

METEOSAT

WEATHER AND CLIMATE MONITORING
FROM GEOSTATIONARY ORBIT



A continuous and reliable service for Europe



The Meteosat satellite service has surpassed all expectations raised during the development of the programme in the early 1970's. For over 30 years, Meteosat satellites of the first and now second generation have been delivering a continuous and reliable stream of data from their position 36,000km above the surface of the Earth. These data provide a vital contribution to daily weather forecasting and are contributing to climate studies on a global scale.

MSG-2 (renamed Meteosat-9 after launch), being prepared for launch, which took place on 21 December 2005



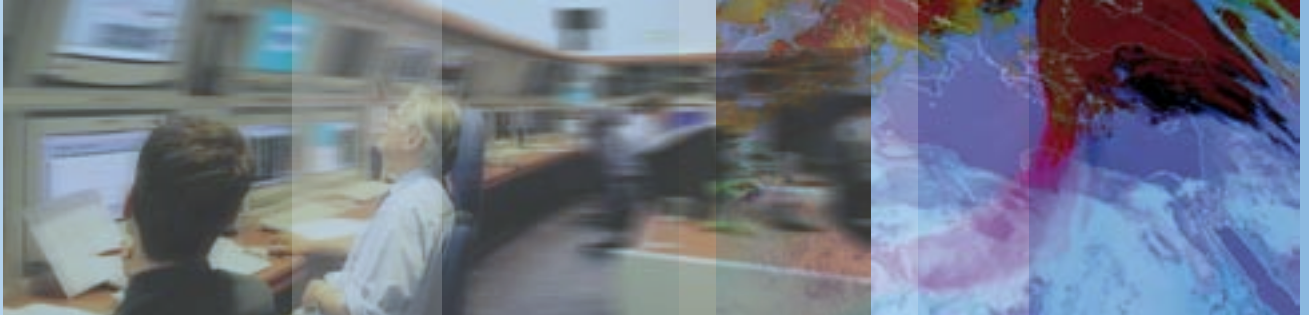
In a world that is facing both climate change and increasingly instable weather patterns, accurate and timely data to monitor weather, climate and the environment are an absolute must. This requires advanced forecasting techniques, ranging from nowcasting applications or numerical weather prediction models to the provision of relevant data for climate monitoring and research. Of paramount importance is the accurate monitoring and forecasting of severe weather situations to help save human lives and property, and here the new, significantly enhanced second generation of Meteosats (Meteosat-8 and -9) has proven to be a vital asset.

The operational meteorological satellite service over Europe is now exclusively provided by second generation Meteosats. The first generation is still very active, with the two remaining satellites (Meteosat-6 and -7) currently in geostationary orbit over the Indian Ocean, where they provide important data coverage for the region and also contribute to the Tsunami Warning System. In fact, before it was decommissioned in April 2007, Meteosat-5 had completed 16 years in orbit.

Like their predecessors, the second generation of Meteosats are spin-stabilised and are in geostationary orbit. Every 15 minutes, a multi-spectral image of the Earth's surface and cloud systems is taken in 12 spectral channels, compared to just three channels every 30 minutes from the first generation of Meteosats. In addition, the second generation offers a higher spatial resolution, which can even discover algae bloom or windborne pollen in the atmosphere.

The Meteosat Second Generation (MSG) programme includes a total of four satellites, securing the future of EUMETSAT's geostationary meteorological observations and services until at least the year 2018. Before this time a third generation of Meteosat spacecraft should be poised for take over. In order to ensure a full operational service with a backup satellite in orbit at all times, MSG-2 (renamed Meteosat-9 after commissioning) was launched on 21 December 2005, while MSG-3 and -4 are currently in storage and are scheduled for launch in 2011 and 2013 respectively.



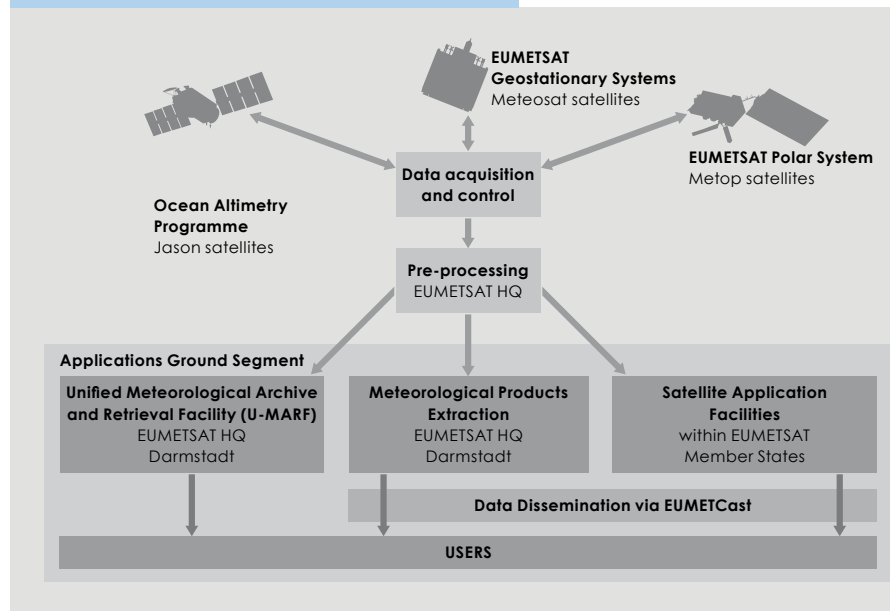


Collecting and disseminating data

The main payload of the MSG satellites is the Spinning Enhanced Visible and Infrared Imager (SEVIRI). This radiometer scans the Earth's surface in 15-minute repeat cycles using 12 spectral channels, which provide precise data of the atmosphere, including permanent data on temperatures of clouds, land and sea surfaces. In particular, the High Resolution Visible (HRV) channel, at a resolution of 1 km, helps weather forecasters to detect and forecast severe weather situations.

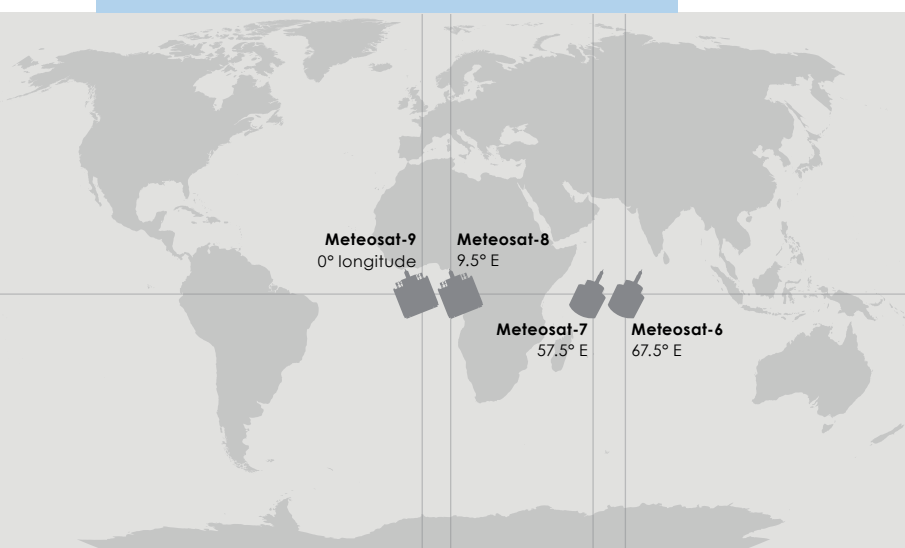
Also carried on board MSG is the Geostationary Earth Radiation Budget (GERB) instrument. Initiated by the European Space Agency (ESA) and developed by a European consortium led by the Rutherford Appleton Laboratory (RAL), United Kingdom, GERB measures the Earth's radiation balance as it views the top of the atmosphere, providing some unique opportunities in support of Earth Sciences research, particularly with regard to global climate.

The EUMETSAT ground segment



The ground segment consists of purpose-built core facilities in the EUMETSAT Mission Control Centre (MCC) in Darmstadt, Germany and also includes ground stations located in Usingen (north of Frankfurt - Primary Ground Station), Maspalomas, Spain (Backup and Ranging Station) and Cheia, Romania (Secondary Backup Ground Station). The ground segment constitutes the MSG infrastructure for satellite control and data reception, and a similar infrastructure exists for the first generation satellites with a primary ground station in Fucino, Italy.

Meteosat satellites currently in orbit



The raw data are processed in the MCC and retransmitted to EUMETSAT users via the global telecommunications system and EUMETCast, EUMETSAT's unique data dissemination system. The Unified Meteorological Archive and Retrieval Facility, common to all EUMETSAT programmes, enables the archiving and retrieval of the data.

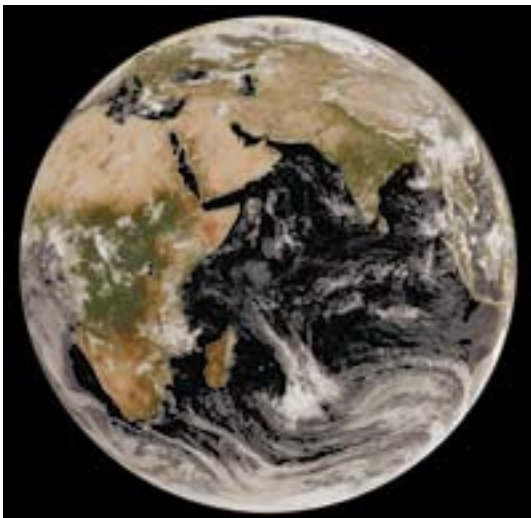
In addition to the central data processing and distribution, a network of processing centres, known as Satellite Application Facilities (SAFs), is developing throughout Europe to provide specialised data products to user communities. In total, there are eight SAFs, which provide information on Land Surface Analysis, Ocean and Sea Ice, Climate Monitoring, Numerical Weather Prediction, Support to Nowcasting and Very Short Range Forecasting, GRAS Meteorology, Ozone and Atmospheric Chemistry Monitoring, and Support to Operational Hydrology and Water Management.



Meteosat Services

Meteosat First Generation Indian Ocean Data Coverage

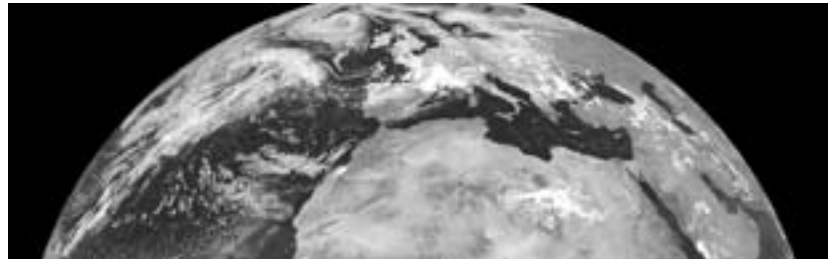
Provided by Meteosat first generation satellites, the Indian Ocean Data Coverage (IODC) service was originally established to support INDOEX by providing Meteosat imagery for the Indian Ocean area for the duration of this experiment. The relocation of Meteosat-5 to the 63°E position was initiated on 14 January and finished on 18 May 1998. The operational service from this position started on 1 July 1998 and at the request of EUMETSAT Member States and other users in the Indian Ocean region, the service was continued and is currently planned to remain operational until end 2010. On 6 February 2007, Meteosat-7 (located at 57.5°E), replaced Meteosat-5 as the operational IODC satellite.



A Meteosat-7 RGB colour composite image of one infrared channel and one visible channel over the Indian Ocean, 11 October 2006

Meteosat Second Generation Imaging service

Imaging is the main mission of MSG. The highly sophisticated SEVIRI instrument delivers images of remarkable accuracy, which are in fact excellent tools for observing the atmosphere, the oceans and land surfaces. Combined datasets from several spectral channels are used to produce “working” images for use in a variety of meteorological applications.



Meteosat Second Generation Rapid scanning service

A new Rapid Scan Service (RSS) from Meteosat-8 began in May 2008 replacing the successful Meteosat-6 RSS which ended in January 2007. It delivers Meteosat Second Generation (MSG) image data as well as a selection of meteorological products thus supporting the detection of rapidly developing localised convective weather systems like thunder storms.

Rapid scan data from the new service complements the 15-minute High Resolution Image data generated by the other operational Meteosat satellite, Meteosat-9. The scan period is five minutes, compared to 10 minutes for the previous service, and is now the same as that of European weather radars. The scan will cover a latitude range of 15° to 70°. The image data and products will be based on the full 12 spectral channels available from MSG.

Product extraction service

A comprehensive range of meteorological and geophysical products is derived at EUMETSAT headquarters in Darmstadt. All of these products are extracted on a fully automated basis requiring a minimum of human intervention. A large part of these products are distributed routinely in near-real-time via EUMETCast. This includes products such as Atmospheric Motion Vectors providing information on wind vectors at different heights, which are extracted from the motion of clouds as well as other tracers. Cloud Masks display information on the presence of clouds, snow and ice at full resolution and the more advanced Cloud Analysis product provides an identification of cloud layers, giving information on total coverage, the height and types of clouds. The Global Instability Indices product provides a few hours of warning for potentially strong convective storms.

The unprecedented capabilities of the SEVIRI data enable continuous improvements in existing products in order to meet evolving user requirements. It also allows the introduction of innovative products, like fire detection and upper tropospheric divergence fields, in response to new and challenging user requirements.

There are also offline products generated centrally which are available only on request. These are mainly products used in climate research and monitoring including items such as a Climate Data Set or a Precipitation Index important for research in agrometeorology and hydrology.

In addition to the core set of centrally generated MSG products there are also those that are being developed by the growing network of SAF's.



Data collection and relay service

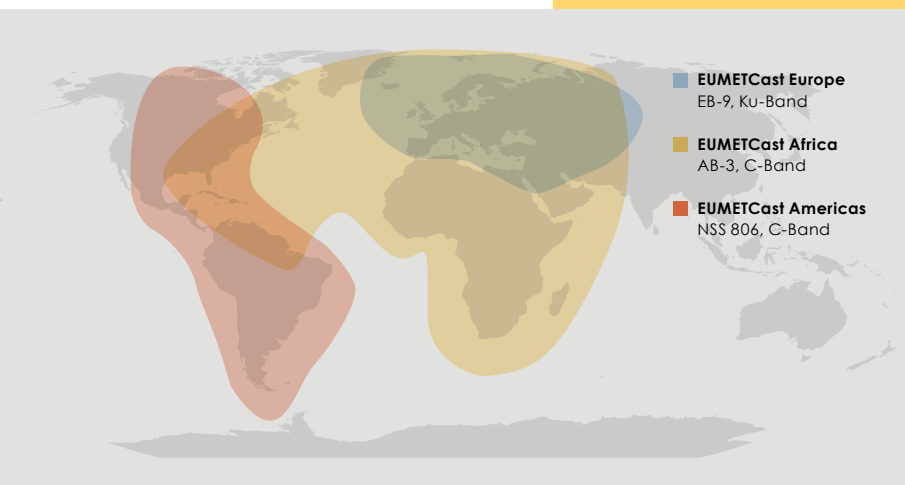
The MSG satellites are also used to collect and relay observations and environmental data from automated data collection platforms that are located within the satellite's view.

Data dissemination service

Meteosat data are delivered to the meteorological user community in real time via the EUMETCast system, using the services of a commercial satellite operator and telecommunications provider to distribute data files using Digital Video Broadcast (DVB) technology.

One of the strengths of the EUMETCast system is the simplified user infrastructure and the resulting low cost for obtaining high-quality data. All available data can be received with a single reception station using off-the-shelf components.

EUMETCast Coverage



Other missions and services

In addition to their services in support of meteorology the MSG satellites offer a Search and Rescue (S&R) service through a transponder that relays distress calls from beacons on ships, aircraft or individuals to relevant emergency services.

The Geostationary Earth Radiation Budget (GERB) mission provides valuable data on reflected solar radiation and thermal radiation emitted by the Earth and atmosphere. It is an experimental mission, which is very important for research in climatology and global warming.

A more detailed overview of all services and products provided by MSG can be found on the EUMETSAT website which also provides information on the Indian Ocean Service covered by the First Generation of Meteosats.

Meteosat Third Generation

EUMETSAT is already preparing a third generation of Meteosat satellites. Meteosat Third Generation (MTG) will provide more capability for longer than MSG, which it will eventually replace, at a comparable cost to the user per year of service over 20 years of operational service. Unlike the two previous generations of spinning Meteosat, the three-ton MTG will be a three-axis stabilised satellite.

The MTG Preparatory Programme foresees both imagery and sounding missions. With its Flexible Combined Imager, MTG will produce more frequent images of higher spatial, temporal and radiometric resolution and will have more channels than its predecessor (16 compared to 12). In addition, novel missions will be implemented for the geostationary orbit with Infrared Sounder, the Lightning Imager and an atmospheric chemistry instrument measuring the Ultraviolet and visible spectrum. The first MTG satellite is scheduled for launch in late 2015, guaranteeing continuity of operational service over the following 20 years. In addition, it will open the possibility for future geostationary applications.

Data policy

In order to promote and encourage research in the field of meteorology and climatology, EUMETSAT offers the full set of data and products including historical data free of charge for scientific and educational use, as well as for private individual use. Also, a set of essential data will always be made available to every interested user, free of charge and unrestricted.

However, satellite programmes are costly and Member States as well as Cooperating States pay a significant contribution to secure unlimited access to the full dataset for official duty use. Non-Member States can for this reason be granted free access only to a subset of EUMETSAT meteorological data, and would be expected to pay licence fees in order to obtain the full set. EUMETSAT supports National Meteorological Services (NMS) of less wealthy countries by granting access to all of its data, free of charge.

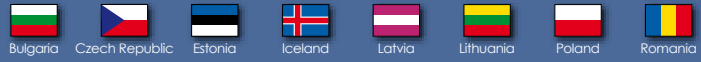
In order to maintain a level playing field between commercial branches of NMS and private commercial companies both will be expected to obtain data licences, at a cost, to utilise EUMETSAT data for commercial purposes.



Member States



Cooperating States



EUMETSAT also has established cooperation agreements with the National Meteorological Services of Canada, China, India, Japan, Korea, Russia and USA.



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