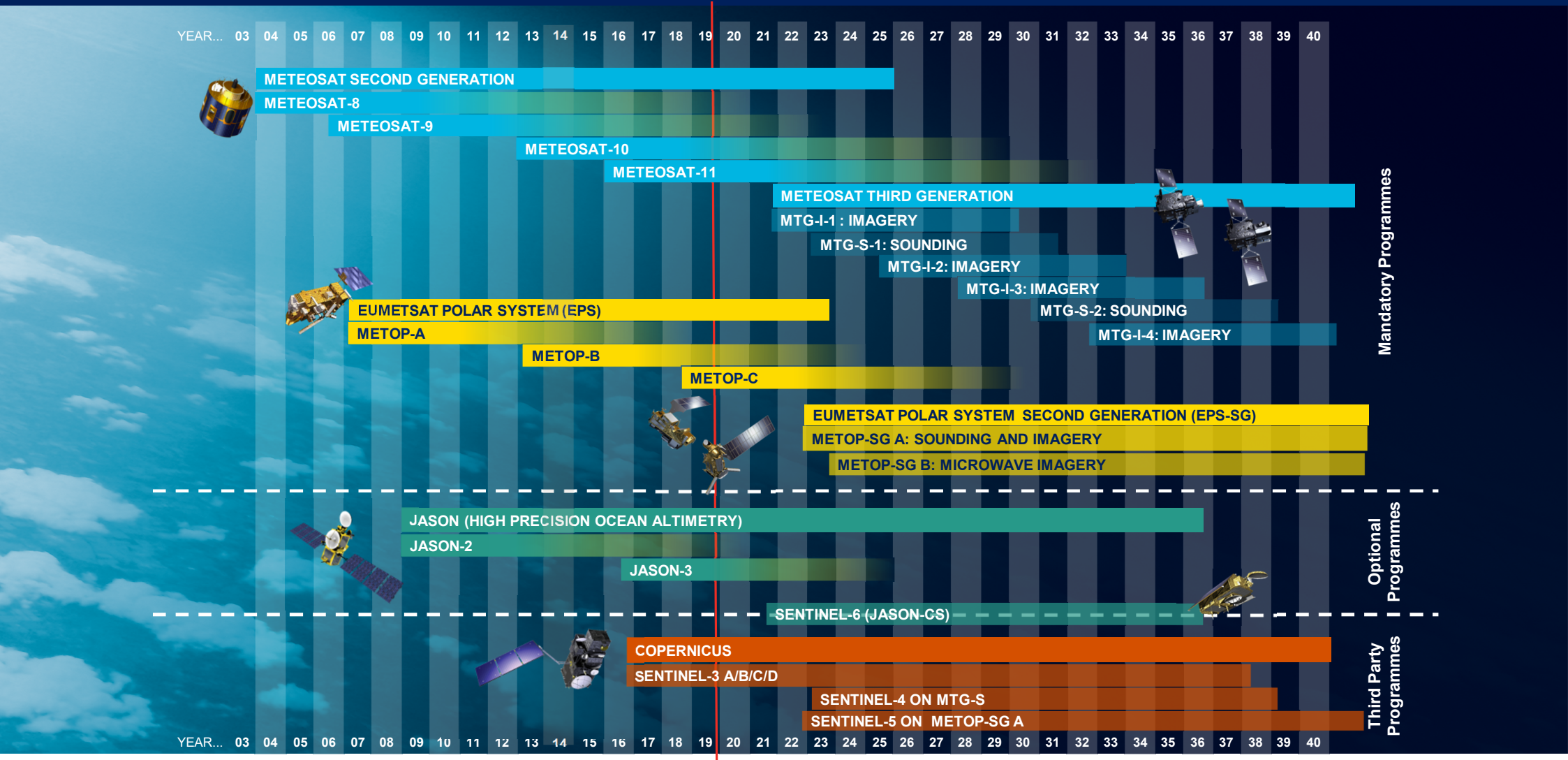
METEOSAT-9, -10, -11

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)) *METEOSAT-9 RSS GAP FILLING AND BACK UP SPACECRAFT*(3.5° E))

METEOSAT-8 (41.5° E)

GEOSTATIONARY ORBIT
METEOSAT 2ND GENERATION PROVIDING IODC FROM FEBRUARY 2017 – MID-2020

EUMETSAT mission planning



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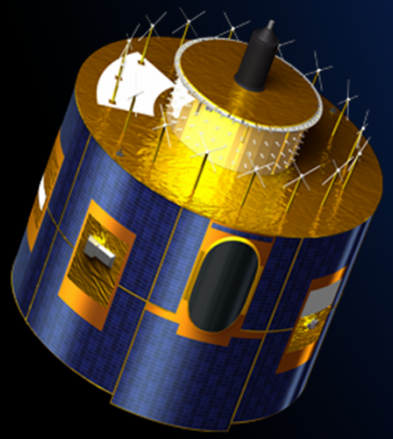
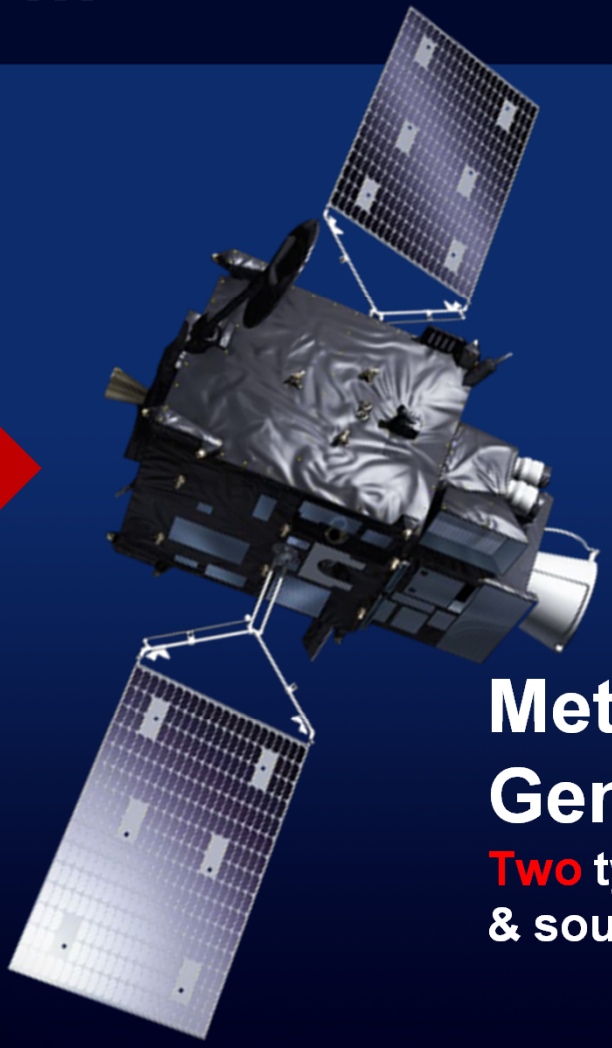
A new generation is coming …



Meteosat Second Generation



Meteosat Third Generation

Two types satellite: imager & sounder

Meteosat Third Generation: Mission Objectives

- Primary mission: support nowcasting/ Short Range Forecasting of high impact weather
  - Continuity and enhancement of MSG imagery
  - Addition of a new lightning imaging capability
  - New, innovative infrared hyper-spectral sounding
- Secondary mission: air quality monitoring over Europe
  - Synergy between Sentinel-4, IRS and imagery

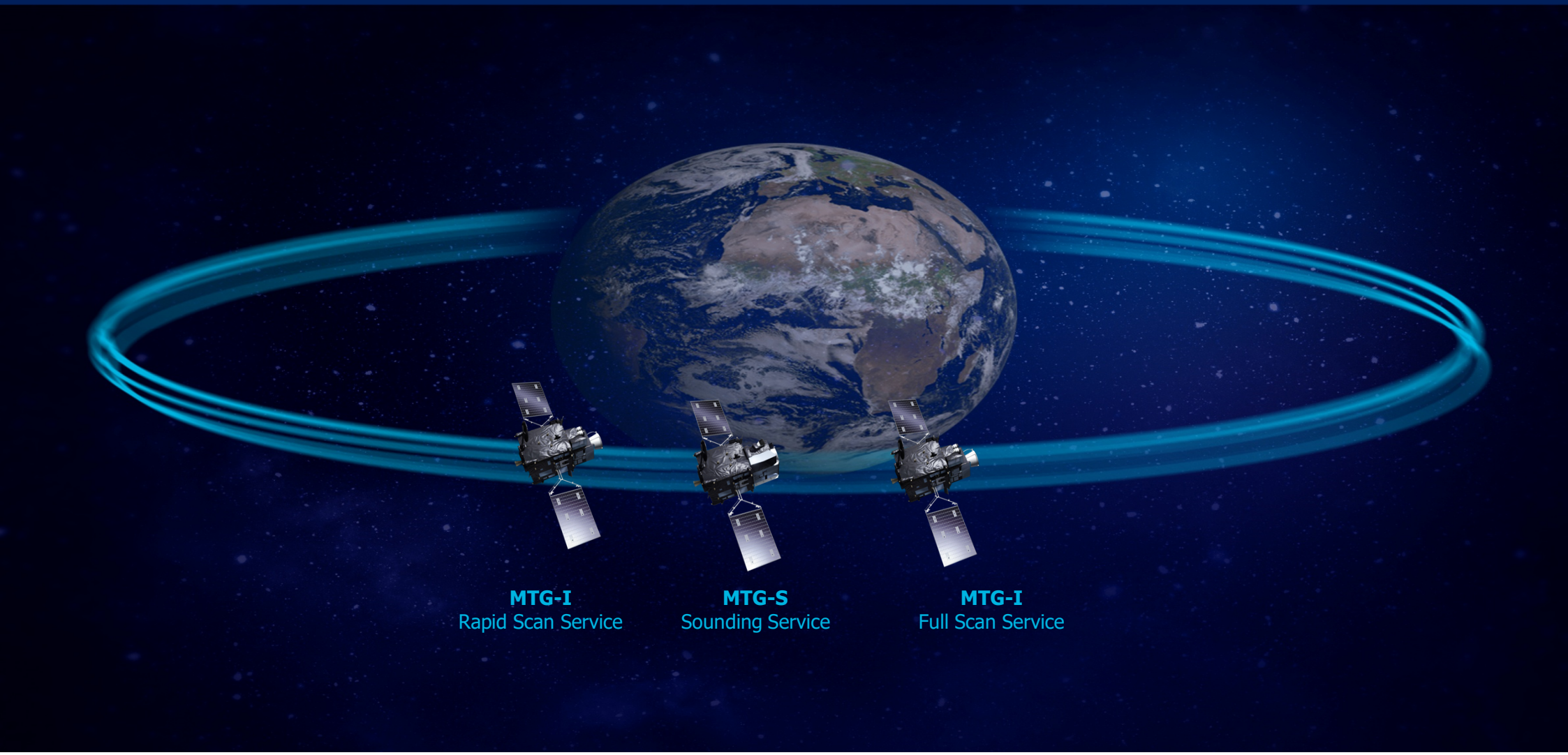
MTG-I imaging mission

- Imagery mission implemented by two MTG-I satellites
- Full disc imagery every 10 minutes in 16 bands
- Fast imagery of Europe every 2.5 minutes
- New Lightning Imager (LI)
- Planned launch in 2021
- Start of operations in 2022
- Operational exploitation: 2022-2042

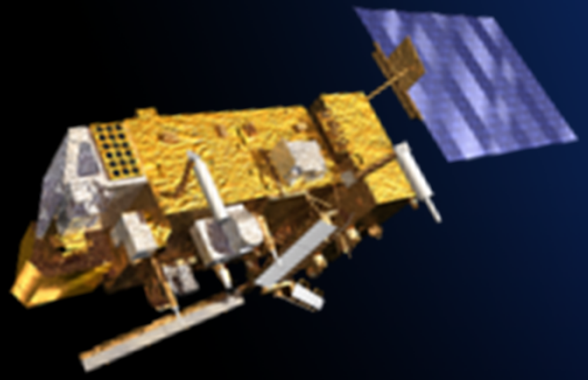
MTG-S sounding mission

- Hyperspectral infrared sounding mission
- 3D weather cube: temperature, water vapour, O3, every 30 minutes over Europe
- Air quality monitoring and atmospheric chemistry in synergy with Copernicus Sentinel-4 instrument
- Planned launch in 2023
- Start of operations in 2024
- Operational exploitation: 2024-2043

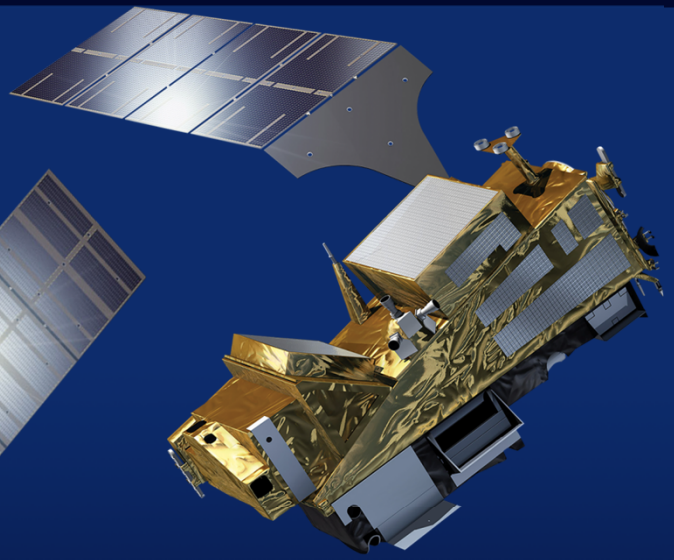
MTG full operational configuration



Time for an upgrade in polar orbit too…



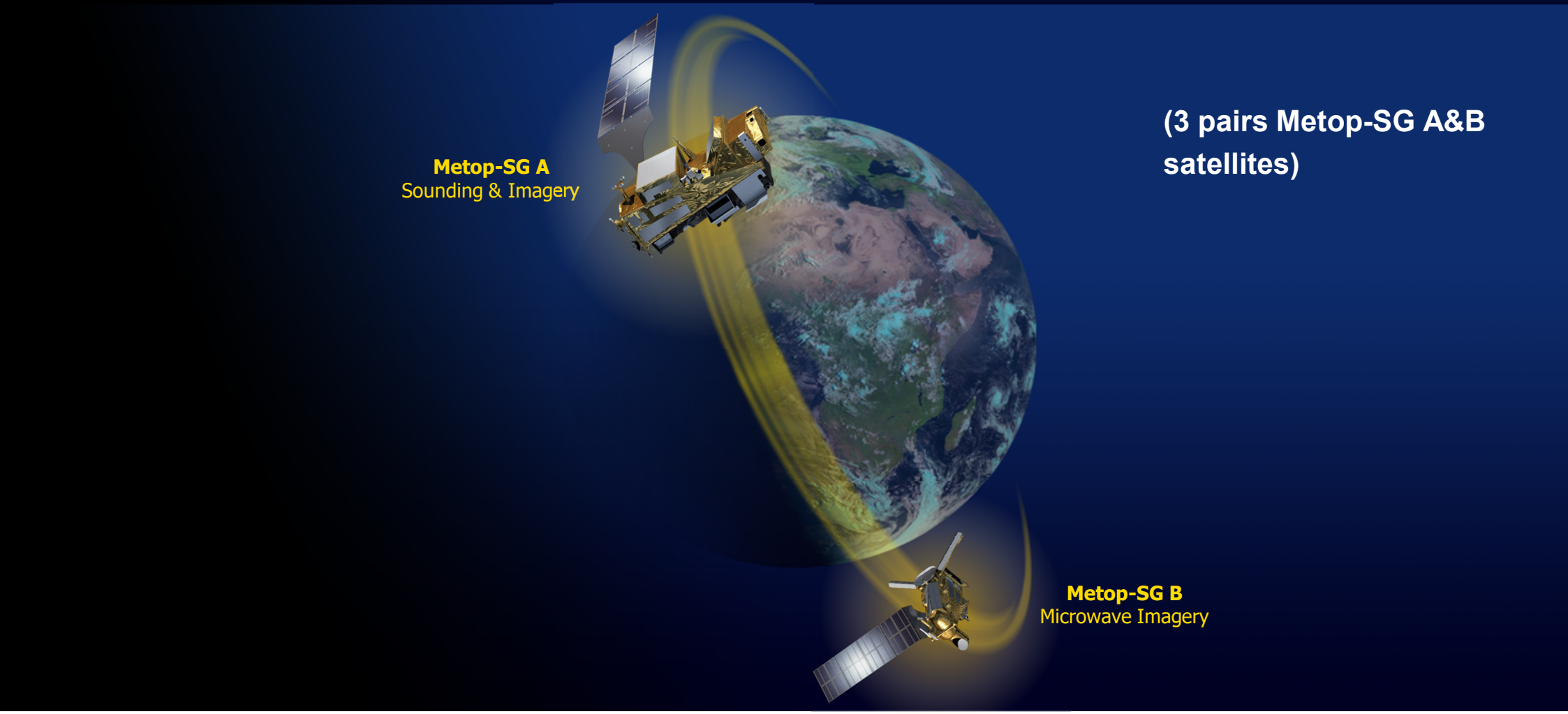
Metop



Metop Second Generation

Two types satellite work as pair: imager/sounder & microwave imager

EPS-SG full operational configuration

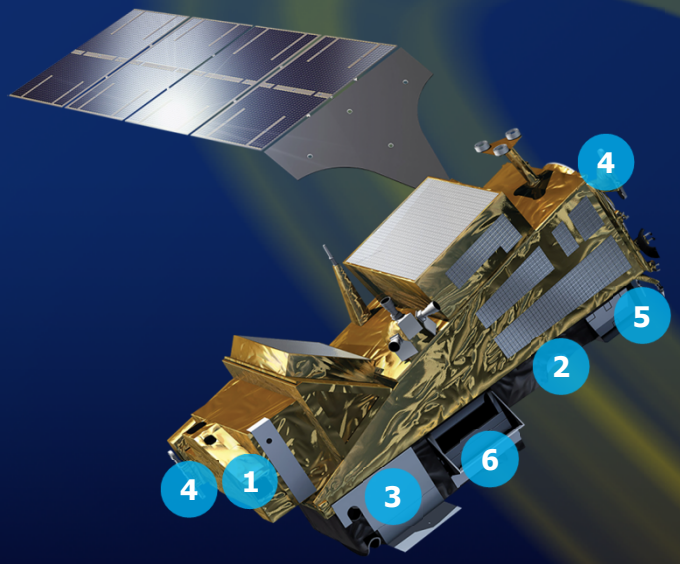


(3 pairs Metop-SG A&B satellites)

EPS-SG Programme Objectives

- **Primary mission: further improve observational inputs to Numerical Weather Prediction models.**
- **Continuation and enhancement of service from mid morning polar orbit.**
- **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 (first generation).**

EPS-SG A sounding and imagery mission

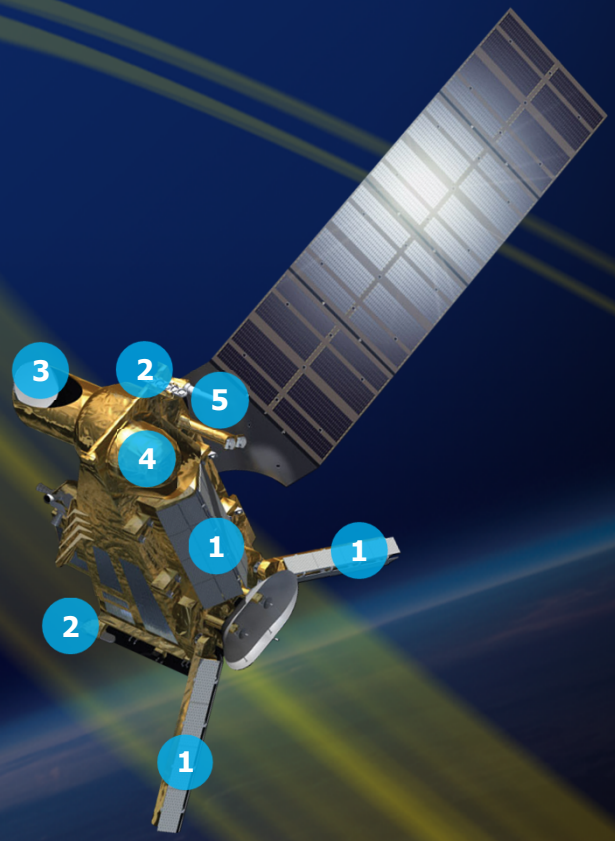


1. **IASI-NG**
   Infrared Atmospheric Sounding
2. **MWS**
   Microwave Sounding
3. **METImage**
   Visible-Infrared Imaging
4. **RO**
   Radio Occultation
5. **3MI**
   Multi-viewing, -channel, -polarisation Imaging
6. **Copernicus Sentinel-5**
   UN/VIS/NIR/SWIR Sounding

Metop-SG A suite of infrared, microwave for sounding temperature, moisture and trace gases in the atmosphere and Imaging instruments.

EPS-SG B microwave imagery mission

1. **SCA**
   Scatterometer
2. **RO**
   Radio Occultation
3. **MWI**
   Microwave Imaging for Precipitation
4. **ICI**
   Ice Cloud Imager
5. **ARGOS-4**
   Advanced Data Collection System



Metop-SG B - radar observations of ocean-surface wind and soil moisture & all-weather microwave imagery of precipitation and ice clouds

EPS-SG Sounding missions: Enhancements and Innovations

Main Payload	Enhanced Capabilities	Innovative Capabilities	Applications Benefitting
High-Resolution Infrared Sounding **(IASI-NG)** **Metop Heritage: IASI**	+75% information in temperature profiles +30% in water-vapour profiles	More trace gases and their vertical profiles	NWP, NWC, AC, CM
Microwave Sounding **(MWS)** **Metop Heritage: AMSU, MHS**	Enhanced spatial over-sampling, five more spectral channels	Ice-cloud info in support of humidity profiling	NWP, NWC, CM
Radio Occultation Sounding **(RO)** **Metop Heritage: GRAS**	Large increase of number of radio-occultations, implementation on A- and B-satellites	Tracking of Galileo and Compass/Beidou signals	NWP, CM
Nadir viewing UV/VIS/NIR/SWIR Sounding **(Sentinel-5)** **Metop Heritage: GOME-2**	Drastic increase of spatial resolution, extension into UV and short-wave infra-red	Additional trace gas measurements; CO_2 being studied	Air Quality, CM, AC

EPS-SG Imaging Missions: Enhancements and Innovations

Main Payload	Enhanced Capabilities	Innovative Capabilities	Applications Benefitting
VIS/IR Imaging **(METimage)** **Metop Heritage: AVHRR**	Better radiometric and spatial resolution	Far more variables measured with higher accuracy	NWC, NWP, Operational Oceanography, Hydrology, CM
Scatterometry **(SCA)** **Metop Heritage: ASCAT**	Higher spatial resolution and coverage	Cross polarisation for higher wind speeds	NWP, NWC, Operational Oceanography, Hydrology, CM
Multi-viewing, -channel, -polarisation Imaging **(3MI)**	New mission	Aerosol parameters	Air Quality, CM, NWC
Microwave Imaging **(MWI)**	New mission	Precipitation observations	NWP, NWC, Hydrology, Operational Oceanography, CM
Ice Cloud Imaging **(ICI)**	New mission	Cloud microphysics parameters	NWP, NWC, Hydrology, Operational Oceanography, CM


EUMETSAT User Support

User Preparation for MTG and EPS-SG: Objectives

MTG-UP

- Smooth transition from Meteosat Second Generation (MSG) to MTG for all comparable services;
- Early adoption of MTG services into operational meteorology;
- Exchange of user feedback on MTG programmatic and general user preparation issues.

EPS-SG UP

- Support the National Meteorological Services of Member States to have a smooth transition and continuity of operations with EPS-SG data;
  - Enable the NMSs in the early assimilation of data from heritage instruments in Global and Regional NWP
  - Support the existing users of the other application areas of EPS-SG.
- Support the Member State NMSs in their preparation to gain advantage from the enhanced and novel capabilities from the EPS-SG mission.
- Facilitate the sharing of user preparation experiences and lessons learnt among relevant actors.

User groups

- MTG User Preparation
  - MTG UP User group – representatives from National Meteorological Services of Eumetsat Member States

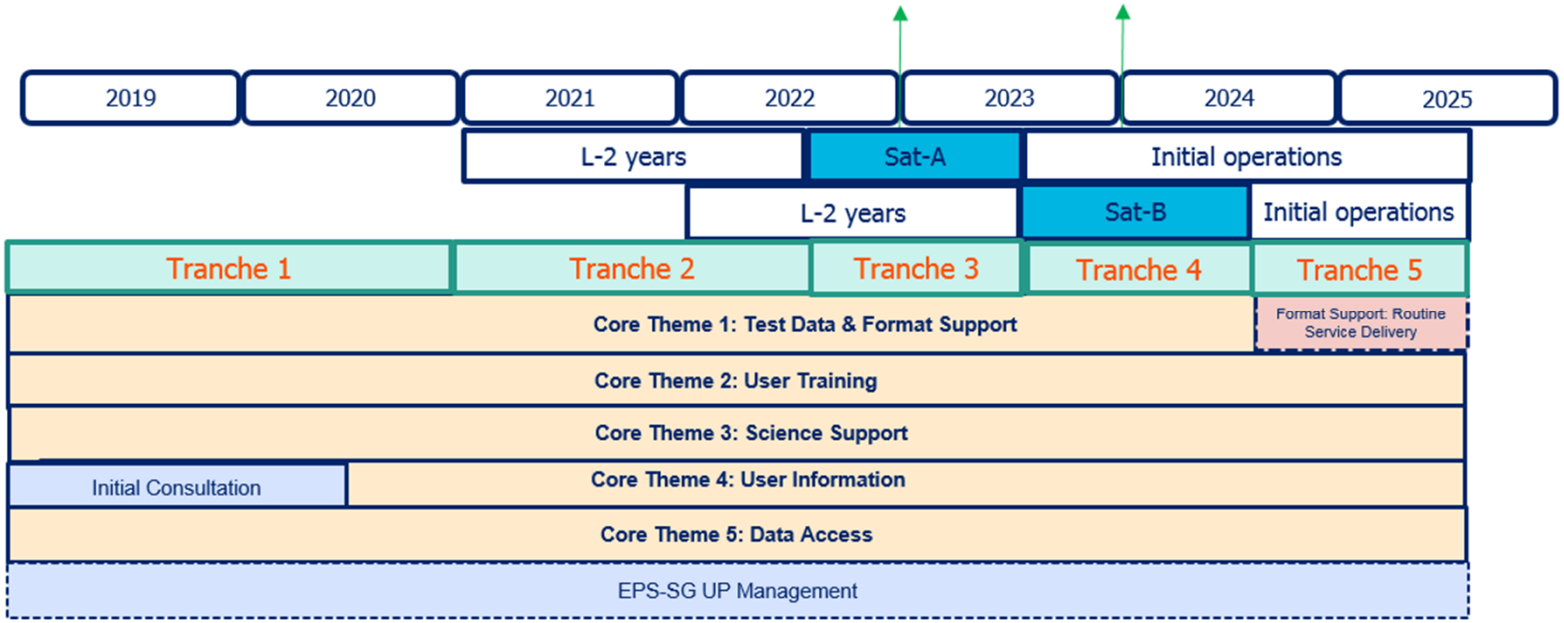
- EPS-SG User Preparation
  - representatives from National Meteorological Services of Eumetsat Member States
  - Global NWP Centres
    - Global NWP centres within Europe: interaction through NWP-SAF
    - interaction through the existing coordination bodies for Global NWP(GODEX)
  - Regional NWP in Europe
    - Regional Modelling Consortia and European Working Group on LAM
  - Nowcasting for Nordic Member States

EPS-SG/MTG User Preparation: Core Themes

1. Test Data and Format Support
   - Test Data Plan updates
   - Test Data packages
2. Science Support
   - Product Validation Reports
3. User Training
   - Training Plan approved by EUMETSAT council
   - EPS-SG specific events following from the Training Plan
   - Massive Online Open Course
4. User Information and Communication
   - Product User Guides
   - Videos: Measurement principles, Application videos
   - User Communication events
5. Data Access
   - Informaton on changes in data access service

EPS-SG User Preparation Project Schedule

- Kickoff: September 2019
- Project close: One year after the commissioning of Metop-SG B



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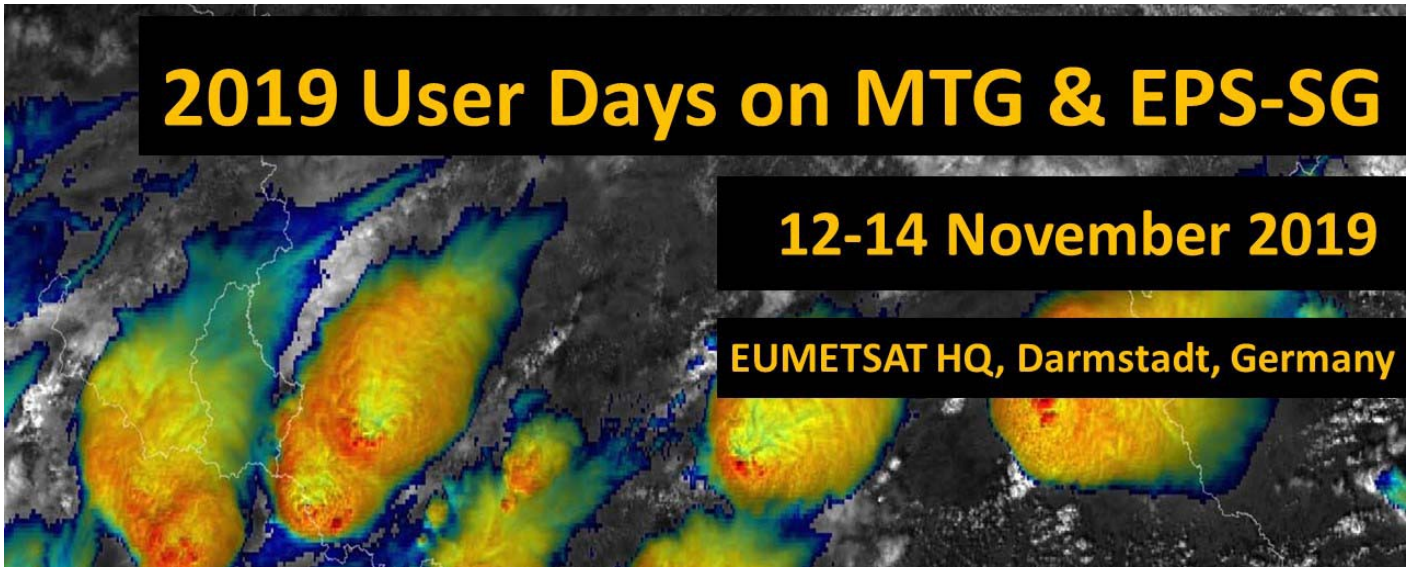
EPS-SG user preparation activities 2019-2020 towards NWP

- Early engagement with ECMWF, other European Global NWP Centres to better understand their preparation activities & plans to use the novel instrument data:
  - Visit to ECMWF in June 2019 - feedback from the meeting is being incorporated into our planning
  - Plans to discuss with other European Global NWP groups in early 2020
- Keep the Global NWP user community informed about the new capabilities of EPS-SG
  - Plan to interact with GODEX-NWP in 2020

EPS-SG user preparation activities 2019-2020

- Regional NWP user community:
  - Planning a workshop with Regional NWP consortia members in early 2020
    - Understand the community
    - Seek your needs and requirements in relation to uptake of MTG and EPS-SG
    - Use this platform to help plan the workshop

Co-located MTG/EPS-SG User Days 2019



(By invitation only)

12 Nov 2019: ‘MTG Day’

13 Nov 2019: ‘Main User Day Event’

- Cross-cutting themes: data access and visualization, incl. an exhibition area with HW/SW manufacturers

14 Nov 2019: ‘EPS-SG Day’

User Service Helpdesk

Please don’t hesitate to approach our helpdesk available to you

- During normal working hours, Monday to Thursday 08:30–17:15 CET, Friday 08:30–16:00 CET.
- **Tel:** +49 6151 807 3660/3770
  Fax: +49 6151 807 3790
- Email: ops@eumetsat.int

Thank You