EUMETSAT Strategy
Challenge 2025
Summary

EUMETSAT

Foreword

In June 2016 EUMETSAT adopted a new 10-year strategy named "Challenge 2025".

Under its previous strategy adopted in 2011 ("EUMETSAT: a global operational satellite agency at the heart of Europe"), EUMETSAT developed as a global partner and gained approval for new programmes - Meteosat Third Generation (MTG), EUMETSAT Polar System-Second Generation (EPS-SG), Jason-CS and its contribution to Copernicus - shaping the future of Europe in weather and climate monitoring from space.

"Challenge 2025" now aims to further develop EUMETSAT through the realisation of these programmes for the benefit of its Member States and the European Union.

The main strategic goal for 2025 is indeed the full deployment of the new MTG, EPS-SG and Jason-CS satellite systems, in a safe transition from current generation systems, and the full implementation of the Copernicus Sentinel -3, -4, -5 and -6 missions on behalf of the EU.

Challenge 2025 also reflects EUMETSAT's response to the multi-facetted evolutions of its external environment and its commitment to European and global partnerships involving the European Meteorological Infrastructure (EMI)[1], the World Meteorological Organisation (WMO), the EU, the European Space Agency, national space agencies and other satellite operators.

This summary presents EUMETSAT's missions, vision, priorities, policy principles and strategic objectives for the next decade.

Missions

Establish, maintain and exploit European systems of meteorological satellites.

Contribute to the operational monitoring of the climate and the detection of global climatic changes.

Vision

Be the leading user-driven operational agency in Europe for Earth observation satellite programmes that fulfil the objectives of its Convention, and a trusted global partner for those outside Europe who share these objectives.

Priorities

In realising this vision, the first priority shall be to fulfil in the most effective manner, through its own satellite programmes, the essential requirements of its Member States for observations and data services for operational weather and Earth system monitoring and forecasting, and for climate services.

The second priority shall be to establish additional capabilities in partnership with the European Union and other satellite operators to achieve synergy with its own satellite missions for the common benefit of its Member States and partners.

Policy Principles

1. *EUMETSAT, being an intergovernmental organisation, derives its main priorities from its Convention;*
2. *EUMETSAT's activities shall be implemented in a manner that is affordable for its Member States and achieves best value for money and cost effectiveness;*
3. *EUMETSAT, being user-driven, shall implement and continuously adapt its operational systems in response to evolving user requirements for the benefit of its Member States;*
4. *EUMETSAT shall take maximum advantage of science and technologies developed in its Member States to implement its programmes;*
5. *EUMETSAT shall continue to rely on ESA for the development of the space segment of its mandatory programmes;*
6. *EUMETSAT shall be an active partner of the European Meteorological Infrastructure with the aim of increasing its efficiency;*
7. *EUMETSAT shall consider supporting EU programmes that provide benefits to both its Member States and the EU as long as EUMETSAT's contributions to these programmes mobilise a proportionate share of its overall resources;*
8. *EUMETSAT shall make extensive use of international cooperation to increase efficiency, broaden and extend the benefits of its programmes;*
9. *EUMETSAT shall continue to contribute to the space component of the WMO Integrated Global Observing System (WIGOS).*

EUMETSAT in a changing world

Our society and economy demand further improvements in weather forecasts and warnings

Our society is becoming more sensitive to weather and less tolerant of inaccurate observations, forecasts and warnings. Therefore, governments and industries manage weather risks as a core risk, and the public is demanding more weather information for safety and for private use.

Weather forecasts and early warnings save lives and prevent economic losses due to high impact weather and hazards that are influenced by weather (e.g. floods, droughts, wildfires, pollution, etc.).

According to the WMO[2], 90,000 lives[3] and €315 billion were lost in Europe between 1970 and 2012 through weather-related disasters. Although improved forecasts and warnings and their integration into disaster risk reduction systems have already significantly reduced losses, further improvements are required under the Sendai Framework for Disaster Risk Reduction[4] and across the Sustainable Development Goals adopted by the United Nations. The challenge for National Meteorological and Hydrological Services (NMHSs) is not only to further develop forecasts and early warnings but also to work with other institutions involved in disaster reduction to meet the expectations of governments, citizens and industries.

Weather forecasts also contribute to economic growth. Recent studies[5] indicate that 25-30% of the Gross Domestic Product (GDP) of highly developed economies is weather-sensitive and that the socio-economic benefits of forecasts are proportional to GDP. In the EU, the direct added value to the economy was estimated at €40 billion per year[6] across vital sectors such as transport, energy, agriculture, tourism, food and construction.

This requires more and better observations from space

As weather forecasts rely critically on satellite observations, which today account for 64% of the reduction of error in day-1 forecasts[7], more and better observations from space are expected from EUMETSAT.

Over the next decade, satellite data will need to fulfil the requirements of innovative, very-high-resolution numerical weather prediction models that will be increasingly used by NMHSs for very-short-range forecasts in conjunction with real-time observations.

The development of seamless Earth system prediction systems addressing short- to extended-range forecasts of weather, air quality, the ocean and the cryosphere, on regional to global scales, will require seamless space-based observations of all components.

Thus, the delivery of critical observational inputs to an increasing variety of forecasts and warnings will remain EUMETSAT's *raison d'être*.

Weather and climate services for mitigation and adaptation to climate change

According to the 5th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) published in 2014[8], climate change is already a reality.

Southern Europe will experience droughts coinciding with an increased demand for water for irrigation, industrial and domestic use, which, in combination with wildfires threatening entire regions, will affect agriculture and major industries. At the same time, Central and Northern Europe will experience more frequent and severe flooding, and sea level rise will impact coastal areas.

Through the Paris Agreement[9] adopted in 2015, the Parties to the United Nations Framework Convention on Climate Change are now committed to adaptation and mitigation policies that are both vital to manage risks and to contain emissions and the magnitude of climate change.

Adaptation and mitigation both require integrated weather and climate information services built on solid scientific foundations - including observations, forecasts, warnings based on real-time qualification of extreme events against climatology, climate projections and impact assessments - that NMHSs are best placed to deliver to decision makers and users in each country. Therefore, following WMO guidelines, European NMHSs are evolving into full weather and climate services, relying on the European Centre for Medium-range Weather Forecasts (ECMWF) for medium-range numerical weather prediction and on EUMETSAT for space-based observations.

As meteorological satellites build the longest climate records from space - more than 35 years of Meteosat data are already available - and now observe the atmosphere, the ocean, the cryosphere and land surfaces on a global scale, climate data records of essential climate variables (ECV) observed from space are expected from EUMETSAT as inputs to climate information services. Likewise, EUMETSAT's commitment to sustained space-based observations of the ocean is a requirement, in view of the key role of the global ocean in the climate system and as a driver of the predictability of the atmosphere from weeks to years.

Copernicus is now a reality

In 2014, the EU launched its flagship Copernicus Earth observation programme to *"ensure an autonomous capacity for space-borne observations and provide operational services in the field of atmosphere, marine, land and climate change monitoring, emergency management and security"*.

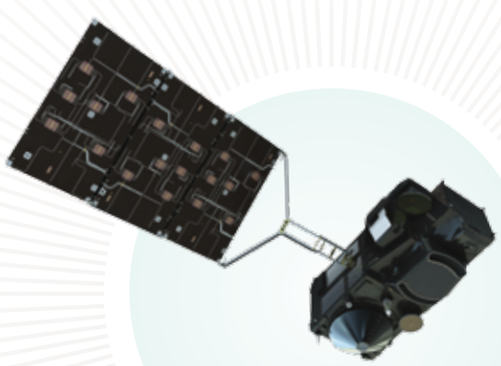
Following the signature of the Copernicus Agreement with the EU in November 2014, EUMETSAT is a committed Copernicus partner. It is already exploiting the Jason-3 and Sentinel-3 Copernicus marine missions on behalf of the EU and delivering multi-mission data services to the Copernicus marine environment and atmosphere monitoring services (CMEMS and CAMS) and to Copernicus users. It will also implement the Copernicus Sentinel-4 and Sentinel-5 atmospheric composition missions as part of its MTG and EPS-SG systems, and Sentinel-6 as a shared mission with the United States.

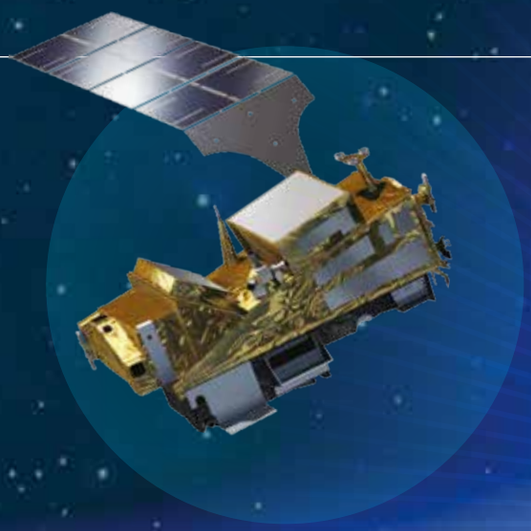
The "big data" agenda

The new "big data" paradigm involving cloud technologies and new concepts for interactions with users is high on the Digital Agenda of Europe. This will also be an important driver and opportunity for EUMETSAT and its users for the next decade.

The economic situation remains difficult in Europe

The 30 EUMETSAT Member States have now approved the MTG, EPS-SG and Jason-CS programmes as long-term strategic investments, expecting a benefit-to-cost ratio of at least 20[10], but many are still suffering from the economic crisis and all expect a cost-effective implementation of these programmes that delivers maximum value for money.





Strategic objectives

1. *Deliver services responding to evolving user requirements, based on the continuous infusion of science and on cost-effective infrastructures and operations*
2. *Maximise the lifetime of the current satellite systems to ensure the best return on Member States' investments and a safe transition to the next generation systems*
3. *Plan, develop and implement the next generation of EUMETSAT satellite systems to deliver the maximum benefits to Member States*
4. *As a partner in the European Space Policy, establish and exploit EU Copernicus missions in synergy with EUMETSAT's missions, for the common benefit of the EU and EUMETSAT Member States*
5. *Meet additional needs of Member States through cooperation with other satellite operators*
6. *Expand the user base for EUMETSAT data, products and services in EUMETSAT Member States and WMO Member States*

SERVICES

Deliver services responding to evolving user requirements

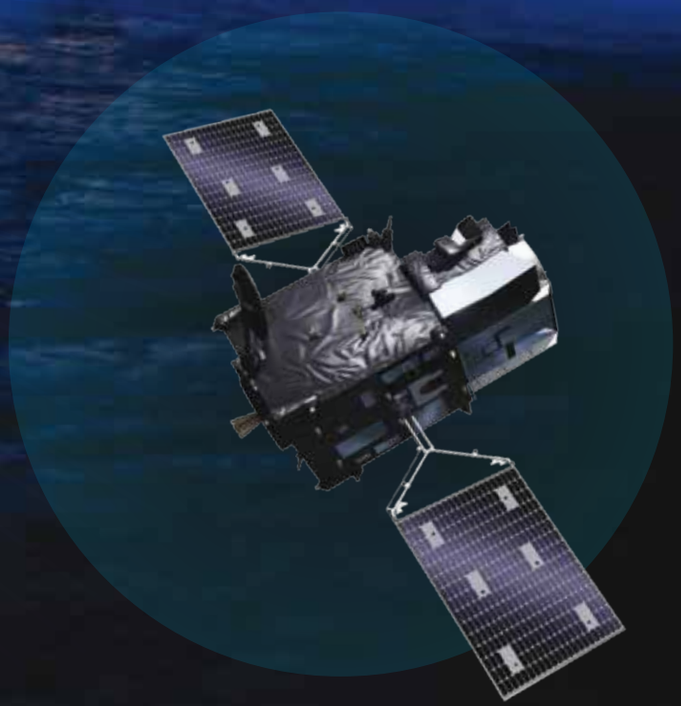
CONTINUITY

Secure continuity and improvement of data services to users for another decade and beyond

7 *Contribute to global partnerships of relevance to monitoring of weather, climate and environment from space*

8 *Continuously improve management and risk management processes*

9 *Recruit and maintain a core resource of talented and engaged people with relevant skills*



DEPLOYMENT

Ensure full deployment of the new MTG, EPS-SG and Copernicus Sentinel-3, -4, -5 and -6 missions

COOPERATION

Build on European and global partnerships involving the EU, ESA and national space agencies, and on a portfolio of bilateral cooperation with other satellite operators

1 *Deliver services responding to evolving user requirements, based on the continuous infusion of science and cost-effective infrastructures and operations*

Atmosphere, ocean, ice and land surfaces: a seamless portfolio of observational products

EUMETSAT will feed Earth system prediction systems delivering short to extended-range forecasts of weather, air quality, the ocean and the cryosphere, on regional to global scales, with a seamless portfolio of global, regional and local observational products of the atmosphere, ocean, ice and land surfaces, including snow cover.

This will be achieved through the optimum combination and processing of frequent observations from the geostationary orbit and global, more comprehensive observations from low Earth orbits collected by EUMETSAT's, shared and partners' satellite missions.

The EUMETSAT network of Satellite Applications Facilities: a strategic asset

In order to develop innovative environmental products that realise the full potential of space-based observations, EUMETSAT will continue to rely on its network of SAFs, each specialised in one application area, as this allows the best use of resources and expertise available across its Member States and the fastest response to evolving application requirements.

Infusing science to deliver more and better observational products

The continuous infusion of the latest advances in remote sensing and algorithmic sciences into operational data processing chains will be the main ingredient of the evolution of EUMETSAT's product portfolio, in response to evolving user requirements.

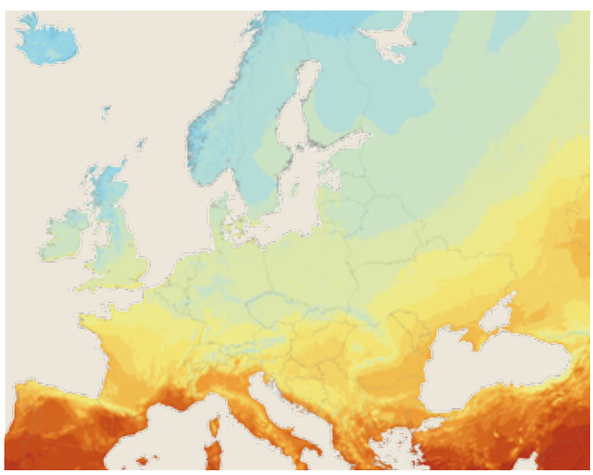
For this purpose, scientific expertise will be developed and shared across EUMETSAT and its network of SAFs, as required to:

- Maintain an in-depth understanding of satellite observations, their use in various applications and user requirements and priorities for enhanced or new products;
- Further develop methods for calibration of satellite data, using in situ observations as a reference when appropriate, in order to improve the quality of all downstream products;
- Support sustained interactions with the remote sensing research community, including through visiting scientists at EUMETSAT and SAF premises;
- Implement agreed enhanced and new products through day-to-day interactions between scientists and engineers and validate them in cooperation with users.

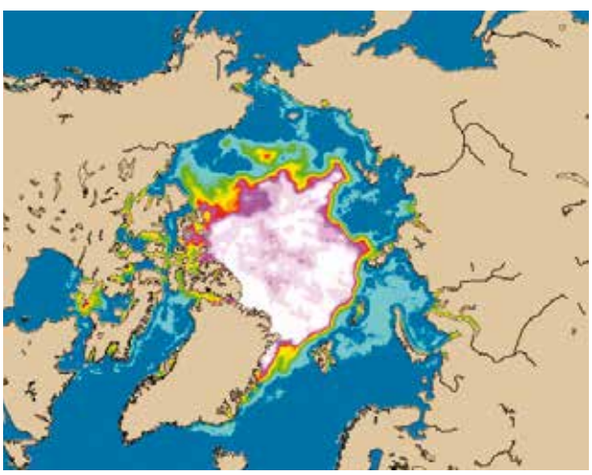
Supporting climate services

EUMETSAT's support to climate services will be embedded in the WMO-led Global Framework for Climate Services (GFCS) and the architecture for climate monitoring from space, coordinated by the CGMS and CEOS as the response of space agencies to the GFCS.

A map of photovoltaic solar electricity potential based on Meteosat solar irradiance climatology (source: JRC/CM SAF)



Sea ice concentration map in the arctic (source: OSI SAF)



Using the expertise available at its headquarters, at the Climate Monitoring SAF and other SAFs EUMETSAT will expand its portfolio of climate records, and, for this purpose, will:

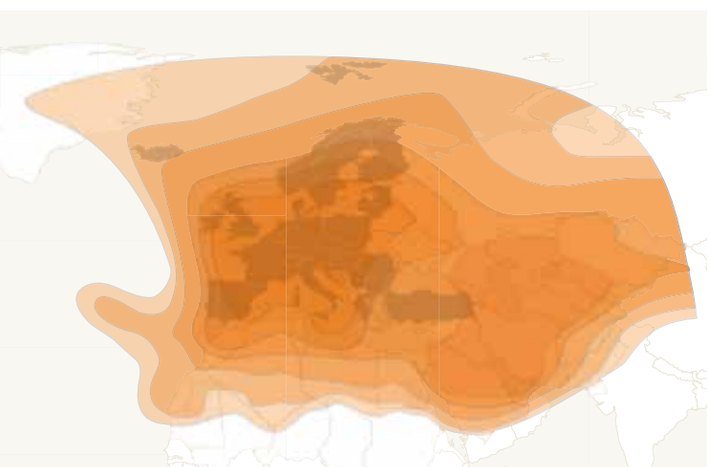
- Maintain a unique archive, spanning decades, of space-based observations of the atmosphere, ocean and land surfaces from its own and partners' missions;
- Produce fundamental climate data records of physical variables through recalibration and reprocessing of long series of space-based observations and, downstream, thematic climate data records of essential climate variables (ECVs);
- Cooperate with the scientific community to validate climate data records and stimulate their use in climate services;
- Ensure easy access to a broad range of well-documented climate records;
- Support the EU in the implementation of its Copernicus Climate Change Service (C3S);
- Support climate-related capacity building initiatives, especially in Africa.

A proper balance will be maintained between sustained operations and contributions to selected cooperative research projects, with a mix between EUMETSAT, Copernicus and other third-party funding sources, e.g. EU research and innovation programmes.

Improving data access

EUMETSAT's most specific mission being to deliver time-critical data, its key objective will continue to be achieving the shortest possible latency and offering a high level of service at low cost to users scattered across its Member States, Africa and at the periphery of Europe.

EUMETCast Europe coverage area



In the foreseeable future, this will be achieved through:

- The continuous improvement of the EUMETCast satellite data broadcast service, based on the use of the most efficient digital video broadcasting standards and optimised management of available bandwidth;
- Enhancements of regional data services achieving latency of 15-30 minutes from sensing for data broadcast to a European network of ground stations by a constellation of three polar orbiting satellites operated by EUMETSAT, NOAA and CMA.

EUMETCast will deliver an integrated real-time data stream including weather, atmospheric composition, marine and land products based on shared funding of bandwidth between EUMETSAT, Copernicus and EU-funded capacity-building initiatives.

Web Map Services (WMS) will also be further developed to facilitate the overlaying of EUMETSAT products with other geo-referenced information.

For less time-critical and offline data, EUMETSAT will develop online access services for larger volumes of data, enhance the search, discovery, visualisation and retrieval functionalities of its Earth Observation Portal and promote interoperability with other portals.

Facing the "big data" challenge

EUMETSAT will implement a roadmap of pathfinder projects for future data services to assess the relevance of "big data" concepts and technologies to its wide spectrum of data access requirements.

Whilst focussing on its specific requirements, EUMETSAT will consider similar projects across the EMI, ESA and the EU Copernicus programme, and will establish cooperation whenever appropriate.

Continuity of service and cost-effectiveness will remain major drivers

Service continuity and cost effectiveness will remain major drivers for operations and all evolutions of multi-mission ground systems and data services. This will involve balancing the contributions of EUMETSAT's headquarters and the SAF network to the development and delivery of new products.

2 *Maximise the lifetime of the current satellite systems to ensure the best return on Member States' investments and a safe transition to the next generation systems*

In view of the schedule uncertainties on the deployment of the next generation systems at this early stage of their development, and to achieve the best return on Member States' past investments, EUMETSAT will maximise the useful lifetime of its current generation satellite systems in order to ensure:

- A safe and seamless transition from the current to the next generation of satellite systems, with a sufficiently long overlap in orbit;
- The continuity of core data services, even in the event of a launch failure of the first satellites in the MTG and Metop-SG series.

In practice, EUMETSAT will seek optimum workarounds to irrecoverable anomalies on ageing spacecraft to maximise their lifetime and make best use of resources onboard.

EUMETSAT will also strive to exploit the residual capacities of ageing satellites to ensure maximum benefits to Member States and users. Thus, dual Metop operations will be maintained as long as possible and Meteosat-8 operations will be extended at 41.5°E to provide a "best effort" contribution to Indian Ocean Data Coverage (IODC) services in partnership with India, Russia and China.

3 *Plan, develop and implement the next generation of EUMETSAT satellite systems to deliver the maximum benefits to Member States*

Timely delivery of new generation satellite systems

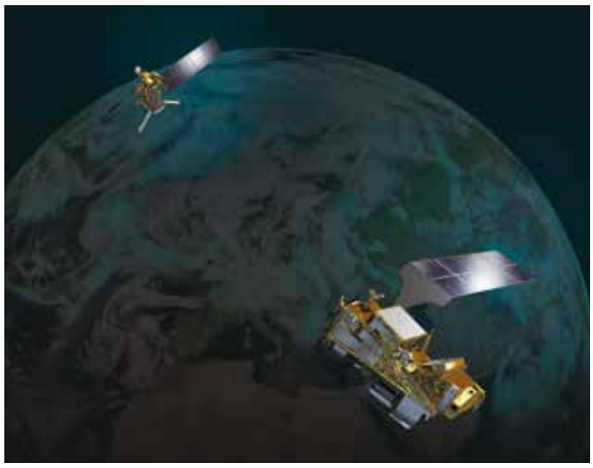
The EUMETSAT Member States have approved the MTG, EPS-SG and Jason-CS programmes to extend and enhance data services currently provided by the MSG, EPS and Jason-2/-3 systems in the next decades.

MTG will collect very frequent imagery from the geostationary orbit to support nowcasting and very short-range forecasting over Europe, Africa and adjacent seas, while EPS-SG will deliver global observations from the mid-morning polar orbit as the prime source of input data to global numerical prediction models used for short- to medium-range forecasts.

Taking over Jason-3, the Jason-CS/Sentinel-6 altimetry mission, implemented in partnership with ESA, the EU (Copernicus) and the USA, will continue monitoring mean sea level, ocean currents and sea state in support of operational oceanography, marine meteorology, seasonal forecasting and climate services.

The target for the next decade will be to establish the next generation satellite systems through:

- The successful completion of the development of these systems in cooperation with ESA and other development partners;
- Their deployment in time to secure service continuity with a sufficiently long overlap with the last satellites of the current generation (Meteosat-11, Metop-C and Jason-3).



Planning the optimum deployment of recurrent satellites

After the initial deployment of the full in-orbit capacity for MTG, EPS-SG and Jason-CS, the objective will be to maximise the benefits of all programmes to Member States through:

- Assessment of their impact on forecasting and other applications, in cooperation with the ECMWF, European NMHSs and the providers of Copernicus information services;
- Deployment of additional products in cooperation with SAFs and Copernicus;
- Optimum planning of the deployment of the recurrent satellites to assure continuity of services and in-orbit cross-calibration of successive satellites;
- Maximising the in-orbit lifetime of all individual satellites.

Planning for future programmes

In preparation for future programmes, EUMETSAT will maintain and review a set of technology-independent user requirements for satellite observations, taking into account WMO Rolling Requirements Reviews and lessons learnt from users in the assessment of MTG, EPS-SG, Jason-CS and third party missions' data.

Considering the 5.5-year design lifetime of the Jason-CS satellites, EUMETSAT will first have to prepare for its contribution to the follow-on high precision ocean altimetry mission with its European and US partners.

EUMETSAT will then prepare the user consultation process that needs to be initiated with ESA in the 2025-2027 timeframe as the first formal step in the planning of the Meteosat Fourth Generation (M4G) and the EPS-Third Generation (EPS-TG) programmes.

The process will consider first how user requirements can be fulfilled through an optimum balance between observations from geostationary and low Earth orbits, and then assess remote sensing techniques that are, or may be, capable of delivering required observations.

Candidate instruments and space segment concepts will then be traded off, taking into account the assessment of the maturity and capabilities of new technologies and concepts (e.g. miniaturisation of sensors, CubeSats, hosted payloads, etc.).

ESA will remain the development and procurement agency of choice for the space segment of future EUMETSAT mandatory programmes, based on the proven cooperation model which has made Europe a world leader in satellite meteorology, making best use of respective competencies. Under this model, ESA is responsible for the development of satellites fulfilling EUMETSAT requirements and procures recurrent satellites on EUMETSAT's behalf, while EUMETSAT develops the overall system and ground segment, procures launch services and operates the full system for the benefit of users.

When planning the M4G and EPS-TG development programmes, EUMETSAT will aim to fulfil service continuity requirements, whilst attempting to phase both developments to avoid an unaffordable peak for Member States' overall financial contributions.

The case for the transition to operational status of research missions - in particular ESA Earth Explorer missions like AEOLUS or SMOS - will be evaluated on a case-by-case basis, considering user priorities, enhancement and technology development required to fulfil operational requirements, lifecycle costs, and partnership and co-funding opportunities.

MTG-S

1. ***IRS*** *(Infrared Sounder)*
2. ***COPERNICUS SENTINEL-4*** *(Ultra-violet, Visible and Near-Infrared Sounder)*

MTG-I

1. ***FCI*** *(Flexible Combined Imager)*
2. ***LI*** *(Lightning Imager)*
3. ***DCS*** *(Data Collection System)*

   GEOSAR *(Search and Rescue)*

Metop-SG A

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 B

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)*

Jason-CS/Sentinel-6

1. ***Poseidon-4*** *(Dual Frequency Altimeter)*
2. ***AMR-C*** *(Advanced Microwave Radiometer)*
3. ***DORIS*** *(Doppler Orbitography and Radio-positioning Integrated by Satellite)*
4. ***GNSS RO*** *(GNSS Radio Occultation)*
5. ***LRA*** *(Laser Retroreflector Array)*
6. ***GNSS POD*** *(GNSS Precise Orbit Determination)* *(unseen on top of the satellite)*

4 *As a partner in the European Space Policy, establish and exploit EU Copernicus missions in synergy with EUMETSAT's missions, for the common benefit of the EU and EUMETSAT Member States*

EUMETSAT's role in the European Space Policy

As an operational user-driven agency, EUMETSAT brings to Europe a unique, resilient capability to deliver global observations, data and user support services around the clock, based on the combination of scientific and engineering skills and experience of day-to-day interactions with multiple user communities.

Within Copernicus, the objective of EUMETSAT, as a public, business-neutral entity, will remain to make available its unique multi-mission infrastructure, expertise and operational experience to support the most efficient implementation of relevant Sentinel missions and to offer, through synergies with its own missions, the broadest possible range of opportunities to users and providers of services in EU and EUMETSAT Member States.

EUMETSAT will seek to maintain a direct relationship with the EU within the Copernicus governance and consider opportunities presented by other EU space initiatives, e.g. in relation to space situational awareness, including space weather.

EUMETSAT will continue to support the Commission in the space dialogues established with non-European countries and to inform these dialogues of the mutual benefits of bilateral cooperation it has established with partners in each country.

Delivering and planning contributions to Copernicus

Until 2021, the priority will be the realisation of the tasks entrusted by the EU under the Copernicus Agreement signed on 7 November 2014, including:

- Operations and exploitation of the Sentinel-3 and Jason-3 marine missions in cooperation with ESA, CNES and NOAA and preparation for the operations of the Jason-CS/Sentinel-6 cooperative mission with European and US partners;
- Preparation for operations of the Sentinel-4 and Sentinel-5 atmospheric composition monitoring missions implemented as part of EUMETSAT's MTG and EPS-SG systems;
- Delivery of operational data and support services to the Copernicus marine and atmosphere services and users, including dissemination of selected products from international partners' missions, responses to evolving requirements and user training;
- Technical implementation of data exchange arrangements established by the European Commission with third-party countries or groups of countries.

Building on the maximum synergy with its own missions and data services, EUMETSAT will deliver integrated, multi-mission data.

Subject to consistency with its own roadmap for future data services and to funding by Copernicus, EUMETSAT will contribute to the roadmap for an Integrated Copernicus Ground Segment, e.g. through the deployment of a cloud-based data and information access and service platform in partnership with the providers of Copernicus marine, atmosphere and climate information services.

EUMETSAT will prepare for the continuation of its cooperation with the EU on Copernicus in the next Multiannual Financial Framework (post-2020), with a view to negotiating a new agreement in a timeframe enabling the seamless continuity of entrusted tasks.

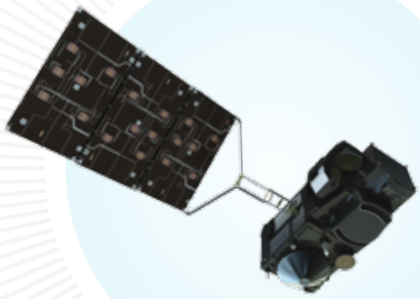
Planning for additional and next generation Sentinel missions

In the short term, EUMETSAT will focus on the proposed additional Sentinel missions that are relevant to its Convention, create synergies with its own missions or Sentinel missions it already exploits, and deliver benefits to EUMETSAT and EU Member States, e.g. for monitoring atmospheric CO_2, the ocean and the polar regions.

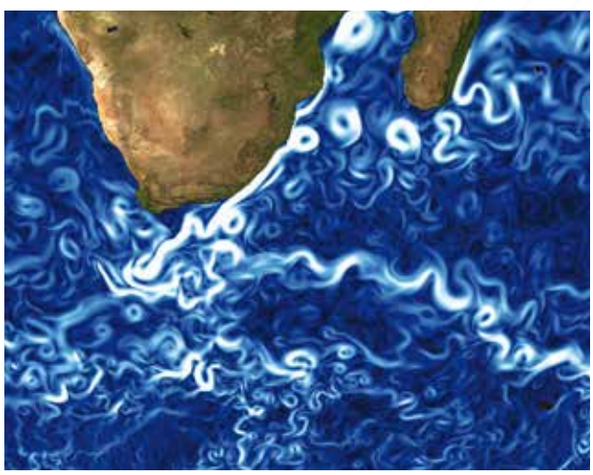
In the medium term, EUMETSAT will prepare the implementation of the next generation of Sentinel marine missions, after Sentinel-3 and Sentinel-6/Jason-CS.

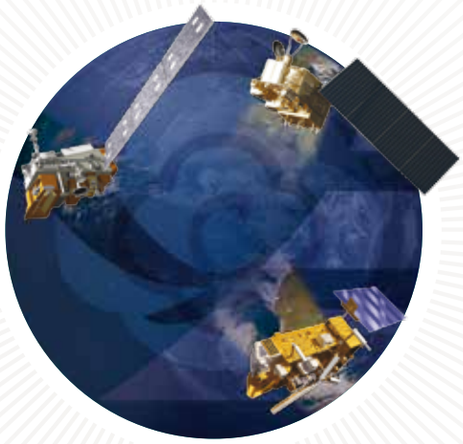
In principle, EUMETSAT will seek responsibility for operations of these Sentinel missions on behalf of the EU, making maximum reuse of its multi-mission ground infrastructure and of its specific expertise, and cooperation with ESA in the development of the ground segment, as necessary to appropriate the new systems and prepare for their safe operations.

The model for EUMETSAT's involvement will be assessed on a case-by-case basis, assuming that operations are, in any case, covered by a third-party programme funded by the EU. Contributions to development through a EUMETSAT-funded programme may be considered for cooperative missions like Jason-CS/Sentinel-6 or for missions implemented as part of EUMETSAT's future satellite systems.



Argulhas current modelisation (source: CMEMS/Mercator Océan)





Observations from mid-morning, afternoon and early-morning polar orbits from Metop, JPSS (NOAA) and FY-3E (CMA) satellites

Alain Ratier, Director-General of EUMETSAT and Stephen Volz, NOAA Assistant Administrator, signed the JPS Agreement during the 84th session of the EUMETSAT Council

5 *Meet additional needs of Member States through cooperation with other satellite operators*

As no single country can, on its own, provide sufficiently global and frequent observational coverage from space, EUMETSAT will consolidate a consistent portfolio of bilateral cooperation agreements with other satellite operators, considered as a strategic asset.

Cooperation based on reciprocity will meet additional requirements from Member States for data, broaden EUMETSAT's user-base outside Europe, and seek synergies between orbits, missions or instruments to improve overall capacity, coverage and sampling.

The cooperation with the United States, firmly established through the Long-Term Cooperation Agreement signed with NOAA, will continue to involve the sharing of satellite systems in low Earth orbits. Within the Joint Polar System, EUMETSAT will continue to provide observational coverage from the mid-morning orbit with its EPS-SG programme, while the NOAA Joint Polar Satellite System programme will cover the afternoon orbit. Likewise, EUMETSAT will continue to share operations of the Jason-3 mission with NOAA and further cooperate with NASA, NOAA, ESA and the EU to develop the follow-up Jason-CS/Sentinel-6 mission.

Cooperation with the China Meteorological Administration will focus on coordination of assets in polar and geostationary orbits, science and exchange of data with cross-dissemination to the respective user communities. Substantial opportunities will arise with the launches of one FY-3 satellite to the unpopulated early morning polar orbit and of the FY-4 geostationary satellite equipped with a hyperspectral infrared sounder, like MTG-S. Cooperation with China's State Ocean Administration will continue in parallel on the acquisition, sharing and processing of ocean satellite data.

EUMETSAT will further develop cooperation on science, data acquisition, exchange and processing with partner agencies in India, Japan, Russia, South Korea and Canada to deliver third-party data services to its users and make its own data available to users outside Europe.

Cooperation with R&D space agencies will focus on research missions delivering near-real-time data usable for weather forecasting.

Finally, EUMETSAT will seek access to space weather data and forecasts from international partners to meet increasing demand from Member States' NMHSs for such information.

6 *Expand the user base for EUMETSAT data, products and services in EUMETSAT Member States and WMO Member States*

EUMETSAT membership

EUMETSAT will consider new accessions to its Convention for EU Member States and countries having established formal relationships with the EU through an on-going accession process. For other countries, project-based arrangements will be considered with the support of the WMO.

Data policy

The WMO Resolutions 25, 40 and 60 on the exchange of hydrological, meteorological and climate data will remain the reference for the EUMETSAT data policy, with full and non-discriminatory access being offered to the worldwide user community under well-documented licensing conditions.

Whilst promoting the use of its own products by Copernicus, EUMETSAT will make sure that their ownership is acknowledged, and will establish arrangements for their authorised re-distribution in compliance with its data policy.

Following the Oslo Declaration[11] endorsed by all constituents of the EMI, EUMETSAT will offer more and better products free of charge, thus sharing the benefits of its more capable systems with all users and encouraging the maximum use of its data.

EUMETSAT will also consider the GEO data-sharing principles and the promotion of full, free and open data policy in Europe, together with the impact of the emergence of commercial providers of meteorological observations on data exchange within the WMO.

Training and user preparedness

EUMETSAT will continue to be active in the provision of user training, as part of an integrated cooperative effort mobilising expertise and resources across the EMI and WMO and involving an international network of experts on satellite products and applications.

The first priority of EUMETSAT-funded training activities will be that personnel of NMHSs maintain and develop the necessary skills to exploit current satellite data for forecasting, research and climate monitoring and be prepared for the uptake of innovative data from the next generations of EUMETSAT satellites. One key objective is to ensure that more and more satellite data are ingested in numerical prediction models.

A second priority will be to extend the user base in Member States beyond the meteorological user community and to provide training to users in Africa and at the periphery of Europe as part of capacity-building initiatives funded by third parties.

EUMETSAT will also support training of Copernicus users in cooperation with the providers of Copernicus information services.

Cooperation with NMHSs or academia will reinforce the science base on the user side, through the Research Fellowship and Visiting Scientist programmes, annual Satellite User Conferences, Copernicus events and other mechanisms.

Capacity building

EUMETSAT will support the Operational Plans of the WMO in Africa and at the periphery of Europe and help the meteorological communities to get access to, and make best use of, EUMETSAT products and services.

At the periphery of Europe, this will facilitate the development of national or regional projects coordinated by the WMO and responding to weather-related EU policy priorities that may be eligible for EU funding.

In Africa, EUMETSAT will work with the European Commission and the African Union Commission to secure a follow-up initiative to the Monitoring of Environment and Security in Africa (MESA) project and support the implementation of the Joint Africa-EU Strategy and the GFCS in Africa. It will support projects funded by new EU instruments, including the deployment of four African ground stations acquiring and processing data broadcast by its Metop satellites as part of the development of a regional numerical weather prediction capability.

7 *Contribute to global partnerships of relevance to monitoring of weather, climate and environment from space*

The EUMETSAT Convention foresees that the organisation shall take into account, as far as possible, the requirements of the WMO.

Therefore, the WMO Integrated Global Observing System (WIGOS) and the WMO Information System (WIS) will remain the general international framework in which EUMETSAT activities are embedded and articulated with those of other operators of meteorological satellites.

In this framework, EUMETSAT will remain the Permanent Secretary and an active member of the Coordination Group for Meteorological Satellites (CGMS) and support the definition of the "WMO Vision for the Global Observing System in 2040" setting the target for the future space-based component of the WIGOS.

As a major provider of satellite data and products, the organisation will also contribute to the WIS, through its various data access systems and services.

EUMETSAT also will be active on the Committee for Earth Observation Satellites (CEOS) as the preferred framework for the space community to address requirements of the Sendai Framework for Disaster Risk Reduction and of the intergovernmental Group for Earth Observation (GEO), and to leverage mutual benefits through the integration of operational and research missions into virtual constellations.

EUMETSAT, through the "Global Architecture for Climate Monitoring from Space" coordinated by CGMS and CEOS, will continue to contribute to the "monitoring and observations" pillar of the Global Framework for Climate Services (GFCS) and to fulfilling the requirements of the Global Climate Observing System. In addition, sustained interactions with the World Climate Research Programme will promote the integration of EUMETSAT's satellites in climate observation strategies and the use of its climate records in research.

EUMETSAT's participation in other global partnerships will be focused on activities creating added value to its missions and benefits for its Member States.

8 *Continuously improve management and risk management processes*

Management

EUMETSAT will consolidate its matrix organisation to make the most flexible use of its human resources and to face the challenge of operating more satellites.

In the context of the growth of the organisation, the emphasis will remain on the continuous improvement of processes to ensure that activities are managed in a safe, responsive and cost-effective manner and, as a result, to maintain compliance with the ISO 9001 standard.

The EUMETSAT procurement process will remain driven by best value for money achieved through open competition but with a clear preference for European industrial solutions, where they are competitive. Notwithstanding the European preference, EUMETSAT will retain flexibility in deciding on procurements of launch services and probe the market.

EUMETSAT will continue to follow international accounting standards, in particular the International Public Sector Accounting Standards, and will further improve its budgeting and financial planning processes, taking into account the risks and uncertainties inherent to its complex development programmes.

The suitability of the Enterprise Resource Planning (ERP) tool for business and control requirements will be reassessed and evolutions considered if needed and affordable.

EUMETSAT will maintain its headquarters facilities in a cost effective manner taking into account the coexistence of ageing and new buildings, safety and security requirements, standards applicable in Germany and the objective of minimising carbon emissions.

Risk Management

Risk management is part and parcel of EUMETSAT's development and operations activities, in view of the large investments involved and of the criticality of the continuity of its data services for the protection of life and property and for the economy.

EUMETSAT will continue to improve management of operational, development and financial risks based on relevant standards, and to protect its tangible and intangible assets.

In the operations area, the processing of anomalies will remain a priority to minimise data outages, and the continuity of core data services will remain a requirement, even in the event of a disaster at EUMETSAT premises.

The protection of operational assets will focus on cyber security risks and avoidance of collisions with space objects using space situational awareness services.

EUMETSAT will continue to protect its intellectual property and the ownership of data and intangible assets through relevant licensing and clauses in contracts and agreements.

Development risks will be managed throughout the development cycle of new systems using state-of-the art methods and best practices.

EUMETSAT will coordinate with the WMO, Member States and other space agencies for the protection of vital frequencies in the context of the International Telecommunication Union.

Internal controls will involve line management, the Director-General and the Council, and a mix of a priori controls and audits evolving towards more audits.

9 *Recruit and maintain a core resource of talented and engaged people with relevant skills*

A vital asset of EUMETSAT is its people, and their skills and know-how.

In order to ensure that highly qualified human resources remain available in-house during the long lifecycle of its programmes, EUMETSAT will:

- Respond to the ageing of its population of engineers and scientists - a general feature in the space sector - through the recruitment of high-potential early career professionals;
- Recognise the role of senior experts in the development of less experienced staff;
- Reinforce its attractiveness in the recruitment of the highly experienced technical and science managers required to manage a broader portfolio of programmes and projects.

Whilst seeking to recruit the best candidates through open competition, EUMETSAT will facilitate internal mobility by offering managerial or expert career perspectives to qualified employees.

Training will be prioritised and planned to ensure the availability of required skills and to prepare staff for current and future roles.

EUMETSAT will, as a Coordinated Organisation, maintain remuneration and pension benefits as appropriate to ensure that recruitment and retention needs are met, whilst ensuring that non-remuneration aspects of benefits and working conditions remain attractive.

EUMETSAT will remain committed to excellent employee relations through the use of a variety of communication and feedback mechanisms and constructive partnership with the Staff Association Committee (SAC).

Glossary

CMA	China Meteorological Administration
ECMWF	European Centre for Medium-Range Weather Forecasts
EMI	European Meteorological Infrastructure
ESA	European Space Agency
GFCS	Global Framework for Climate Services
NASA	National Aeronautics and Space Administration
NMHSs	National Meteorological and Hydrological Services
NOAA	National Oceanic and Atmospheric Administration
SAFs	satellite application facilities
WIGOS	World Meteorological Organization Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization

References

1 *The EMI is formed by the European National Meteorological and Hydrological Services (NMHSs), their EUMETNET grouping, the European Centre for Medium-Range Weather Forecasts (ECMWF) and EUMETSAT.*

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6 *"The Case for the Eumetsat Polar System (EPS)/Metop Second-Generation Programme: Cost Benefit Analysis" - Hallegatte, Stéphane (et al.) in "Yearbook on Space Policy 2011/2012: Space in Times of Financial Crisis" (Editors: Al-Ekabi, C., Baranes, B., Hulsroj, P., Lahcen, A.)*

7 *"The impact of Metop and other satellite data with MET Office NWP system using an adjoint-based sensitivity method", S. Joo, J. Eyre and R. Marriot, UKMO, 2012*

8 *https://www.ipcc.ch/report/ar5/*

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10 *"The Case for the Eumetsat Polar System (EPS)/Metop Second-Generation Programme: Cost Benefit Analysis" - Hallegatte, Stéphane (et al.) in "Yearbook on Space Policy 2011/2012: Space in Times of Financial Crisis" (Editors: Al-Ekabi, C., Baranes, B., Hulsroj, P., Lahcen, A.)*

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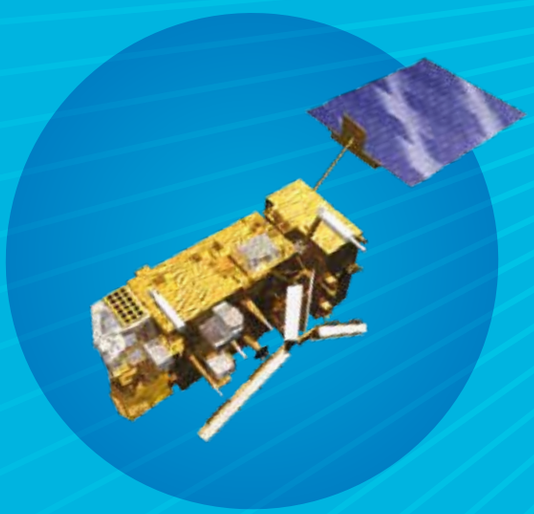

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