EUMETSAT PROGRAMMES

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INTRODUCTION

When the Amending Protocol to the EUMETSAT Convention entered into force on 19 November 2000, the Annexes to the EUMETSAT Convention were abrogated in accordance with Article 23.2 of the Amending Protocol (see EUM/C/Res. XXXVI, approved by the 15^{th} Council on 4-5 June 1991).

The Annexes to the 'original' Convention contained the System Descriptions and Scales of Contribution for all EUMETSAT programmes. Following the abrogation of the Annexes, this information, although still existing in Resolutions approved by the EUMETSAT Council, was no longer available for easy reference.

It is therefore the intention of this section to provide, in a user-friendly format, the System Descriptions and Scales of Contribution for all EUMETSAT programmes. References to relevant Council Resolutions are also included here. The full text of the Council Resolutions can be found on the EUMETSAT website.

To avoid redundancy and to facilitate future updates, we have in this publication deleted the Scales of Contributions from each Mandatory Programme which is currently in force. A new section containing the Scale of Contributions for Mandatory Programmes has been created. In programmes that have expired we have for historical reasons kept the Scale of Contributions which was in force at the time of expiry of the programme. No change has been made in Optional Programmes as each programme will keep its dedicated Scale.

I MANDATORY PROGRAMMES

As stipulated in the EUMETSAT Convention mandatory programmes are those programmes in which all Member States participate, which are:

(a) the Meteosat Operational Programme (MOP);

(b) the basic programmes required to continue the provision of observations from geostationary and polar orbits;

(c) other programmes as defined as such by the Council.

Mandatory programmes and the General Budget are established through the adoption of a Programme Resolution by the Council, to which a detailed Programme Definition, containing all necessary programmatic, technical, financial, contractual, legal and other elements is attached.

METEOSAT OPERATIONAL PROGRAMME

SYSTEM DESCRIPTION

(originally formed Annex I of the EUMETSAT Convention, which was opened for signature at the Conference of Plenipotentiaries for the establishment of EUMETSAT, held on 24 May 1983. This programme expired in 1995.)

1 GENERAL

The European Meteorological Satellite system will continue the pre-operational Meteosat programme of geostationary satellites. The nominal position of the satellite will be over the 0^{o} meridian. The system will comprise a space segment and a ground segment. The design of the spacecraft will be based on that of Meteosat. The ground segment will also make use of the experience gained during the pre-operational Meteosat programme and will provide for the tracking and control of the spacecraft and for central processing of the data.

2 FUNCTIONAL DESCRIPTION

2.1 Space Segment

The satellite will be equipped with the following capabilities:

– Imagery in three spectral regions, visible, infra-red atmospheric window, infra-red water vapour band.

– Dissemination of images and other data on two channels, each capable of transmitting digital or analogue data to users stations.

– Collection of data transmitted from in situ measuring stations.

– Distribution of meteorological data to earth stations.

2.2 Ground Segment

The ground segment will provide the following functions, most of which have to be performed in near real-time to meet meteorological requirements:

– Control, monitoring and operational use of one active satellite.

– Possibility of controlling a second satellite not in operation.

– Reception and pre-processing of image data. Pre-processing is the process of determining and adjusting for radiometric and geometric variations in the raw data. It will comprise as a minimum, mutual registration of the different channels, calibration of the infra-red atmospheric window channel, image localisation.

– Dissemination of pre-processed images to primary (PDUS) and secondary (SDUS) user stations.

- Dissemination through the satellite of miscellaneous data including administrative messages and charts supplied from meteorological services.

- Dissemination of images from other meteorological satellites.

- Acquisition and limited processing of messages from in situ measuring stations (Data Collection Platforms (DCP)) and their dissemination. Dissemination of these messages will include both input to the meteorological Global Telecommunication System and transmission through the satellite to users station. (These transmissions will be in addition to the other transmissions listed in this section).

- Extraction of quantitative meteorological data, including wind vectors; other data needed for operational meteorology, such as sea surface temperature, upper tropospheric humidity, cloud amount and height; and a data set suitable for climatological purposes.

- Archiving in digital form of all available images for a sliding period of at least five months and of all the produced elaborated meteorological information permanently.

- Archiving on photographic film of at least 2 full disc images each day.

- Retrieval of archived information.

- Production and distribution of documentation including for instance an image catalogue and a system users' guide.

- Quality control of products and transmissions.

3 TECHNICAL PERFORMANCE

3.1 Space Segment

The detailed performance specification for the spacecraft will be decided by the Council but will not be inferior to the specification for the pre-operational Meteosats except that the facility for "interrogating" data collection platforms through a dedicated down-link will be omitted.

The following improvements are foreseen:

- Improved lifetime as regards electric power and propellant.

- Improved reliability of radiometer and electronics.

- Water vapour channel to be brought to the same standard of design and manufacture as the other two channels; noise (interference) to be reduced.

- Simultaneous operation of the infra-red window channel, the water vapour channel and both visible channels.

- "In flight" calibration of the water vapour channel.

- Temperature control of calibrating black body.

– Modification of transponder to allow for distribution of digital data to earth stations in addition to pre-operational Meteosat functions.

3.2 Ground Segment

The technical performance for the functions listed in 2.2 shall at least be that of the pre-operational system. The system will however be updated with the aim of improving reliability and reducing operating costs.

4 BRIDGING ACTIVITIES

The operation of the existing system, including Meteosat F1 and F2 and the satellite P2 (if launched within the framework of the pre-operational programme) will also be incorporated with the operational programme with effect from 24 November 1983.

5 LAUNCH SCHEDULE

5.1 The operational programme will cover the procurement of components and building of sub-units necessary for three new flight models (MO1, MO2, MO3) and one spare.

Only one integration team will be used and the spacecraft will be integrated sequentially.

MO1 will be launched when ready, in principle in the first half of 1987.

MO2 will be launched about one and a half years later, in principle in the second half of 1988.

MO3 will be launched in principle in the second half of 1990.

This launch date could be moved as warranted by the status of the programme and the availability of launchers at decision time.

Insurance of the launches of MO1 and MO2 will be arranged in order to allow for integration and launch of an additional flight unit if necessary.

5.2 The maximum amount referred to in I assumes that all launches will share a dual launch on ARIANE. The Council may decide by unanimous vote to use single launches if the programme requires.

6 DURATION OF THE PROGRAMME

The use of the operational satellites resulting from the tentative schedule is expected to be 8.5 years starting with the launch of MO1 in 1986-87. In addition, there will be bridging activities using existing satellites and providing operation of those satellites (F1, F2, P2) as available during the period from 24 November 1983 until the launch of MO1 in 1986-87. The expected overall duration of the programme is 12.5 years from beginning 1983 until mid 1995.

METEOSAT OPERATIONAL PROGRAMME

FINANCIAL ENVELOPE AND SCALE OF CONTRIBUTIONS

1 OVERALL ENVELOPE

The overall envelope for the initial system is estimated at 400 million accounting units (MAU) (mid-1982 prices and 1983 conversion rates) over the period 1983 to 1995, broken down as follows:

- Maximum amount of expenditure incurred by the Agency: 378 MAU
- EUMETSAT Secretariat (10.5 years): 10 MAU
- EUMETSAT contingency margin: 12 MAU

2 SCALE OF CONTRIBUTIONS*

The Member States shall contribute to the remaining expenditure of the Meteosat Operational Programme including costs of the Secretariat associated with this programme and the contingency associated with this programme as of 1 January 1987 in accordance with the following scale of contributions.

MEMBER STATES	% CONTRIBUTIONS
Austria	0.60
Belgium	4.37
Denmark	0.58
Finland	0.35
France	25.45
Germany	26.23
Greece	0.30
Ireland	0.11
Italy	11.93
Netherlands	2.98
Norway	0.50
Portugal	0.30
Spain	5.21
Sweden	0.92
Switzerland	3.01
Turkey	0.50
United Kingdom	16.66
TOTAL	100.00

* This scale of contributions reflects the one in force at the expiry of the programme in 1995.

GENERAL BUDGET

DESCRIPTION

(originally adopted in Resolution EUM/C/Res. XVIII at the 11th meeting of the EUMETSAT Council on 5-6 December 1989; the ceilings for each subsequent 5-year period were established in Resolutions EUM/C/93/Res. I, EUM/C/95/Res. VI, EUM/C/99/Res. V, EUM/C/57/05/Res. I, EUM/C/63/07/Res. II and EUM/C/67/09/Res. III)

The General Budget will constitute the programmatic frame for all EUMETSAT core and prospective activities in 1990 and subsequent years.

Core activities shall be defined as those which are not linked to a specific programme. They represent the basic technical and administrative infrastructure of EUMETSAT including core staff, buildings and equipment.

Prospective activities mean preliminary activities authorised by Council in preparation of future programmes which are not yet approved.

The overall description of General Budget activities is currently contained in Article 2.5 of the Amended Convention.

GENERAL BUDGET

CEILING AND CONTRIBUTIONS

1 CEILING

The ceiling of the General Budget applicable for the period 2011-2015 amounts to M€ 90 at 2010 economic conditions.

2 CONTRIBUTIONS

The Member States shall contribute to the General Budget in accordance with a scale of contributions based on the Gross National Income statistics issued by the OECD. The current scale of contributions is provided in Section II below. The scale will be updated in triennial intervals.

METEOSAT TRANSITION PROGRAMME

SYSTEM DESCRIPTION

(as adopted in Resolution EUM/C/Res. XXVII at the 13th meeting of the EUMETSAT Council on 27-29 November 1990 and subsequently extended by EUM/C/97/Res. VII, EUM/C/02/Res I, EUM/C/04/Res. II, EUM/C/62/07/Res. II, EUM/C/67/09/Res. V and EUM/C/77/12/Res. II)

1 INTRODUCTION

The Meteosat Transition Programme will ensure the continuation of the service provided by meteorological satellites in geostationary orbit after 30 November 1995 at least until 31 December 2017.

2 THE GROUND SEGMENT

A Ground Segment will be developed to take over operations of the MOP and MTP satellites in December 1995. The Ground Segment will be used to provide routine operations support at least until 31 December 2017.

3 SPACE SEGMENT

The MTP Space Segment consists of a single new satellite of the same design as the latest Meteosat satellite (MOP-3), with a launch date scheduled for late 1995. In addition, advance activities will be performed to ensure the possibility of a future decision to manufacture a second new satellite.

4 IMPLEMENTATION PLAN

That the programme will be implemented in two slices. The first slice includes the manufacture of one new satellite, advance activities for a possible second satellite, definition of the Ground Segment and programme management.

The second slice includes the implementation of the Ground Segment, the satellite launch and the operation of Space and Ground Segments at least for 22 years.

The authorisation to proceed with the second slice of activities will take into account relevant results from the first slice.

METEOSAT TRANSITION PROGRAMME

FINANCIAL ENVELOPE AND CONTRIBUTIONS

1 FINANCIAL ENVELOPE

The first slice of activities defined in the System Description will have a financial envelope of 110 MEUR at 1989 economic conditions. The overall programme envelope (first + second slices) shall not exceed 301 MEUR at 1989 economic conditions.*

2 CONTRIBUTIONS

The Member States shall contribute to the Meteosat Transition Programme Budget in accordance with a scale of contributions based on the Gross National Income statistics issued by the OECD. The current scale of contributions is provided in Section II below. The scale will be updated in triennial intervals.

* Envelope as extended in Council Resolution EUM/C/77/12/Res. II

PREPARATORY PROGRAMME FOR METEOSAT SECOND GENERATION:*

PHASE A

SYSTEM DESCRIPTION

(as adopted in EUM/C/Res. XXVIII at the 13th meeting of EUMETSAT Council on 27-29 November 1990 and subsequently extended in EUM/C/Res. XLI and EUM/C/92/Res. VII)

1 INTRODUCTION

Phase A of the MSG Preparatory Programme corresponds to the definition of a geostationary satellite system to ensure operational continuity of the present Meteosat system.

This phase is foreseen for four years, starting from 1 January 1991.

Phase A, in 1991/1992/1993/1994, will study the feasibility of a spin satellite system embarking a visible and infra-red imaging radiometer (SEVIRI) in support of a multispectral high resolution imagery mission and of an atmospheric instability monitoring mission as well as complementary instruments which will neither become design drivers nor cost drivers for the system as described below.

2 SYSTEM DESCRIPTION

2.1 The MSG space segment will consist in a series of spin-stabilised satellites in geostationary orbit at 0 Degree N-0 Degree E and operable between the limits of ± 45 Degree longitude.

2.2 This system, based on two satellites in orbit simultaneously (one operational and one back-up) will be designed for a 12 years operation period after commissioning of the first flight model.

2.3 In accordance with EUM/C/Res.XXIII, all satellites will carry a core payload, consisting of the following sub-systems:

a) An imaging radiometer, referred to as SEVIRI (Spinning Enhanced Visible and Infra-Red Imager), in support of both basic and high resolution imagery missions as well as of air mass analysis.

b) Meteorological communication payload (MCP) for dissemination and relay of images as well meteorological and environmental data and products.

2.4 A complementary payload, experimental or operational, which should not become a design driver for the system.

* This preparatory programme has expired.

2.5 MSG Ground Segment will comprise the following functional elements:

a) satellite and mission control facilities,

b) image processing and dissemination facilities,

c) meteorological product extraction facilities,

d) a central archive.

3 PHASE A CONTENT

Therefore, in 1991 phase A activities should concentrate on the definition of

3.1 a baseline SEVIRI with the set of channels which has been defined by SGATC and STG as meeting Council requirements stated in EUM/C/Res.XXIII,

3.2 a baseline MCP with raw data downlink and preprocessed data dissemination using the same frequency bands as MOP,

3.3 the complementary payload, after review of a call for ideas,

3.4 meteorological data and products to be disseminated,

3.5 ground segment architecture concepts,

3.6 the legal framework.

4 OUTLOOK

The results of a System Concept Review, to be carried out at completion of Phase A, will allow Council to take a decision on the extension of this programme to a Phase B.

Phase B will refine and review the concepts studied during Phase A and will lead to the final definition of the system and its architecture.

At the end of Phase B, a decision on the full programme proposal will be considered.

MSG PREPARATORY PROGRAMME

FINANCIAL ENVELOPE AND SCALE OF CONTRIBUTIONS

(as adopted in EUM/C/Res. XXVIII at the 13th meeting of the EUMETSAT Council on 27-29 November 1990 and subsequently extended in EUM/C/Res. XLI and EUM/C/92/Res. VII)

1 FINANCIAL ENVELOPE

The budgetary envelope for the MSG/PP Programme is fixed at 4.2 MECU at 1991 economic conditions for the financial years 1991, 1992, 1993 and 1994.

2 SCALE OF CONTRIBUTIONS*

The Member States shall contribute to the Meteosat Second Generation Preparatory Programme in accordance with the following scale of contributions:

MEMBER STATES	% CONTRIBUTIONS
Austria	2.23
Belgium	2.70
Denmark	1.76
Finland	1.84
France	16.79
Germany	22.29
Greece	0.95
Ireland	0.54
Italy	15.46
Netherlands	4.03
Norway	1.47
Portugal	0.86
Spain	6.96
Sweden	3.20
Switzerland	3.33
Turkey	1.50
United Kingdom	14.09
TOTAL	100.00

* This scale of contributions reflects the one in force at the expiry of the programme.

METEOSAT SECOND GENERATION PROGRAMME INCLUDING EXTENSION FOR MSG-4

PROGRAMME DEFINITION

(originally adopted in Resolution EUM/C/92/Res. VI at the 25th Council Meeting on 22-24 June 1994; as extended in Resolution EUM/C/03/Res. I adopted at the 55th Council Meeting on 22-23 June 2004)

1 MISSIONS

The Meteosat Second Generation (MSG) Programme will provide for the development, demonstration and operation of a new system of geostationary meteorological satellites. This system will be designed for the continuation and upgrade of meteorological observations from the geostationary orbit over Europe and Africa and adjacent oceanic areas after the end of the Meteosat Transition Programme (MTP), from 2003 until 2018. Accordingly, the following missions have been defined.

a) The Multispectral Imaging Mission

The multispectral imaging mission will exploit atmospheric windows to provide images of clouds and land/sea surfaces. The use of a radiometer with channels having spectral characteristics similar to those of the AVHRR flown on the US polar orbiting satellites is required for consistency, with the advantage of more frequent observations.

b) The Air Mass Analysis Mission

The air mass analysis mission will be used to monitor the thermodynamic characteristics of the atmosphere. The additional spectral channels to be used will be responsive in the water vapour, carbon dioxide and ozone absorption bands. Their spectral characteristics have been selected based on experience gained in Meteosat and GOES-VAS operations.

c) The High Resolution Imaging Mission

The high resolution visible imaging mission will be used to monitor small scale features such as convective cloud evolution, with a resolution at nadir of approximately 1 km. It will use a channel in the same visible band as the existing Meteosat.

d) The Product Extraction Mission

The product extraction mission will derive meteorological and other products from the basic image data. Its outputs will provide information pertinent to products such as:

- winds,
- sea and land surface temperatures,
- air mass instability iny indices,
- cloud description,
- fog,
- albedo,
- vegetation indices,
- precipitable water,
- tropopause height and structure,
- climate data sets, etc...

It will rely on the existing expertise within EUMETSAT Member States.

e) The Data Collection Mission

The data collection mission will continue the collection of environmental data from data collection platform.

f) The Dissemination Mission

The dissemination mission will provide image data and meteorological data to the user community. A primary objective of the mission is to deliver selected image data for nowcasting within a few minutes of the end of acquisition of each image, because the timeliness of data delivery is of the utmost importance. Access to dissemination links will be controlled through the employment of encryption schemes by EUMETSAT.

The dissemination mission will operate in two distinct modes:

i) a High Rate Information Transmission (HRIT) mode, disseminating at least the full set of image data on the European area and a reduced set on the southern part of the Earth disk, together with other data, to major users and to product extraction centres having access to the appropriate receiving stations.
ii) a Low Rate Information Transmission (LRIT) mode, disseminating a reduced set of image and other data, to users operating lower cost receiving stations.

The Meteorological Data Distribution (MDD) Mission and the Data Collection Platform Relay Service (DCPRS) of the first generation Meteosat programmes will be integrated with the MSG dissemination mission.

g) The MSG system may support additional operational or research missions not affecting the performance of the main missions, provided they do not have a significant impact on overall system complexity and **they are not cost drivers and are affordable to EUMETSAT**. Such missions could include a Search and Rescue support capability and/or a dedicated instrument for monitoring components of the Earth Radiation Budget **(GERB)**.

2 THE MSG SYSTEM

2.1 Space Segment

The space segment of the Meteosat Second Generation system will be based on a series of **four** spin-stabilised satellites of an advanced design with the following payload:

a) The Spinning Enhanced Visible and Infra-Red Imaging radiometer (SEVIRI), supporting the multispectral imaging, air mass analysis and high resolution visible imaging missions. The SEVIRI will use 12 channels, as follows:

- seven imaging channels within the visible band and the infra-red windows,
- four channels to measure infra-red emissions within the water vapour, carbon dioxide and ozone bands,
- one broad band visible channel at finer spatial resolution.

The sampling distance of the SEVIRI will be 3 km at sub satellite point, except for the broad band visible channel, for which it will be 1 km. Full Earth images in all these spectral channels will be produced at 15-minute intervals.

b) The Geostationary Meteorological Communication Payload (GMCP), supporting the data dissemination and the data collection missions.

c) Additional payloads (to the extent that these can be accommodated without significant impact on satellite size or complexity and **that they are not cost drivers and are affordable** to EUMETSAT), such as a small Scientific Instrument and/or a Geostationary Search and Rescue (GEOSAR) transponder **and/or GERB**.

2.2 Ground Segment

The Meteosat Second Generation ground segment will consist of a network of ground based facilities, established with the need of long term continuity in mind, with a central node located at the EUMETSAT Headquarters.

2.2.1 EUMETSAT System Ground Segment

a) A Primary Ground Station (PGS), under the control of the satellite operator (EUMETSAT), for the acquisition of telemetry and raw instrument data and for the support of general system operations.

b) A Back-up Ground Station (BGS) for emergency command operations, which could be co-located with an SGS or located at a station with existing satellite control functions.

c) One or more Support Ground Stations (SGS) to be used for the acquisition and pre-processing of data from other meteorological satellites and their relay to the Central Facility.

d) A Central Facility at the EUMETSAT Headquarters, for satellite and mission control, as well as for processing the raw image data from the satellites into level 1.5 data to be made available to users, and including three main functional elements:

   i) Satellite Control Centre (SCC),
   ii) Mission Control Centre (MSS),
   iii) Data Processing Centre (DPC) in support of the imaging missions and data circulation.

e) A MSG Archive and Retrieval capability, part of the Unified Meteorological Archive and Retrieval Facility (U-MARF), for the long-term archive and retrieval of the image data, and some meteorological products. The configuration and location (which may be distributed) are to be determined.

2.2.2 EUMETSAT Applications Ground Segment

The applications ground segment will include all the ground infrastructure involved in product extraction from image data:

a) A Meteorological Products Extraction Facility (MPEF) shall be established in the EUMETSAT Headquarters and shall perform centralized control and management tasks to achieve control over the availability of agreed key products as well as those mature processing tasks which are not strongly dependent upon user interaction. Typically the tasks of the MPEF will consist of the operational production at synoptic scale (grid size around 100 km) of products such as wind vectors and (multipurpose) cluster analyses based upon multi-spectral processing of the complete image data, as a basis for products mentioned in paragraph 1 d).

b) A network of Satellite Application Facilities (SAF), located at national weather services of EUMETSAT Member States or other agreed entities linked to a user community, such as ECMWF, for the extraction of products outside the scope of the MPEF. The nature of these products will be agreed by Council following analysis of user requirements. The implementation of each SAF will be the subject of a competitive Announcement of Opportunity and subsequent **agreements** covering relevant research and development as well as agreed operations.

The further refinement of the list of the products to be extracted from MSG images is a key activity during the detailed system definition phase (phase B), as is the elaboration of the criteria and procedures for allocation to MPEF and SAFs.

2.2.3 User Ground Segment

Receive-only ground stations will be operated by the users to acquire the data disseminated through the MSG System:

a) High Rate User Stations (HRUS), for the acquisition of data through the High Rate Information Transmission (HRIT) scheme,

b) Low Rate User Stations (LRUS), for the acquisition of data through the Low Rate Information Transmission (LRIT) scheme.

The transmission of raw instrument data from the satellite towards the Earth is not part of the MSG dissemination mission. However, if a Member State decides to procure a station capable of receiving the raw image data, then the Member State shall have timely access to the relevant image processing parameters derived at the central site, in accordance with the provisions of the EUMETSAT Data Policy.

3 PROGRAMME CONTENT

The MSG system will be implemented in co-operation with the European Space Agency. The EUMETSAT MSG programme will include the following tasks:

a) A fixed financial contribution to the ESA MSG Programme (with participation in the detailed definition, design, development and demonstration of the MSG prototype satellite MSG-1).

b) Procurement of the launcher for the MSG prototype satellite MSG-1, ready for a target launch date of mid-2000.

c) Detailed definition of the ground segment, for a final decision by Council on the ground facilities network configuration.

d) Development, procurement and test of the ground segment for the operations of the MSG system.

e) System commissioning following the launch of MSG-1.

f) Provision and launch of **three** additional flight models:

   i) MSG-2 to be ready for launch within 18 months of the launch of MSG-1,

   ii) MSG-3 and MSG-4 to be ready for launch **as required to keep predicted MSG system availability above the 90% threshold**;

g) System operations for a period of at least **15** years after the commissioning of MSG-1.

4 IMPLEMENTATION PLAN

The Programme will be implemented in two slices:

a) The first slice, or MSG demonstration slice, includes the fixed financial contribution to the ESA prototype development programme, the procurement of a launcher for the prototype, the development and procurement of the ground segment, and the system commissioning [items a) to e) under 3]. This slice will start in 1993 and end in **2003**.

b) The second slice, or MSG operational slice, includes the procurement and launch of **three** further satellites and systems operations for at least **15** years, from **2002 until 2018** [items f), and g) under 3].

METEOSAT SECOND GENERATION PROGRAMME

FINANCIAL ENVELOPE AND CONTRIBUTIONS

1 FINANCIAL ENVELOPE

The first slice of activities defined in the System Description will have a financial envelope of 352 MEUR at 1992 economic conditions. The overall programme ceiling (first and second slice) shall not exceed 1673 MEUR at 2003 economic conditions (equivalent to 1330 MEUR at 1992 economic conditions).

2 CONTRIBUTIONS

The Member States shall contribute to the Meteosat Second Generation Programme Budget in accordance with a scale of contributions based on the Gross National Income statistics issued by the OECD. The current scale of contributions is provided in Section II below. The scale will be updated in triennial intervals.

Possible cost overruns up to 10% of the financial envelope of the 1st slice and overall programme ceiling may be approved by Council by a vote representing at least two-thirds of the Member States present and voting, representing also at least two-thirds of the total amount of contributions.

PREPARATORY PROGRAMME FOR A EUMETSAT POLAR SYSTEM*

SYSTEM DESCRIPTION

(as approved in EUM/C/92/Res. VIII which was presented for adoption at the 21st meeting of the EUMETSAT Council on 23-25 November 1992, finally adopted at the 25th meeting of Council on 22-24 June 1994 and extended in EUM/C/98/Res. IX at the 39th Council meeting on 7 September 1998)

The EPS Preparatory Programme covers initial Space Segment Payload and Ground Segment activities related to the development of a series of satellites to provide continuous meteorological observations from morning Polar Orbit.

The activities are broken down into three separate areas:

i) Mission
Detailed definition of the mission and payload, including climate monitoring objectives, in cooperation with ESA and NOAA leading to the establishment of cooperation agreements with both organisations.

ii) Space Segment Payload
Covering the development and refinement of the specifications of the Meteorological Communication Package and start of critical development activities for the Microwave Humidity Sounder.

iii) Ground Segment
Covering the conduct of feasibility studies and subsequently the establishment of detailed specifications of the Ground Segment.

* This preparatory programme has expired.

EUMETSAT POLAR SYSTEM PREPARATORY PROGRAMME

FINANCIAL ENVELOPE AND SCALE OF CONTRIBUTIONS

(as approved in EUM/C/92/Res. VIII, which was presented for adoption at the 21st meeting of the EUMETSAT Council on 23-25 November 1992 and finally adopted at the 25th Council meeting on 22-24 June 1994)

1 FINANCIAL ENVELOPE

The budgetary envelope for the EPS/PP is estimated at 30 MEUR at 1993 economic conditions.

2 SCALE OF CONTRIBUTIONS*

The Member States shall contribute to the EPS/PP Budget in accordance with the following scale of contributions:

MEMBER STATES	% CONTRIBUTIONS
Austria	2.47
Belgium	2.96
Denmark	1.96
Finland	1.33
France	16.58
Germany	25.25
Greece	1.35
Ireland	0.68
Italy	12.66
Netherlands	4.34
Norway	1.69
Portugal	1.16
Spain	6.15
Sweden	2.53
Switzerland	3.34
Turkey	2.04
United Kingdom	13.51
TOTAL	100.00

* This scale of contributions reflects the one in force at the expiry of the programme.

EUMETSAT POLAR SYSTEM PROGRAMME

SYSTEM DESCRIPTION AND PROGRAMME CONTENT

(as approved in EUM/C/96/Res. V, which was presented for adoption at the 32nd meeting of the EUMETSAT Council on 3-5 December 1996 and adopted at the 42nd Council meeting on 22-24 June 1999, with the Financial Envelope as increased in accordance with EUM/C/67/09/Res. I adopted at the 67th Council meeting on 30 June-1 July 2009)

1 MISSIONS

The EUMETSAT Polar System (EPS) will provide for the development and operation of a system providing continuation and enhancement of observations from the morning polar orbit. This system will be designed to provide continuous observations from the end of the current service provided by the United States National Oceanic and Atmospheric Administration (NOAA), from 2002 until 2016. The EPS programme is a component of a Joint European/US Polar System comprising satellites with morning and afternoon (equatorial crossing time) orbits. Accordingly, the following main missions have been defined.

a) Operational Meteorology and Climate Monitoring

Global Sounding(incl. Advanced Sounding):	provides vertical profiles of temperature and humidity to support the numerical forecasting models.
Global Imagery:	provides cloud imagery for forecasting applications. Used for the calculation of sea surface temperatures, vegetation indices, ice and snow cover, atmospheric aerosol content and radiation budget parameters. Also supports the global sounding mission through the identification of cloud free areas.
Data Collection/Location:	supports, amongst other activities, World Weather objectives by the reception and dissemination of in-situ meteorological observations from ocean buoys and other similar data collection platforms.
Wind Scatterometry:	provides speed and direction of winds at the Ocean surface.
Climate Monitoring:	provides inter alia information from Imagery and Sounding, Sea Ice coverage information, Ozone Observations.

b) **Further Mission Capabilities**

Provide Data on Cloud Distribution, Earth Missions, Atmospheric Minor Constituents, Stress at Ocean Surface.

These missions contribute to the Global Climate Observing System (GCOS), the World Climate Research Programme (WCRP) and the International Geosphere/Biosphere Programme (IGBP).

c) **Data Services**

Global Data Access:	supports global scale forecasting by providing global data to users within 2 ¼ hours of the instant of observation.
Local Data Access:	supports forecasting activities by the real-time transmission of data to local reception stations (via the LRPT and HRPT services).

d) **Additional Services**

Space Environment Monitoring:	supports routine monitoring of the low earth orbit charged particle environment by a Space Environment Monitoring instrument (SEM)
Humanitarian:	supports an international Search and Rescue service (S&R).

2 THE EUMETSAT POLAR SYSTEM

2.1 Space Segment

The space segment of the EUMETSAT Polar System is based on a series of three METOP satellites embarking the following payload:

a)	Advanced Microwave Sounding Unit-A (AMSU-A):	Microwave sounder with 15 channels in the range 23-90 GHz (will be replaced by a Micro-wave Temperature Sounder (NPOESS or MTS), if available for METOP-3);
b)	Microwave Humidity Sounder (MHS):	Microwave sounder with 5 channels at 89,157 and around 183 GHz;
c)	High resolution Infra-Red Sounder (HIRS):	Sounder with 19 infrared channels in the range 3-15 microns, and one visible channel;

d)	Infrared Atmospheric Sounding Interferometer (IASI):	Infrared Michelson Interferometer covering the 3.4-15.5 microns range;
e)	Global Navigation Satellite Systems Receiver for Atmospheric Sounding (GRAS):	Receiver performing Radio Occultation measurements of the signals provided by the GPS or GLONASS navigation satellites;
f)	Advanced Very High Resolution Radiometer (AVHRR):	Imaging radiometer with 6 channels in the range 0.6-12 microns (will be replaced by a Visible and Infra-Red Imager (NPOESS or VIRI), if available for METOP-3);
g)	Data Collection System (DCS-Argos):	UHF receiver and signal processor;
h)	Ozone Monitoring Instrument:	Global Ozone Monitoring Experiment (GOME-2) flying on METOP-1 and 2 and ImS being considered for METOP-3 assuming compatibility with the EPS financial envelope;
i)	Advanced Scatterometer (ASCAT):	Pulsed radar in C-band;
j)	Space Environment Monitor (SEM):	
k)	Search and Rescue (S&R):	

2.2 Ground Segment

The EUMETSAT Polar System ground segment will consist of a network of functional facilities whose definition takes into account identified functional, communication and location constraints. The architecture of the ground segment takes due account of the EUMETSAT policy on the repartition of processing facilities amongst a central and national sites.

a) The Polar Command and Data Acquisition (PCDA) station, to be located in Northern Europe, provides the receiving and transmission facilities for satellite monitoring, tracking and control and X-Band receiving facilities for the acquisition of the Global Data Stream recorded on-board. The PCDA is supplemented by a back-up station. During the LEOP phase and contingency operation, the PCDA will be complemented by a rented S-Band ground network.

b) The centrally located Polar Satellite Control Centre (PSCC) performs the operation of the METOP satellite and monitors and controls the health and safety of the platform and the instruments.

c) The centrally located Polar Mission Control Centre (PMCC) is responsible for the management of the overall EPS system. It establishes the work schedule for the METOP satellites, controls all elements of the Ground Segment and monitors the execution of the various tasks. The PMCC is responsible for the planning of the satellite payload activities and for the monitoring of all EPS missions execution.

d) The centrally located Polar Data Ingestion Facility (PDIF) receives the global data received by the PCDA station and generates earth located, quality controlled, and calibrated data, which are then forwarded for product generation.

e) The centrally located Polar Product Extraction Facility (PPEF) generates key meteorological products for general distribution. It also provides general support and expertise to the routine management of the system as a whole.

f) Satellite Application Facilities (SAF) will be established in Member States to provide meteorological and environmental products not generated by the PPEF.

g) The centrally located Polar Archive and Catalogue Facility (PACF) will archive at least all centrally generated measurements data and products from the METOP and, possibly, from the NOAA Initial Joint Polar System (IJPS) satellites. It will maintain a catalogue of all information in the archive and provide the appropriate tools for consultation and data retrieval.

h) Data circulation networks ensure the distribution/exchange of data and the interfaces between the facilities.

3 PROGRAMME CONTENT

The EPS system will be implemented in cooperation with the United States National Oceanic and Atmospheric Administration (NOAA), the European Space Agency (ESA) and the Centre National d'Etudes Spatiales (CNES). The EPS Programme will include the following:

a) A Space Segment which will consist of three METOP satellites accommodating the payload instruments identified under b) below.

   The Space Segment will be established in co-operation with the European Space Agency, in the framework of a Single Space Segment, according to the modalities defined in the Cooperation Agreement.

b) The following instruments for flight on the METOP satellites:

   i) Advanced Microwave Sounding Unit-A (AMSU-A) replaced by a Microwave Temperature Sounder (NPOESS or MTS) if available for METOP-3;

   ii) Microwave Humidity Sounder (MHS);

   iii) High Resolution Infrared Sounder (HIRS);

   iv) Infrared Atmospheric Sounding Interferometer (IASI);

   v) Global Navigation Satellite Systems Receiver for Atmospheric Sounding (GRAS);

vi) Advanced Very High Resolution Sounder (AVHRR) replaced by a Visible and Infra-Red Imager (NPOESS or VIRI) if available for METOP-3;

vii) Data Collection System- Argos (DCS-Argos);

viii) Global Ozone Monitoring Experiment (GOME-2) flying on METOP-1 and 2 and ImS being considered for METOP-3 assuming compatibility with the EPS financial envelope;

ix) Advanced Wind Scatterometer (ASCAT);

x) Space Environment Monitor (SEM);

xi) Search and Rescue Service (S&R).

A Cooperation Agreement will be entered into with the United States National Oceanic and Atmospheric Administration (NOAA) for the provision of the instruments in i), iii), vi), x) and xi) above.

Cooperation Agreements will be entered into with the Centre National d'Etudes Spatiales (CNES) for the provision of the instruments in iv) and vii) above.

The instruments in v), viii) and ix) will be procured as part of the Single Space Segment in cooperation with the European Space Agency.

The instrument in ii) will be procured by EUMETSAT.

c) Procurement of the launch services for the METOP satellites.

d) Conclusion of a Cooperation Agreement with the Centre National d'Etudes Spatiales on a launch shared between METOP-1 and SPOT-5.

e) Identification of a partner for a second, and possibly third, shared launch and conclusion of the corresponding agreement(s), or procurement of dedicated launch service(s) at a comparable cost.

f) The development, procurement and test of the ground segment for the operations of the EPS System.

g) System commissioning following the launch of the satellites.

h) Operations for a period of 14 years.

i) Conclusion of an Agreement with NOAA to provide the afternoon service of the Initial Joint Polar System.

j) Procurement of 2 Microwave Humidity Sounders (MHS) for the US satellites NOAA N and NOAA N'.

EUMETSAT POLAR SYSTEM PROGRAMME

FINANCIAL ENVELOPE AND CONTRIBUTIONS

1 FINANCIAL ENVELOPE

The activities defined in the System Description will have a financial envelope of M€ 1610.4 at 1994 economic conditions.

2 CONTRIBUTIONS

The Member States shall contribute to the EUMETSAT Polar System Programme in accordance with a scale of contributions based on the Gross National Income statistics issued by the OECD. The current scale of contributions is provided in section II below. The scale will be updated in triennial intervals.

Possible cost overruns up to 10% of the financial envelope may be approved by Council by a vote representing at least two-thirds of the Member States present and voting, representing also at least two-thirds of the total amount of contributions. (Note that this cost overrun has been exhausted through Resolution EUM/C/67/09/Res. I).

METEOSAT THIRD GENERATION

PREPARATORY PROGRAMME DEFINITION

(as approved in EUM/C/62/07/Res. I, which was presented for adoption at the 62nd meeting of the EUMETSAT Council on 26-27 June 2007 and entered into force on 25 June 2008 and subsequently extended in EUM/C/71/10/Res. II)

1 GENERAL

The Meteosat Second Generation (MSG) system is the primary European source of geostationary observations over Europe and Africa and started routine operation services in January 2004. MSG is one of the key EUMETSAT contributions to the Global Observing System (GOS) of the World Meteorological Organization (WMO). The series of four MSG satellites will deliver observations and services at least until end of 2018 (MSG-4). According to availability analyses, the first in-orbit element of the Meteosat Third Generation (MTG) system needs to be available around 2015, to ensure continuity of the EUMETSAT imagery mission.

MTG preparatory activities started end of 2000 in cooperation with the European Space Agency (ESA), following the decision of the EUMETSAT Council to proceed with a EUMETSAT/Post-MSG User Consultation Process aimed at capturing the foreseeable needs of EUMETSAT users in the 2015-2025 timeframe. This process led to the definition of the mission requirements for the MTG candidate observation missions.

2 MISSION OBJECTIVES AND CANDIDATE MISSIONS

The MTG Mission Requirements baseline for the Phase A is the result of the user consultation process, the Mission Definition Review output (spring 2006), and the requirements descoping undertaken with the MTG Mission Team until end of 2006. The selected mission concept for the MTG Phase A encompasses four candidate observation missions, which are:

- **F**ull **D**isk **H**igh **S**pectral resolution **I**magery (**FDHSI**) mission, covering the full disk with a Basic Repeat Cycle (BRC) of 10 minutes with a spatial resolution of 1 / 2 km;

- **H**igh spatial **R**esolution **F**ast **I**magery (**HRFI**) mission, looking at local scales with a BRC of 2.5 minutes and a spatial resolution of 0.5 / 1 Km;

- **I**nfra**R**ed Sounding (**IRS**) mission covering the full disk with a BRC of 30 minutes (goal – 60 minutes threshold) and a spatial resolution of 4 km, providing hyperspectral sounding information with a spectral resolution of 0.625 cm^{-1} in **L**ong **W**ave **I**nfra**R**ed and **M**id **W**ave **I**nfra**R**ed;

- **L**ightning **I**magery (**LI**) mission, detecting lightning events linked to discharges taking place in clouds or between clouds and ground, over 80% of the full disk;

A priority ranking has been assigned to the MTG candidate missions with priority 1 for FDHSI and HRFI, both to be realized by one instrument, the so called Flexible Combined (FCI) imager, priority 2 for the IRS and priority 3 for the LI mission.

3 MTG SYSTEM CONCEPT

The MTG system concept encompasses the following characteristics:

- Space Segment based on a Twin-satellite in-orbit configuration (TSC):
  - TSC satellites (Imaging and Sounding) implemented using a common platform;
  - Use of 3-axis stabilised platforms for all required satellites;
- Development of satellites based on inheritance of commercial Geostationary platforms;
- Compatibility with more than one launcher (capability of vertical and horizontal processing);
- Maximum reuse of existing EUMETSAT Infrastructures;
- Distribution of the Ground Segment capabilities, including the assets of the EUMETSAT Satellite Application Facilities (SAF Network);
- Need to establish at EUMETSAT level (for the MTG era) a Ground Segment supporting parallel operations of the MSG and MTG Series;
- Interoperability, in terms of standardisation of the space to ground interface, supporting a possible integration into required international contexts (e.g, GEOS, GMES, etc.).

The MTG satellites will operate from the geostationary orbit at 0° longitude, this being the nominal position of the operational satellites, with additional orbital positions for the hot/active and spare satellites between 10^{o} W and 10^{o} E.

4 PREPARATORY PROGRAMME CONTENT

The MTG Preparatory Programme covers the EUMETSAT activities associated with the closeout of MTG Phase A in 2008 and contains for EUMETSAT the full MTG Phase B, up to the System Preliminary Design Review (PDR) planned for mid 2010.

It is assumed that all activities following the PDR will be covered under the MTG Development and Operational Programme.

Phase B will focus on consolidation of the requirements for the MTG system, and their justification via detailed analyses and trade-off, to derive necessary design elements, in line with programmatic constraints (schedule and costs). These activities will allow the system to be subsequently developed, produced, operated and maintained.

The requirements activities are formally closed by a Preliminary Design Review (PDR), which leads to the Development Configuration Baseline of the MTG system. The definition and justification activities start after the System Requirements Review (SRR) at which the system specification is baselined. Justification Files are generated by analyses, trade-offs, and Design Reports and will constitute an important element of the documented project progress. An essential part of the work will be the analysis of risks on technical, costing and scheduling aspects.

At EUMETSAT level, the Phase B activities will encompass the overall MTG System, including the Ground Segment and all system interfaces. A further important element of the Phase B activities will consist in following-up and supporting the Space Segment activities performed by ESA.

During Phase B, the necessary cooperation agreement with ESA covering the Phase C/D of the Space Segment will be established and submitted to Council for approval.

A close interaction with users over the course of EUMETSAT Phase B activities through direct involvement of the MTG Mission Team and MTG User consultation Workshops as required will ensure the elaboration of a consolidated EURD (End User Requirements Document).

The duration of the Preparatory Programme is from 01 January 2008 until the start of the MTG Development and Operations Programme, which will cover for EUMETSAT the Phases C/D/E of the MTG Programme, assumed to be no later than mid 2010.

5 IMPLEMENTATION

The main activities planned during the MTG Preparatory Programme will consist of:

- Management and Quality Assurance (QA);
- System Engineering, as the main contribution to the planned effort and including:
  - End User/Mission Requirements baselining and Maintenance;
  - System Requirements & Design;
  - Functional Design;
  - Baselining and maintenance of Segment Level Specifications, external and internal element ICDs;
  - Operations Concept & Constraints;
  - Development Plans;
  - System Engineering Implementation;
  - System Analysis;
  - System and Segment level Reviews;
  - Prototyping of meteorological product S/W packages;
  - System Integration Verification & Validation planning.
- External System Support Studies, addressing technical and scientific topics;
- External Ground Segment Studies, related to the MTG Overall Ground Segment Architecture and its implementation approach.

MTG PREPARATORY PROGRAMME

FINANCIAL ENVELOPE AND CONTRIBUTIONS

1 FINANCIAL ENVELOPE

That the financial envelope of the Preparatory Programme shall amount to 30.0 MEUR at 2007 economic conditions, with an indicative payment profile of 11.0 MEUR in 2008, 12.4 MEUR in 2009, and 6.6 MEUR in 2010.

2 CONTRIBUTIONS

The Member States shall contribute to the EUMETSAT MTG Preparatory Programme in accordance with a scale of contributions based on the Gross National Income statistics issued by the OECD. The current scale of contributions is provided in Section II below. The scale will be updated in triennial intervals.

METEOSAT THIRD GENERATION
PROGRAMME DEFINITION

(as approved in EUM/C/69/10/Res. I, which was presented for adoption at the 69th meeting of the EUMETSAT Council on 26 March 2010, adopted on 25 February 2011)

1 INTRODUCTION

The establishment of the MTG Programme derives from the EUMETSAT Convention, where the primary objective of EUMETSAT to establish, maintain and exploit European systems of operational meteorological satellites is stated, together with the further objective to contribute to the operational monitoring of the climate and the detection of global climatic changes.

2 MISSION OBJECTIVES AND MTG MISSIONS

MTG is the basic Programme required to continue the provision of observations from geostationary orbit following MSG and as such is a mandatory Programme. As successor of MSG, it has the capability and capacities to provide the geostationary satellite data needs to continue supporting and improving meteorological applications and services at Meteorological Centres. The Imagery mission provides substantially enhanced information compared to that currently delivered by SEVIRI on MSG to improve the Nowcasting (NWC) and regional/global Numerical Weather Prediction (NWP) systems. The novel Infrared sounding mission delivers unprecedented information on the dynamic features of atmospheric moisture and temperature profiles in high vertical, horizontal and temporal resolution, beyond serving emerging applications of operational chemistry and air pollution. Nowcasting applications are further supported by the lightning imaging mission delivering continuously and simultaneously information on total lightning (cloud to cloud and cloud to ground) over the full disc with a high timeliness and homogeneous data quality. Finally the Sentinel 4 mission of GMES will be implemented via MTG, supporting the need for continuous monitoring of the atmospheric composition and air quality.

2.1 Observation Missions

The nominal MTG system will be based upon two types of satellites, MTG-I, the imaging satellite, and MTG-S, the sounding satellite. MTG-I will embark an imaging radiometer, the Flexible Combined Imager (FCI), and an imaging lightning detection instrument, the Lightning Imager (LI). MTG-S will embark an imaging Fourier interferometer, the InfraRed Sounder (IRS), and a high resolution spectrometer, the Ultraviolet- Visible Near infrared (UVN) spectrometer, provided by ESA as a part of the GMES Space Component programme.

The MTG System is designed, in support to nowcasting (NWC) and Numerical Weather Prediction (NWP), to fulfil the objectives agreed for the following observation missions:

- the **F**ull **D**isk **H**igh **S**pectral resolution **I**magery (**FDHSI**) mission, which will be provided via measurements taken by the FCI. In FDHSI mission mode data from the FCI will be provided over the full earth disc at a repeat cycle time of 10 minutes with a spatial resolution of 1 km;

- the **H**igh spatial **R**esolution **F**ast refresh **I**magery (**HRFI**) mission, which will be provided via measurements taken by the FCI. In HRFI mission mode data from 4 channels of the FCI will be provided on regional scales (e.g. about 1/4th or 1/3rd of the full disk seen from the geostationary position) at a repeat cycle rate of 2.5 or 3.3 minutes and a spatial resolution of 0.5 km and 1.0 km;

- the **I**nfra**R**ed Sounding (**IRS**) mission able scan the full earth disc within 60 minutes providing a spatial resolution of 4 km, and hyperspectral imaging and sounding information at a spectral resolution of 0.625 cm^{-1} in two bands, a **L**ong **W**ave **I**nfra**R**ed (**LWIR**: 700 – 1210 cm^{-1}) and **M**id **W**ave **I**nfra**R**ed (**MWIR**: 1600 -2175 cm^{-1}) band;

- the **L**ightning **I**magery (**LI**) mission, continuously detecting optical pulses, over almost the full earth disc in view from the geostationary satellite position;

Moreover, the MTG missions comprise the accommodation of the GMES Sentinel -4 **(S4)** sounding mission, achieved through the **U**ltraviolet, **V**isible & **N**ear-infrared **(UVN)** Instrument, covering Europe every hour taking measurements in three spectral bands (UV: 305 - 400 nm; VIS: 400 - 500 nm, NIR: 750 - 775 nm) with a resolution around 8 km.

In addition, the MTG mission will make a major contribution to climate monitoring activities providing high quality radiances, reprocessed product supporting generation of Essential Climate Variables (ECVs), providing also stewardship of decadal geostationary data records of the First and Second Generation of Meteosat.

2.2 Other MTG System Functions

Besides the essential functions covering the optical observations, the MTG system includes essential support functions necessary to fulfil its operational services, including:

- The Level 2 product generation and extraction;
- The processing of data received from Data Collection System (DCS) platforms collecting data of in-situ observations gathered from the land beacons, buoys, ships, balloons or airplanes;
- The Foreign Satellite Dissemination, that collects selected data from other EUMETSAT and Third Party satellite systems for support to global applications;
- Delivery and Data services to users, including:
    - Near real-time and direct data distribution services;
    - Data stewardship and re-analysis support;
    - Off-line data delivery;
    - On line services to Users;
    - Data exploitation support, reach-out, training, and help desk;
- The Search and Rescue mission: similarly to MSG, the MTG system will accommodate a SAR terminal, enabling the operations of the mission under the aegis of the COSPAS-SARSAT system;
- Extension of the DCS capabilities to support the relay and delivery to Argos ground stations of messages transmitted by Argos platforms.

3 MTG SYSTEM DESCRIPTION

3.1 System Architecture

The operational architecture of the MTG system consists of a Space Segment made up by a nominal configuration of two MTG-I and one MTG-S satellites linked to a distributed Ground Segment comprising functional facilities at various sites.

The MTG system consists of the following main segments and services:

- Space Segment, embedding the protoflight and recurrent MTG-I and MTG-S satellites, ground support elements (Ground Support Equipments – GSE - and tools) and services used for the space segment development or delivered in support to the system development and verification (Satellite Simulator, TT&C Suitcase, Payload Data Generator, etc) ;

- Ground Segment, supporting the planning, management, control and monitoring of the missions and acquiring, processing, and distributing to the users the observations taken and the products extracted. To fulfil the functions required to meet the mission objectives, substantial new developments associated with the new MTG missions will be undertaken for the MTG Ground Segment. In addition, the Ground Segment will rely on maintained infrastructure from the current systems as Infrastructure Facilities and Multi Programme Facilities.

- Launch and LEOP Provider services.

3.2 Space Segment

The MTG Space Segment consists of four imaging satellites (MTG-I1 to 4) and two sounding satellites (MTG-S1 to 2) with the payload complements given below:

- MTG-I1 to 4: FCI, LI, DCS and SAR
- MTG-S1 to 2: IRS and UVN

3.2.1 Satellites

The imaging and sounding satellites are based on 3- axis stabilised platforms taking as much technological heritage from commercial communication satellites as is pertinent and safe to fulfil the MTG service requirements. The platform shall be based on a common architecture.

3.2.2 Payload Elements

3.2.2.1 Flexible Combined Imager (FCI)

The FCI simultaneously provides data for 16 FDHSI, 4 HRFI channels and 2 channels with an extended radiometric range for fire detection.

The FCI can be commanded to operate in either:

- a Full Disc Coverage (FDC) over a repeat cycle of 10 minutes with a mandatory coverage described by a circle of 17.7° diameter centred on the Sub-Satellite Point (SSP), and

- a Local Area Coverage (LAC) over a repeat cycle of 10/2, 10/3 or 10/4 minutes, with the coverage reduced proportionally. The LAC zone can be positioned anywhere over the FDC.

3.2.2.2 Infra-Red Sounder (IRS)

The IRS is a Fourier Transform Spectrometer (FTS) providing measurements in two bands mid-wave infrared (MWIR) and long-wave infrared (LWIR).

The IRS takes data according to a repeat sequence selected from four Local Area Coverage (LAC) zones. Each LAC zone covers a quarter of the Full Disc Coverage (FDC), described by a circle of 17.7° diameter centred on the Sub-Satellite Point (SSP) and can be positioned anywhere over the FDC. A LAC zone is scanned within 15 minutes.

3.2.2.3 Lightning Imager (LI)

The LI continuously monitors lightning flashes during day and night, covering an area of the earth disk within a circle of 16^{o} in diameter subtended from the geo-stationary position and shifted northward to cover EUMETSAT Member States.

3.2.2.4 UVN – Sentinel 4 Spectrometer

The satellite will have the possibility to embark the UVN-Sentinel-4 instrument. The instrument will be developed as part of GMES in compliance with MTG interfaces and within the capabilities allocated to the satellites to fulfil the Sentinel-4 mission.

3.3 MTG Ground Segment

The Ground Segment contains the main ground elements necessary to support the mission. They are logically decomposed in Facilities as follows:

- Ground Station Facilities (GSTF);
- Mission Operations Facility (MOF);
- Instrument Data Processing Facility (IDPF);
- Multi-Programme Facilities (MPF);
- Infrastructure Facilities and Supporting Facilities;
- and, as part of the Application Ground Processing System:
    - the Level 2 Processing Facility (L2PF),
    - the Satellite Application Facilities (SAF) network;

The Ground Station Facilities are made up of Telemetry Tracking & Command (TT&C) Ground Stations which include the functions to support acquisition of satellites housekeeping telemetry, transmission of telecommands, tracking and ranging. The Mission Data Acquisition (MDA) Ground Stations receive the scientific data from the satellite payload and interfaces with the front end applications of the IDPF.

The Mission Operations Facility will include the capability to command and control multiple MTG spacecraft.

The processing of the Instrument data will ingest the data and generate Level 1 and Level 2 products. The Level 1 products will be generated by the IDPF. The Level 2 products will be partially centrally generated via the L2PF and partially generated by the Satellite Application Facilities network. Tasks and outputs of the Satellite Application Facilities (SAF) network will be the subject of dedicated proposals for the Continuous Development and Operations Phase to be agreed by Council.

The MTG Ground Segment will make use of and extend as appropriate existing MPF for such aspects as dissemination and archiving/retrieval of products, following a continuity of maintenance and a credible upgrade path. MPF will include the EUMETSAT Data Centre, previously known as the Unified Meteorological Archive and Retrieval Facility (U-MARF) which receives and archives images and meteorological products from EUMETSAT satellites (METEOSAT and METOP), the EXGATE and INGATE to provide a secure file transfer service between operational environments within EUMETSAT and with remote locations through external network interfaces, and EUMETCast to disseminate data and products to the users.

The EUMETSAT Headquarters, the Central Site of the MTG Ground Segment will include the main components needed for mission operations and exploitation (e.g. MOF, IDPF, L2PF and MPF). It will also include other infrastructure and supporting facilities and possibly the prime MDA Ground Station.

In addition, the Ground Segment will include other sites, as follows:

- Backup Spacecraft Control Centre (BSCC), having same MOF functionality as the one in the Central Site in order to continue monitoring & control of the in-orbit spacecraft constellation;
- Diversity MDA Ground Station, to minimise impact of link outages caused by heavy precipitation;
- Prime and Secondary TT&C Ground Stations, with site diversity foreseen for availability and ranging considerations;
- EUMETCast uplink station, for satellite based dissemination.

Finally, the Satellite Application Facilities (SAF) network is not centrally hosted.

4 MTG IN-ORBIT DEPLOYMENT PLAN

The deployment of the MTG system is driven by the required duration of the operational services, associated availability and readiness of the prototype satellites. This has been defined to ensure the optimal continuity of MTG services to the User Community in-line with the definition of high system and spacecraft availability figures, as well as to ensure the continuity of the services provided by MSG in articulation with the deployment of the last MSG satellites and in preparation for the post-MTG satellites.

The resulting MTG satellite deployment scenario will take account of actual operational serviceability of MSG and MTG satellites to maximise the useful life of each satellite whilst maintaining the required operational availability, developing from a baseline of earliest launch dates:

- MTG-I1: Dec 2016
- MTG-S1: June 2018
- MTG-I2: Dec 2021
- MTG-I3: Jan 2025
- MTG-S2: June 2026
- MTG-I4: Dec 2029

Measures for allowing extended satellite in orbit lifetime will be implemented: in this respect, the propellant margin embarked on board the satellite will allow a possible scenario of 25 years of operational service for the imagery mission.

In support to this MTG satellites deployment, the Ground Segment infrastructure will be developed and deployed according to a staggered incremental approach (through a Ground Segment versioning concept).

5 SCOPE OF EUMETSAT PROGRAMME

The scope of the EUMETSAT MTG Programme encompasses the following main elements:

- A fixed financial contribution to the ESA MTG Space Segment Development Programme;
- Procurement of the four recurrent satellites and related activities;
- Procurement of Launch and LEOP services for all six MTG satellites;
- Establishment of a ground segment system to support the operation of the MTG System;
- At least twenty years of routine operations of the imagery mission, encompassing fifteen and half years of routine operations of the sounding mission;
- Ten years of continuous development and operations (CDOP) activities of the EUMETSAT SAFs;
- The management of the developments and procurements, and the conditioning of the infrastructure to host components of the system, including back-up services and related systems.

6 IMPLEMENTATION ARRANGEMENTS

6.1 Interaction with Users and Experts

The process for involvement of users and experts established during the initial phases of the MTG activities will continue during the development and operations phases. The MTG Mission Team which has been instrumental to integrate and consolidate the information base and help EUMETSAT Secretariat and the MTG Team to shape the discussions with Delegates, will continue to be involved in the implementation phases of the Programme.

A key result of the coordinated efforts is the end user requirements document (EURD) subject to approval by Council. A list of products to be generated centrally at EUMETSAT HQ is established for reference, design and sizing of the core functionality of the ground segment. The initial set products in the list emphasises the continuity of MSG services into the next generation and the most direct and essential derivates from the new instruments.

Users support will still be needed in the implementation phase to ensure that optimum benefit is obtained from the observations and system under development. Further support from users will also be essential in preparing for and implementing the calibration and validation plans, and preparedness of user will be an objective of the efforts of the Programme.

6.2 Coordination Mechanisms between EUMETSAT and ESA

The roles of EUMETSAT and ESA are detailed in a dedicated Agreement with ESA on MTG to be approved by EUMETSAT Council, specifying, among others, the roles of EUMETSAT and ESA within the MTG, financial liabilities, procurement policy, implementation mechanisms, and ownerships of data.

6.3 Sentinel 4 Implementation

The implementation of the Sentinel 4 on the MTG-S satellites will be formalised through an “Implementing Arrangement” with ESA, to be signed upon entry into force of the MTG Programme. This Implementing Arrangement is based on the Framework Agreement between EUMETSAT and ESA on the cooperation on GMES signed on 20 July 2009. ESA is responsible for the GMES Space Component, and as such will develop the Sentinel 4 mission and instrument, in compliance with MTG interfaces and within the capabilities allocated to the satellites to fulfil the Sentinel-4 mission

It is to be noted that the above Implementing Arrangement with ESA does not cover the funding of the operational cost of the mission which EUMETSAT Member States expect to be provided from a yet to be defined EC GMES operational Budget.

6.4 Coordination with SAFs

SAFs are part of EUMETSAT’s multi-mission infrastructure and thus an integral part of the EUMETSAT Programmes and their ground segments, which together with the central level-2 product generation facilities constitute the Application Ground Processing System.

Through the development of the MTG system SAFs will enter the second 5-year slice of their Continuous Development and Operation Phase (CDOP), which will span from 2012 to 2017. Subsequently a third phase of CDOP for addition five years will be supported through MTG. Almost coincidently with the start of the third CDOP slice SAFs will have to transition from using MSG observations to the use of MTG Imager data.

6.5 Other Partner Agencies

In order to continue the provision of support and services for Search and Rescue operations a cooperation scheme with COSPAS-SARSAT will be established.

Should the technical ongoing discussions with CNES conclude fruitfully with an agreement to support and supplement the ARGOS mission with a geostationary component, a dedicated agreement will be set up.

7 PROGRAMME ENVELOPE & INDICATIVE EXPENDITURE PROFILE

The proposed EUMETSAT MTG Programme envelope amounts to M€ 2,369 at 2008 economic conditions. It is equivalent to M€ 2,470 at 2010 e.c.

The following table shows the indicative expenditure profile of the MTG Programme:

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	Total
MEUR at 2008 e.c.	62	121	149	200	213	198	177	161	104	105	119	81	76	71	72	65	64	59	56	27	27	27	27	27	27	27	27	**2369**

Figure 7-1: Preliminary MTG expenditure profile

MTG PROGRAMME

FINANCIAL ENVELOPE AND CONTRIBUTIONS

1 FINANCIAL ENVELOPE

That the financial envelope of the MTG Programme shall amount to 2,369 MEUR at 2008 economic conditions, with an indicative expenditure profile as described in the Programme Definition.

2 CONTRIBUTIONS

The Member States shall contribute to the EUMETSAT MTG Programme in accordance with a scale of contributions based on the Gross National Income statistics issued by the OECD. The current scale of contributions is provided in Section II below. The scale will be updated in triennial intervals.

EUMETSAT POLAR SYSTEM SECOND GENERATION

PREPARATORY PROGRAMME DEFINITION

(as approved in EUM/C/73/11/Res I, which was presented at the 73rd Meeting of the EUMETSAT Council on 5 October 2011 and adopted on 15-16 November 2012)

1. GENERAL

The EUMETSAT Polar System (EPS) is Europe's first polar orbiting operational meteorological satellite system, and with its Metop satellites it is the European contribution to the Initial Joint Polar-Orbiting Operational Satellite System (IJPS). EPS started routine operation services in May 2007, and the series of three Metop satellites are expected to deliver observations and services until 2021. According to availability analyses, the first in-orbit element of the EUMETSAT Polar System Second Generation (EPS-SG) needs to be available in 2019 to ensure continuity to EPS.

The EPS-SG preparatory activities started in 2005 with the user consultation process established with Member States, aimed at capturing the needs of EUMETSAT users in the 2020-2035 timeframe and conducted in cooperation with the European Space Agency (ESA) as part of the Phase 0. Following the endorsement by the EUMETSAT Council of the Application Expert Groups Position Papers as outcome of the user consultation in 2006, the process led to the definition of the mission requirements for the EPS-SG candidate missions that were endorsed by Council in June 2009. Iterations with EUMETSAT's international partners ESA, NOAA, DLR and CNES on the definition of cooperation in the EPS-SG Programme have been ongoing since 2008.

2 MISSION OBJECTIVES AND CANDIDATE MISSIONS

The EPS-SG mission requirements baseline for the Phase A which started in January 2010 is the result of the user consultation process, the Mission Definition Review in autumn 2009 which closed the Phase 0, and the requirements de-scoping undertaken with the EPS-SG Mission Experts Team (PMET) until mid of 2010.

The selected mission concept for the EPS-SG Phase A encompasses a total of nine candidate observation missions, which are:

- **I**nfrared **A**tmospheric **S**ounding (IAS) mission, providing hyper-spectral infrared sounding with a spectral resolution of 0.125 cm^{-1} within the spectral range from 645 to 2760 cm^{-1} at an average spatial sampling distance of 25 km;
- **V**isible/**I**nfrared **I**maging (**VII**) mission, providing moderate-resolution optical imaging in >20 spectral channels ranging from 0.443 to 13.345 µm with a spatial sampling of 250 to 500 m;
- **M**icro**W**ave **S**ounding (**MWS**) mission, providing all-weather microwave sounding in the spectral range from 23.4 to 229 GHz, at a spatial sampling of 10 to 20 km;
- **SCA**tterometry (**SCA**) mission, providing back-scattered signals in the 5.9 GHz band at a spatial resolution of 25 km;
- **R**adio **O**ccultation sounding (**RO**) mission, providing high vertical resolution, all-weather soundings by tracking GPS (Global Positioning System) and Galileo satellites;

- **M**icro**W**ave **I**maging_(**MWI**) mission, providing precipitation and cloud imaging in the spectral range from 18.7 to 668 GHz at a spatial sampling from 8 km (highest frequency) to 12 km (lowest frequency);
- Nadir-viewing **U**ltra-violet **V**isible **N**ear-infrared shortwave infrared **S**ounding (**UVNS**) mission, providing hyper-spectral sounding with a spectral resolution from 0.05 to 1 nm within the spectral range from 0.27 to 2.4 µm at a spatial sampling of 15 km;
- **M**ulti-viewing **M**ulti-channel **M**ulti-polarisation imaging mission (**3MI**), providing moderate resolution aerosol imaging in the spectral region ranging from ultra-violet (0.342 µm) to short-wave infrared (2.13 µm), at a spatial sampling of 2 to 4 km;
- **R**adiant **E**nergy **R**adiometry mission (**RER**), providing earth radiation budget measurements in three bands of the solar and terrestrial spectral domains with a spatial sampling of 10 km.

A priority ranking has been assigned to the EPS-SG candidate missions with the rank "very high" for the IAS, VII, MWS and SCA missions, rank "high" for the RO mission, rank "medium" for the MWI, UNVS and 3MI missions, and rank "low" for the RER mission.

3 EPS-SG SYSTEM CONCEPT

The EPS-SG system concept encompasses the following characteristics:

- Designed to constitute the European contribution to the Joint Polar System with the U.S.A. (mid-morning orbit);
- Space Segment based on a two satellites in-orbit configuration;
- Strong heritage from EPS continuity missions;
- Accommodation and operations of GMES Sentinel 5 instruments;
- Satellite development based on maximum reuse of existing technologies;
- Distribution of Ground Segment capabilities, including the assets of the EUMETSAT Satellite Application Facilities (SAF Network);
- Reliance on evolution of available data acquisition capabilities (i.e. Svalbard and Antarctica stations);
- Provision of global and regional downlink capabilities;
- Re-use of EUMETSAT infrastructures, taking into account the EPS heritage and multi-mission reusable elements;
- Compatibility with more than one launcher.

The EPS-SG satellites will fly in a sun synchronous, low earth orbit, at 817 km altitude and 09:30 descending equatorial crossing time (mid-morning orbit). The two satellites will be separated from each other within the orbit of typically 25 minutes, in order to separate visibility periods and perform routine operations from the same ground station(s).

4 PREPARATORY PROGRAMME CONTENT

The EPS-SG Preparatory Programme covers the EUMETSAT activities associated with the EPS-SG Phase B starting in May 2012, up to the completion of the Phase B activities end 2014.

It is assumed that all activities following the PDR will be covered under the full EPS-SG Programme, covering the EPS-SG Phases C/D/E.
Phase B will focus on the consolidation of the requirements for the EPS-SG system, and their justification via their detailed analyses and trade-off, to derive necessary design elements, in line with programmatic constraints (schedule and costs). These activities will allow the system to be subsequently developed, produced, operated and maintained.

During Phase B, an incremental system requirements review process will be conducted at system level and space segment level, taking into account the needs of the ESA Space Segment Phase B, of the EUMETSAT Ground Segment studies, and of the cooperation with the international partners.

The Phase B activities are formally closed by the Preliminary Design Review (PDR).

5 IMPLEMENTATION

The main activities planned during the EPS-SG Preparatory Programme will consist of:

- Preparatory Programme Management:
  - Management
  - Project Control and Planning

- System and Operations Preparation
  - System Management
  - End User Activities
  - System Engineering
  - System Definition and Development
  - Meteorological Products Activities
  - Operations Preparation
  - System Integration and Verification and Validation
  - External Services (Launch Services Activities and LEOP Services Activities)

- Satellites Activities

- Instruments Activities
  - Instruments with Existing Design
  - New Instruments

- Ground Segment Activities

- Quality Assurance

EUMETSAT POLAR SYSTEM SECOND GENERATION PREPARATORY PROGRAMME (EPS-SG PP)

FINANCIAL ENVELOPE AND CONTRIBUTIONS

1 FINANCIAL ENVELOPE

The financial envelope of the EPS-SG PP shall amount to 40.91 MEUR at 2011 economic conditions, with an indicative payment profile of 5.92 MEUR in 2012, 17.30 MEUR in 2013, and 17.69 MEUR in 2014.

2 CONTRIBUTIONS

The Member States shall contribute to the EPS-SG PP in accordance with a GNI-based scale of contributions established in accordance with Article 13 of the EUMETSAT Financial Rules. The current scale of contributions is provided in Section II below. The scale will be updated in triennial intervals.

II SCALE OF CONTRIBUTIONS FOR MANDATORY PROGRAMMES AND GENERAL BUDGET

In accordance with the EUMETSAT Convention Article 10.2, each Member State shall pay an annual contribution to the EUMETSAT General Budget and Mandatory Programmes on the basis of the average Gross National Product [Income] of each Member State for the three latest years for which statistics are available.

In accordance with Council document EUM/C/74/11/DOC/52, the current Scale of Contributions for the EUMETSAT Mandatory Programmes and General Budget is as follows:

MEMBER STATE	CONTRIBUTION (%)
AUSTRIA (AT)	2.0828
BELGIUM (BE)	2.6202
SWITZERLAND (CH)	2.5631
CZECH REPUBLIC (CZ)	0.9782
GERMANY (DE)	18.8801
DENMARK (DK)	1.7617
SPAIN (ES)	7.9215
FINLAND (FI)	1.3798
FRANCE (FR)	14.7590
UNITED KINGDOM (GB)	14.0213
GREECE (GR)	1.7237
CROATIA (HR)	0.3377
HUNGARY (HU)	0.7159
IRELAND (IE)	1.1546
ITALY (IT)	11.6351
LUXEMBOURG (LU)	0.2204
LATVIA (LV)	0.1607
NETHERLANDS (NL)	4.3792
NORWAY (NO)	2.1656
POLAND (PL)	2.4285
PORTUGAL (PT)	1.2495
ROMANIA (RO)	0.9452
SWEDEN (SE)	2.5086
SLOVENIA (SI)	0.2660
SLOVAK REPUBLIC (SK)	0.4527
TURKEY (TR)	2.6889
TOTAL	100.0000

The basis for the calculation of the contributions is the Gross National Income issued by EUROSTAT internet online statistics database on 1 September 2011. The current scale of contributions is based on the reference period 2007-2009, applicable for the period 2012-2014. The scale will be updated in triennial intervals.

III OPTIONAL PROGRAMMES

As stipulated in the EUMETSAT Convention, optional programmes are those which count with the participation by those Member States that agree so to do. Optional Programmes are programmes within the objectives of EUMETSAT agreed as such by the Council.

Optional programmes are established through the adoption of a Programme Declaration by the Member States interested to which a detailed Programme Definition, containing all necessary programmatic, technical, financial, contractual, legal and other elements is attached. Any optional programme shall be within the objectives of EUMETSAT and be in accordance with the general framework of the Convention and the rules agreed by the Council for its application. The Programme Declaration is approved by the Council in an Enabling Resolution.

Any Member State shall have the opportunity to participate in the preparation of a draft Programme Declaration and may become a Participating State of the optional programme within the time frame set out in the Programme Declaration.

Optional programmes take effect once at least one third of all EUMETSAT Member States have declared their participation by signing the Declaration within the time frame set out and the subscriptions of these Participating States have reached 90% of the total financial envelope.

EUMETSAT JASON-2 ALTIMETRY OPTIONAL PROGRAMME DEFINITION

(Adopted by Potential Participating States on 4-5 December 2001 in Council Declaration EUM/C/01/Decl.I, amended by Resolution EUM/C/02/Res. IV adopted on 26-27 November 2002, entered into force on 27 June 2003, reflecting subsequent subscriptions up to 29 November 2010 and amended by Council Resolution EUM/C/77/12/ Res. III adopted on 15-16 November 2012)

1 GENERAL

The primary objective of the EUMETSAT Jason-2 Altimetry Programme will be to ensure that the EUMETSAT user community continues to receive precise altimetry data on an operational basis. To meet this need, Jason-2 will be an Earth orbiting satellite in a 66° orbit equipped with a radar altimeter and other instruments to directly measure sea surface elevation along a fixed grid of sub-satellite groundtracks. Jason-2 will, for an estimated period of seven years, continue the data collection started with Topex/Poseidon and continued with Jason-1. The intention is for EUMETSAT to be an equal partner in the Ocean Surface Topography Mission (OSTM) alongside NOAA, NASA and CNES. Both NASA and CNES have confirmed that a decision by their authorities to proceed with support for OSTM is dependent on the financial involvement of the operational agencies EUMETSAT and NOAA.

2 MISSION OBJECTIVES

The main focus of OSTM is to pursue the unique accuracy, continuity and coverage of the Topex/Poseidon and Jason-1 missions in support of operational activities such as marine meteorology, seasonal forecasting, oceanographic services and the monitoring of the climate and for describing and understanding the ocean circulation, its variability on all scales, and its influence on climate.

The basic missions to be addressed by OSTM are described below.

2.1 Marine meteorology

The two parameters measured by altimetry that have meteorological applications are wind speed and significant waveheight (SWH). Sea-state is a parameter with rapid short timescale changes of a few hours. Sea-state prediction models are forced by NWP forecasts of surface winds, but dense and frequent measurements on short time-scales are needed to constrain the models efficiently, and this is beyond the scope of in-situ networks. Real time wind speed and SWH as measured by the Jason-2 altimeter will be of value in data assimilation into models. Operational systems are already running in several meteorological centres providing reliable 12-24 hours forecasts.

2.2 Mesoscale oceanography

Three dimensional mesoscale structures have horizontal spatial scales of 30-300 km and time-scales of 20-90 days. They are mainly associated with the formation and propagation of eddies which are very energetic, have a key role in heat transport from low to high latitudes, and need to be forecast to support fisheries and other applications.

2.3 Seasonal Forecasts and Climate

Seasonal and Interannual variability is known to be significantly impacted by the El Niño and this has a consequential impact on a wide range of economic and social activities of countries affected by these events. To date altimetric data assimilation runs have significantly improved the quality of the seasonal and interannual forecasting (6 months to 1 year in advance), and Jason-2 will continue to contribute and enhance this service.

OSTM will have a major contribution to the observation of large spatial variability (intra-seasonal to interannual) thanks to the expected low error budget and a very precise orbit determination. The OSTM observations will allow an improved characterisation of the seasonal cycle and its geographic dependence as well as better understanding of the associated ocean-atmosphere interactions. The accurate knowledge of the seasonal cycle is especially important to evaluate and to adjust at a first order the ocean models and climate models. OSTM will also continue to contribute to our understanding of mean sea level trends

2.4 Other Applications

Altimetry is also useful for many applications in geodesy, geophysics, glaciology and hydrology.

The observations from OSTM will continue to contribute to our improved knowledge of tides. Water vapour content as measured by the radiometers on-board altimetric satellites can be useful to monitor atmosphere characteristics in the troposphere and to constrain operational weather models. Precipitation is another parameter that may be derived from the dual-frequency radar altimeter and the radiometer and be used by meteorologists to complete their data sets.

Despite the inappropriate technical design and orbit geometry, interesting results have been obtained with Topex/Poseidon data by scientists studying sea-ice, enclosed seas, lakes, large rivers and flat continental topography.

3 OCEAN SURFACE TOPOGRAPHY MISSION (OSTM) SYSTEM DESCRIPTION

3.1 Overview

The OSTM end to end system includes a satellite, launch, and a full ground system. The task sharing between the four partners will ensure a coherent overall system. The overall system described below is the total system that will be jointly provided by the four partners. Section 4 deals with the specific EUMETSAT activities.

3.2 Space Segment

The Jason-2 payload consists of a:

- Two-frequency altimeter called Poseidon-2 and its antenna
- Three-frequency radiometer and its antenna
- Doppler Obitography and Radiopositioning Integrated by Satellite (Doris) on board package;
- Laser retroreflector array;
- Turbo Rogue Space Receiver (TRSR) GPS space receiver and up to two (2) antennas.

The Jason-2 satellite bus will be the PROTEUS (Plateforme Reconfigurable pour l'Observation de la terre, les Telecommunications et les Utilisations Scientifiques) platform developed for Jason-1.

NASA will provide the launch of the Jason-2 satellite.

3.3 Ground System Description

The ground system consists of a control ground system and a mission ground system distributed between the US and Europe and between the four partners.

3.3.1 Control Ground System

The Control Ground System comprises:

a. **A Satellite Control Centre (SCC)** located in Toulouse to monitor the satellite during the complete mission lifetime. Satellite control and operations are also executed from this centre until the end of the assessment phase.

b. **A Project Operation Control Centre (POCC)** expected to be located in Pasadena California under NOAA/NASA control. This centre will be operational from the end of the assessment phase and will control the satellite and the associated instruments for the remainder of the mission.

c. **An Earth Terminal Network** to provide command transmission and data acquisition. There will be at least three Earth Terminals, one of which will be in Europe to provide global coverage.

3.3.2 Mission Ground System

The Mission Ground System comprises:

a. **The EUMETSAT Mission Centre(EMC)** to provide:

- Data reception and primary processing for real time products;
- User interfaces;
- Real time data distribution and archiving.

b. **The CNES Mission System Centre** comprises the Segment Sol Multimission Altimétrie et Orbitographie (SSALTO) and a DORIS system beacon network. The functions are:

- Instrument programming and monitoring (altimeter and DORIS)
- Commands requests generation (altimeter and DORIS)
- Mission management and operation plan definition
- Precise Orbit Determination (POD)
- Algorithm definition and POD data production and validation
- Offline altimeter data processing and validation of altimetry product
- Offline data distribution and archiving
- Network of ground beacons

c. **A NASA/NOAA Mission Centre** (expected to be part of the JPL POCC) whose functions are:

- Instrument programming and monitoring (Radiometer and TRSR)
- Command requests generation (Radiometer and TRSR).
- Offline altimeter data processing and validation of altimetry product in parallel with the EUMETSAT, CNES mission centre
- Real Time altimeter data processing
- Real time and offline data distribution and archiving

3.4 Data Products and Services

3.4.1 Geophysical Products

The basic data services proposed for OSTM are a continuation of the services provided for Jason-1. The products are:

- A **three hour real time Operational Sensor Data Record (OSDR),** mainly for marine meteorological applications. The aim is to have 75% of the data available within three hours and 95% within five hours, but every effort will be made to improve upon this aim for European regional data. The wind wave accuracy will be better than 2m/s or 10% with an orbit accuracy of better than 50cm and a range accuracy of better than 4.5cm.
- A **three day Interim Geophysical Data Record (IGDR)** for oceanography. The aim is to have 95% of the products available. The wind wave accuracy will be better than 1.7m/s or 10% with an orbit accuracy of better than 4cm and a range accuracy of better than 3.3cm.
- A **thirty day Geophysical Data Record (GDR)** for off-line science. The wind wave accuracy will be better than 1.7m/s or 10% with an orbit accuracy of better than 2cm and a range accuracy of better than 3.3cm.

3.4.2 Other Products

In addition there will be a set of specialist products, such as the combined products making effective use of OSTM and Envisat altimetry data, designed for expert users who wish to undertake certain analysis. These primarily concern orbit parameters and cross over products as well as the radiometer data.

3.4.3 Data Dissemination

The OSDR will be distributed using the GTS network, and such other networks (e.g. the World Wide Web) as may be agreed by EUMETSAT Participating States. EUMETSAT will be responsible for receiving data within Europe and making the data available to users on a routine basis in a way that ensures all EUMETSAT Participating States gain access to them in an optimum manner. NOAA/NASA will have a similar responsibility within the USA.

The IGDR will be distributed using the GTS network, and such other networks (e.g. the World Wide Web) as may be available. Within Europe the primary centre for processing the IGDR will be the SSALTO based in Toulouse. They will receive and archive all the data from both the European and US based Earth Terminals.

Within Europe the primary centre for processing and distributing the GDR will be the SSALTO based in Toulouse. They will receive and archive all the data from both the European and US based Earth Terminals. These data will be available on request.

3.4.4 Data Policy

It is recommended that all data available through this programme be made available in accordance with WMO Resolution 40 (Cg-XII) and that all OSTM data are classified as “essential”.

4 THE EUMETSAT JASON-2 ALTIMETRY PROGRAMME CONTENT

The EUMETSAT Jason-2 Altimetry Programme covers the EUMETSAT contribution to the US-European OSTM and aims at providing a seven-year OSTM operational data service to Member States and other users. The main elements of the EUMETSAT Programme are:

a. A financial contribution by EUMETSAT to CNES. This, along with the CNES, NASA, and NOAA funds will ensure the supply of the satellite, launcher and all ground segment and operations not specifically provided by EUMETSAT

b. Acquisition, installation, operations and maintenance of a EUMETSAT Earth Terminal to receive data from the satellite and uplink the commands to the satellite. The preferred location is Darmstadt.

c. The algorithms for the processing of the real time data in EUMETSAT will be provided by the SSALTO based on the Jason-1 activities. Associated with this will be the need for a computing hardware and data dissemination chain.

d. The operational role of EUMETSAT shall be to:

- Receive via the EUMETSAT Earth Terminal all data scheduled for reception in Europe;
- Process these raw data to produce the OSDR products;
- Transmit all the received raw data to the SSALTO and the NASA/NOAA Mission Centre for archiving and offline processing;
- Receive the OSDR products generated in the US from their reception site (TBC);
- Distribute the OSDR products to users;
- Maintain a rolling archive to ensure data are safely archived at the long term archives;
- Provide a user interface for enquiries on data formats, quality availability etc;
- Contribute to activities related to scientific Announcements of Opportunity and visiting scientists;
- Engage in other activities as agreed, to optimise the data service provided to EUMETSAT Member States and other users.

e. Management of the Cooperation with CNES, and the US partners.

5 IMPLEMENTATION

OSTM is a four party activity with clear and distinct responsibilities being allocated to each party. A four party Memorandum of Understanding and associated bilateral Agreements will set out these roles in detail.

An OSTM Joint Steering Group (OSG) will be established to provide direction and to review project implementation status. The OSG will establish a Project Plan. This plan will contain detailed statements as to how the cooperative project is to be carried out. It will include all aspects of the mission. This Project Plan will form the basis for the EUMETSAT/CNES activities.

Each party will also establish its own OSTM Project Office to provide for its project planning and management. Each office will be responsible for ensuring that its role is fulfilled.

EUMETSAT will implement the EUMETSAT Jason-2 Altimetry Programme in a single slice. Jason-2 has to be ready for launch in December 2004. The actual launch date is dependent upon the successful launch and operations of Jason-1. The expected period of operations is 7 years. It is intended that agreement will be sought to extend operations if the performance of the satellite remains satisfactory towards the end of this period. This will require a separate decision by all EUMETSAT Participating States wishing to continue.

EUMETSAT JASON-2 ALTIMETRY OPTIONAL PROGRAMME FINANCIAL ENVELOPE AND SCALE OF CONTRIBUTIONS

(Adopted by Potential Participating States on 4-5 December 2001 in Council Declaration EUM/C/01/Decl.I, amended by Resolution EUM/C/02/Res. IV adopted on 26-27 November 2002, entered into force on 27 June 2003 and reflecting subsequent subscriptions up to 29 November 2010)

1 FINANCIAL ENVELOPE

The overall envelope for EUMETSAT's contribution to the Ocean Surface Topography Mission (OSTM) through the EUMETSAT Jason-2 Altimetry Programme shall be limited to a maximum of 30 MEUR at 2001 economic conditions.

The indicative EUMETSAT payment profile, based upon a 2004 December launch and five years of operations, is:

Year	2003	2004	2005	2006	2007	2008	2009
MEUR	3	4.0	4.6	4.6	4.6	4.6	4.6

2 SCALE OF CONTRIBUTIONS

The Participating States shall contribute to the EUMETSAT Jason-2 Altimetry Programme in accordance with the following scale of contributions:

PARTICIPATING STATE	CONTRIBUTION %
BELGIUM (BE)	3.0550
SWITZERLAND (CH)	3.4504
GERMANY (DE)	26.5158
DENMARK (DK)	1.9576
SPAIN (ES)	6.6735
FINLAND (FI)	1.4534
FRANCE (FR)	17.2722
UNITED KINGDOM (GB)	10.5294
GREECE (GR)	0.7218
CROATIA (HR)	0.2213
IRELAND (IE)	0.9492
ITALY (IT)	13.3965
LUXEMBOURG (LU)	0.2175
LATVIA (LV)	0.0960
NETHERLANDS (NL)	4.5381
NORWAY (NO)	1.7896
PORTUGAL (PT)	1.2754
ROMANIA (RO)	0.5827
SWEDEN (SE)	2.7485
SLOVENIA (SI)	0.2327
TURKEY (TR)	2.3234
TOTAL	100.0000

EUMETSAT JASON-2 ALTIMETRY OPTIONAL PROGRAMME VOTING COEFFICIENT

(Adopted by Potential Participating States on 4-5 December 2001 in Council Declaration EUM/C/01/Decl. I, amended by Resolution EUM/C/02/Res. IV adopted on 26-27 November 2002, entered into force on 27 June 2003 and reflecting subsequent subscriptions up to 29 November 2010)

Pursuant to the scale of contributions contained in Annex II of the Declaration on the EUMETSAT Optional Jason-2 Altimetry Programme, and taking into account Article 5.3 b) of the EUMETSAT Convention, the voting coefficient of Participating States shall be as follows:

PARTICIPATING STATE	CONTRIBUTION %
BELGIUM (BE)	3.0550
SWITZERLAND (CH)	3.4504
GERMANY (DE)	26.5158
DENMARK (DK)	1.9576
SPAIN (ES)	6.6735
FINLAND (FI)	1.4534
FRANCE (FR)	17.2722
UNITED KINGDOM (GB)	10.5294
GREECE (GR)	0.7218
CROATIA (HR)	0.2213
IRELAND (IE)	0.9492
ITALY (IT)	13.3965
LUXEMBOURG (LU)	0.2175
LATVIA (LV)	0.0960
NETHERLANDS (NL)	4.5381
NORWAY (NO)	1.7896
PORTUGAL (PT)	1.2754
ROMANIA (RO)	0.5827
SWEDEN (SE)	2.7485
SLOVENIA (SI)	0.2327
TURKEY (TR)	2.3234
TOTAL	100.0000

OPTIONAL EUMETSAT JASON-3 ALTIMETRY PROGRAMME DEFINITION

(Adopted by the Potential Participating States on 1 July 2009 in Council Declaration EUM/C/67/09/Dcl. I, entered into force on 1 February 2010 and reflecting subsequent subscriptions up to 31 January 2011)

1 GENERAL

The primary objective of the Programme is to ensure that the user community continues to receive precise altimetry data on an operational basis while Europe prepares for a long term operational perspective. To meet this need, Jason-3 will be an Earth orbiting satellite in a 66° orbit equipped with a radar altimeter and other instruments to directly measure sea surface elevation along a fixed grid of sub-satellite ground tracks. Jason-3 will thereby continue the data collection carried out by Topex/Poseidon, Jason-1 and Jason-2.

As an evolution of the Jason-2 OSTM Programme, the Optional EUMETSAT Jason-3 Altimetry Programme will rely on an international partnership between EUMETSAT, NOAA and CNES and NASA. In addition, it is expected that ESA and the European Commission will contribute. The increased role of NOAA and EUMETSAT as operational agencies reflects the ongoing transition from Research and Development towards full operations.

2 MISSION APPLICATIONS

The main focus of Jason-3 is to provide continuity to the unique accuracy, continuity and coverage of the Topex/Poseidon, Jason-1 and Jason-2 missions in support of operational applications related to extreme weather events and operational oceanography and climate applications and forecasting.

2.1 Operational Applications

2.1.1 Marine Meteorology

Meteorological centers run sea state forecast models to anticipate the evolution of waves and swells, which are superimposed, on all parts of the Earth, providing sailors and workers at sea with regular forecasts and special weather updates when weather conditions deteriorate. Such models (e.g. VAG at Météo-France, WAM at the ECMWF European Center) benefit greatly from real-time wave-height and wind speed altimetry products such as those issued within 3 hours from Jason-1 and 2, and ENVISAT.

2.1.2 Short, Medium Range and Seasonal Forecast

The assimilation of altimetry data into coupled atmosphere-ocean models has also proved to be very beneficial for short range, as well as medium range, monthly and seasonal forecasting, which are core activities of the National Meteorological Services. It has already been shown that coupled Atmospheric/Wave models allow to better estimate the flux at the interface between the atmosphere and the ocean, with some positive impact on numerical weather prediction. Also the actual heat content of the ocean mixed layer can have a decisive influence on the development and short range forecasting of high impact weather. In particular the derivation, from altimetry measurements of the so called Tropical Heat Content Potential (THCP), allows an improved prediction of hurricane intensity as was first demonstrated in 2005 with Katrina and Rita, and now being run operationally at NOAA. Likewise, recent mesoscale simulations have demonstrated that, in September/October, an increase of 3°C over some depth in the Mediterranean sea can more than double cumulated rainfall over 6-12 hours, in those convective situations associated with severe floods and major losses in nearby areas.

On longer timescales, the assimilation of both satellite (altimetry and sea surface temperature) and in situ data in ocean models coupled with atmosphere models is key to improving monthly and seasonal forecast.

2.1.3 Ocean Modeling

Several global and regional models (e.g. MERCATOR, FOAM, ECCO...) have been developed and run in an experimental or pre-operational configuration, before entering the operational phase with the MyOcean project. They provide high resolution, high frequency 3D products which depict and forecast a few weeks in advance the very short scale nature of the ocean signal, including current positions and intensity, position and scales of eddies and thermal fronts. Because of the highly turbulent characteristics of this short range signal and its non-linear evolution, it is necessary to take advantage of global, dense, and accurate observations. Altimetry is especially powerful for monitoring in near-real time the mesoscale signal and adjusting regularly the models. The derived products satisfy many applications (e.g. marine safety, marine pollution, ship routing, navy needs, oil drilling, coastal forecasts, fish stock management...).

2.1.4 Coastal Applications

Another field of activity is that concerning coastal areas where there are many problems related to risk prevention and coastal development. High resolution models require as an input high accuracy products in the coastal band as well as at the deep ocean boundary. One example is the prediction of storm surges. Another example is the trajectory monitoring and forecasting of drifting polluted waters, ships, and objects lost at sea. In this domain too, altimetry products have a key role to assess and to constrain frequently the models, improving thus the forecasts.

2.1.5 Security Related Applications

Sound can propagate a long way under water and five times faster on average than it does in air. Variations in the speed of sound with depth determine how sound waves are propagated and are key parameter for security forces deployed at sea.

In the ocean, we encounter fronts, anticyclones, depressions, currents and hot and cold eddies. Each of these structures causes temperature, salinity and velocity profiles to vary. In such turbulent conditions, military oceanography aims to give forces the most accurate picture possible of the ocean so that systems can be employed effectively. In this respect, the advent of operational altimetry satellites has opened new horizons

2.2 Climate Applications and Forecasting

2.2.1 Sea Level Rise and Climate Change

At the other end of the ocean variability spectrum, the secular mean sea level trend is a key indicator of global warming. Global sea level rise (GSLR) – the most obvious manifestation of climate change in the oceans – directly threatens critical coastal infrastructure through increased erosion and more frequent flooding. 146 million people live within 1 meter of mean high water worldwide.

Projections of GSLR for the end of this century as stated in the Third Assessment Report (TAR, 2001) of the Intergovernmental Panel on Climate Change (IPCC) ranged from 9 to 88 cm, while those in the Fourth Assessment Report (AR4, 2007) range from 18 to 59 cm. To evaluate how realistic these projections are, they will need to be compared with future direct observations of GSLR; and the only way to resolve the global variability inherent in sea level rise is to use observations to be collected by Jason-class altimeter missions, in a manner that is fully consistent with the series accumulated since 1992 by TOPEX/Poseidon, Jason-1 and Jason2.

The continuity of these high accuracy measurements is more crucial as there are major uncertainties on sea level rise, associated with major changes in the climate system. The AR4 report stated that…*models* [of GSLR] *used to date do not include uncertainties*…[such as the] …*effects of changes in ice sheet flow*. Forced to ignore these uncertainties because existing climate models are unable to account for them, AR4 further states *...the upper values of the ranges given are not to be considered upper bounds...*for GSLR. The recent U.S. Climate Change Science Program Synthesis and Assessment Report on Abrupt Climate Change goes even further stating that inclusion of these uncertainties …*will likely lead to sea-level projections for the end of the 21st century that substantially exceed the projections presented in the IPCC AR4 report.*

The uncertainties are already showing in the available data sets, with the rise in global sea level (1.8 mm/yr averaged over the past century) increasing to 3.1 mm/yr over the past 1½ decades but decreasing to 2.5 mm/y in more recent years, with less contribution from thermal expansion of the upper ocean and more from melting of continental glaciers. Furthermore, the geographic distribution of sea level rise is even more difficult to predict. Under the scenario of a massive melting of the Greenland ice sheets, the anticipated sea level rise in Europe or South America would be quite different, and recent research results suggest that the assumed stability of the Greenland ice sheets may be very questionable. Reliable projections of regional sea level rise which is of great concerns to coastal zones around the world are crucially dependent on a global observing system. Therefore, it is essential that we maintain and extend our existing capability to collect direct observations of GSLR by satellite altimetry; these measurements have been made continuously since 1992 by a series of three satellites, the most recent, Jason-2, having been launched this past June.

The continuation of Jason type missions is a unique way to fulfill this objective of great importance and of general interest.

2.2.2 Research Topics

The ocean exhibits variability at different scales in time and space, affecting significantly mass and heat transport, exchanges with the atmosphere, and consequently the climate. Sea surface topography as measured by altimetry has proven its usefulness to understand the physics behind this variability. Model parameterization has been improved thanks to these new findings. But there is still more to do. Apart from the seasonal cycle, which leads to an increase or decrease in sea level in each hemisphere, exceeding 15 cm in some areas, there are significant variations from one year to the next which are not yet well understood.

The El Nino event, the North Atlantic Oscillation, the Pacific Decadal Oscillation, the planetary waves crossing the oceans over periods of months to years and even decades are among the mechanisms which need to be better characterized. The predictability of the coupled ocean-atmosphere system at decadal ranges is a subject of intensifying modeling research, with the control of the ocean state playing a key role.

Because of the long period of these phenomena, very long time series of altimeter observations are needed, requiring follow-on missions to Jason-2.

3 CORE PRODUCTS AND SERVICES

3.1 Products Description

The Jason-3 products will be based on the Jason-2 ones as described in the table below.

	Products	**Main Variables**	**Frequency**	**Application Class**
1	**Operational Geophysical Data Record** (OGDR)	**Significant Wave Height** (SWH) **Surface Wind Speed** (WIND) **Sea Surface Height** (SSH)	3 hours	Nowcasting Operational Wave Forecasting
2	**Interim Geophysical Data Record** (IGDR)	**Sea Surface Height** (SSH) **Absolute Dynamic Topography** (ADT) **Ocean Geostrophic Velocities**	Daily	Medium-Range Forecasting Seasonal Forecasting Ocean Weather
3	**Geophysical Data Record** (GDR)	**Sea Surface Height** (SSH)	10 daily (one repeat cycle)	Climate Monitoring Climate Modeling

It should be noted that some demonstration products will be evaluated on Jason-2, for instance, coastal or in land water products. If the performance and quality of those products are demonstrated, then they could become operational products for Jason-3, in which case they would be included in the Operational Service Specification.

3.2 Archiving and Dissemination

The Near Real Time products will be disseminated by EUMETSAT through Eumetcast and also on the GTS network. These products will also be archived in the UMARF. The longer latency IGDR and GDR products will be processed as for Jason-2, disseminated and archived by CNES in Europe and by NOAA in the US. In addition, EUMETSAT is also investigating the possibility to disseminate multi-mission altimetry products.

4 SYSTEM DESCRIPTION

4.1 Overview

The Jason-3 end to end system includes a satellite, launch, and a full ground system. The task sharing between the partners will ensure a coherent overall system. The overall system described below is the total system that will be jointly provided by all partners.

4.2 Space Segment

The satellite includes the satellite bus and the instruments constituting the payload. The total weight of the satellite will be around 550Kg The satellite bus is made up of a platform based on the PROTEUS platform, a payload instrument module and a launcher adapter.

The Jason-3 payload consists of the following instruments:

- Two-frequency altimeter called Poseidon
- Three-frequency advance microwave radiometer
- Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS) on board package
- Global Positioning System Payload (GPS-P)
- Laser Reflector Array (LRA)

NOAA will provide the launch of the Jason-3 satellite.

4.3 Ground System

The ground segment, for satellite and instrument command and control, and for product generation, will be based on a maximum re-use of existing elements from Jason-2. This system is now operational for some months and is compliant with the needs. This ground segment is operated by both the US and Europe and makes extensive use of already existing assets. It has a robust design which includes several levels of redundancy. It comprises:

– **A Satellite Control Centre** provided by CNES. This centre monitors the satellite during the complete mission life time but is only used for satellite control in the early phases of the mission or in the case of a major anomaly during Operations;

– **A Satellite Operations Control Centre** provided by NOAA. After the initial phases of the mission, all nominal operations regarding satellite control and flight operations are executed from this centre;

– **An Earth Terminal/Stations Network**: the CNES control centre and the NOAA operation control centre rely (for command transmission and data acquisition) upon a ground terminal network of earth terminal/stations suitably located to allow the required orbit coverage compliant with the data latency requirement.

  This network is based on:

  – An earth terminal in Europe.
  – Two earth terminals in the USA
  – An additional set of S-band earth terminals for early mission phases and contingency purpose.

  The exact location of these earth terminals needs to be further analyzed to cope with the constraints induced by the initial formation flying between Jason-2 and Jason-3 (both satellites flying one minute apart from each other) which prevents to use the same antennas as for Jason-2.

The operations set-up is based on that of Jason-2, with NOAA in charge of routine satellite operations and CNES leading the satellite expertise and operations in case of anomaly during the mission. With the view of keeping recurrence with Jason-2 and minimising the development costs and associated risks, the Jason-2 operations concept was retained.

5 COOPERATIVE FRAMEWORK AND SHARING OF RESPONSIBILITIES

Like the Jason-2 programme, it is proposed to base the Programme on international cooperation. In the case of Jason-3, and taking into account that this programme represents a further step in the transition towards a long term operational altimetry programme, the following Partners are involved.

From a funding stand point, NOAA, EUMETSAT, CNES, NASA, the European Commission and ESA contribute to the Programme. To avoid the complexity of a 6 partners' Agreement, and bearing in mind that only NOAA, EUMETSAT, CNES and NASA will be directly in charge of the development and the operations of the system, it is proposed to establish a four partner Memorandum of Understanding (MOU) and a set of bilateral Agreements or Arrangements including one between NOAA and NASA for the US contribution:

- Four-partite MOU (EUMETSAT, NOAA, CNES, NASA)
- Agreement between EUMETSAT and CNES
- Agreement between EUMETSAT and ESA
- Agreement between EUMETSAT and the European Commission (EC)

Taking into account the nature of the Jason-3 cooperative framework, it is proposed to adopt the same Data Policy as for the OSTM (Jason-2) cooperation. This means that all Jason-3 data products would be made available in accordance with WMO Resolution 40 (Cg-XII) and be classified as "Essential".

Access to GMES Services and to ESA will be explicitly covered in the arrangements to be concluded with the EC and ESA regarding their funding contributions to the programme.

The operational agencies, EUMETSAT and NOAA, will take the lead on the programme, with CNES making a significant in kind contribution and acting at technical level as system coordinator. NASA will support with the other partners for scientific activities.

EUMETSAT will maintain the operational role already established for the Jason-2 Programme, ie it will operate the Earth Terminal, process, disseminate and archive the near real time products, provide the user services and conduct mission operations jointly with NOAA and CNES.

In addition, EUMETSAT will make payments to CNES to fund part of the CNES activities, and retain a fraction of the funding to prepare and perform its operational activities. EUMETSAT will not play a direct role in the procurements effected by CNES.

NOAA will join EUMETSAT in taking the lead on the programme. NOAA will also provide the launcher and launch services, the radiometer, GPS-P receiver and laser retroreflector and, together with CNES and EUMETSAT, operate the system after the end of commissioning along an equivalent scheme as for Jason-2.

CNES will make a significant in kind contribution, consisting mainly of the satellite bus and human resources. In addition, CNES will act as procurement agent on behalf of EUMETSAT, integrate all payload elements and operate the satellite after the launch.

All agreements will be on a "reasonable efforts" basis, and EUMETSAT will ensure that it does not assume any financial liability for elements or funding to be provided by Partners.

6 SCOPE OF EUMETSAT PROGRAMME AND IMPLEMENTATION

It should be recalled that the primary objective of the Programme and of the EUMETSAT involvement is to secure continuity of data services and that this Programme, recurrent from Jason-2, does not have the development aspects normally associated with the core EUMETSAT meteorological programmes.

The EUMETSAT Jason-3 Altimetry Programme covers the EUMETSAT contribution to the joint system established with the partners and aims at providing a five-year operational data service to Participating States and other users. The main elements of the EUMETSAT programme are:

- A financial contribution by EUMETSAT to CNES,
- Establishment, operations and maintenance of the EUMETSAT Earth Terminal (to be confirmed)
- Processing, dissemination and archive of the near real time products, provision of user services and conduct of mission operations jointly with NOAA and CNES

EUMETSAT will implement the Jason-3 Altimetry Programme in a single slice. Jason-3 has to be ready for launch in mid-2013. The expected period of operations is five years. It is intended that agreement will be sought to extend operations if the performance of the satellite remains satisfactory towards the end of this period. This will require a separate decision by all EUMETSAT Participating States wishing to continue.

7 LONG TERM OPERATIONAL PERSPECTIVE WITH A EUROPEAN JASON-CS PROGRAMME

The Jason-3 programme should be seen as the first intermediate step towards an operational high precision altimetry Jason-CS programme to be agreed with ESA in the 2011 timeframe. This programme would consist of a series of Jason-class satellites based on the Cryosat mission heritage, until a transition to a demonstrated new technology could be considered as an operational altimetry mission.

Following the positive decisions taken at the ESA Council at Ministerial Level in November 2008 (C-MIN 08), dedicated studies on Jason-CS have been approved. These studies should provide the necessary technical and programmatic input for a decision to develop a Jason-CS programme creating a long term operational perspective, at the latest by the ESA Council at Ministerial level currently planned in 2011.

This programme should be developed on the basis of the EUMETSAT-ESA cooperation model successfully used for operational meteorology. It is indeed essential to plan for a series of operational satellites developed along the principles used for operational meteorology in Europe.

OPTIONAL EUMETSAT JASON-3 ALTIMETRY PROGRAMME FINANCIAL ENVELOPE AND SCALE OF CONTRIBUTIONS

(Adopted by the Potential Participating States on 1 July 2009 in Council Declaration EUM/C/67/09/Dcl. I, entered into force on 1 February 2010 and reflecting subsequent subscriptions up to 31 January 2011)

1 FINANCIAL ENVELOPE

The overall envelope for the Optional EUMETSAT Jason-3 Altimetry Programme shall be limited to a maximum of M€63.6 at 2009 economic conditions (M€60 at 2007 economic conditions).

The indicative EUMETSAT payment profile, based upon a mid 2013 launch and five years of operations, is:

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
M€	20.9	26.2	13	3.5	0	0	0	0	0

2 SCALE OF CONTRIBUTIONS

The Participating States shall contribute to the EUMETSAT Jason-3 Altimetry Programme in accordance with the following scale of contributions:

PARTICIPATING STATE	CONTRIBUTION %
BELGIUM (BE)	2.8816
SWITZERLAND (CH)	3.0764
GERMANY (DE)	13.2453
DENMARK (DK)	1.9893
SPAIN (ES)	8.4588
FINLAND (FI)	1.5105
FRANCE (FR)	22.0756
UNITED KINGDOM (GB)	15.7288
GREECE (GR)	0.9243
CROATIA (HR)	0.2767
IRELAND (IE)	1.3044
ITALY (IT)	13.4735
LUXEMBOURG (LU)	0.2407
NETHERLANDS (NL)	4.9041
NORWAY (NO)	2.2684
PORTUGAL (PT)	1.3759
ROMANIA (RO)	0.6432
SWEDEN (SE)	2.8288
SLOVENIA (SI)	0.2570
TURKEY (TR)	2.5367
SUBSCRIBED TOTAL	100.0000

OPTIONAL EUMETSAT JASON-3 ALTIMETRY PROGRAMME VOTING COEFFICIENT

(Adopted by the Potential Participating States on 1 July 2009 in Council Declaration EUM/C/67/09/Dcl. I, entered into force on 1 February 2010 and reflecting subsequent subscriptions up to 31 January 2011)

Pursuant to the scale of contributions contained in Annex II of the Declaration on the Optional EUMETSAT Jason-3 Altimetry Programme, and taking into account Article 5.3 b) of the EUMETSAT Convention, the voting coefficient of Participating States shall be as follows:

PARTICIPATING STATE	% VOTING COEFFICIENT
BELGIUM (BE)	2.8816
SWITZERLAND (CH)	3.0764
GERMANY (DE)	13.2453
DENMARK (DK)	1.9893
SPAIN (ES)	8.4588
FINLAND (FI)	1.5105
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ROMANIA (RO)	0.6432
SWEDEN (SE)	2.8288
SLOVENIA (SI)	0.2570
TURKEY (TR)	2.5367
TOTAL	100.0000