

EUMETSAT CONTRIBUTION TO GMES

In response to CGMS action/recommendation: None

Working Paper Abstract (corresponding to ca ½ a page)

This document describes the EUMETSAT participation in the EC – ESA initiative for the Global Monitoring for Environment and Security (GMES).

GMES is covering several areas of applications, among which EUMETSAT has targeted to play a key role as satellite data provider for the oceanography and atmosphere user communities.

In GMES, in addition to its contribution through its mandatory and optional programmes (MSG, MTG, EPS, Jason-2), EUMETSAT will be the operational agency for the GMES Sentinel-3 satellite (oceanography mission) and for the GMES Sentinel-4 and -5 instruments which will be flown respectively on MTG-S and post-EPS satellites.

Finally, EUMETSAT will support the European Commission in planning for future oceanography and atmosphere monitoring missions, starting with the establishment of structured user requirement definition processes for these areas.

Action/Recommendation : CGMS is invited to take note.

EUMETSAT contribution to GMES

1 INTRODUCTION

This document presents the status of contribution of EUMETSAT in the European Commission – ESA initiative for the Global Monitoring of Environment and Security (GMES).

2 MAIN ELEMENTS OF GMES¹

GMES, which stands for Global Monitoring for Environment and Security, is a European programme for the implementation a European capacity for Earth observation.

The main objective of GMES is to monitor and better understand our environment (How our planet is changing? Why is it changing? How this might influence our daily lives?) and to contribute to the security of every citizen.

GMES will provide decision-makers who rely on strategic information with regard to environmental and security issues with an independent and permanent access to reliable data.

GMES consists of the following three components:

Space

The GMES Space Component consists of space observation infrastructure addressing service data needs with missions observing land, atmospheric and oceanographic parameters. In practice it will rely on:

- Existing or planned European space infrastructure mainly satellites of ESA, EUMETSAT and Member States; and
- Space infrastructure co-financed by the EU and ESA (Sentinel satellites).

Within the Space Component, different functions need to be covered for all space infrastructure types (demonstration missions, initial and recurrent elements of operational missions). Currently, following a gap analysis conducted by ESA, ESA and the EC are jointly developing space observation infrastructure in the frame of the ESA GMES Space Component Programme. This programme aims at developing and implementing a number of satellite missions known as “the Sentinels”.

¹ www.gmes.info

The GMES In-Situ Component will rely on a large number of facilities, instruments and services owned and operated at national, regional and intergovernmental levels inside and outside the EU. In situ infrastructure provides data to monitor the Earth's oceans, continental surfaces and its atmosphere. Examples of such data include the chemistry of the atmosphere and air quality, ice cover and soils and geophysical data among others.

Services

GMES services are the basis for Europe's autonomy in information provision worldwide. The scope and delivery schemes of GMES services should be designed to ensure an operational implementation based on user requirements and applicable legislation, but might have to be prioritised according to institutional and policy needs. The timely and cost-efficient delivery of information depends to a large extent on the successful implementation of the Infrastructure for Spatial Information in the European Community (INSPIRE) Directive, which provides for the development and exchange of data for the implementation of EU.

In 2008 the preoperational services have been launched, paving the way for the future operation of GMES. The types of GMES services at this stage are:

- Marine and Atmosphere Services

This group includes services for the systematic monitoring and forecasting of the state of the Earth's subsystems state at regional and global levels, using models and methodologies that require large computing and processing capacities. These services produce information for monitoring and understanding climate change and may contribute towards improvements in the transport sector and the deeper marine knowledge needed for implementation of the EU's new Integrated Maritime Policy.

- Land, Emergency and Security Services

This group includes geo-information services for land monitoring, emergency response and security applications at national, regional, European and global levels. The development of GMES in its initial phase has given priority to the establishment of services in the area of Earth observation for environmental and emergency services. The development of the security services needs now to be accelerated. There is an opportunity to add value to an emerging European maritime surveillance network as a part of the EU Integrated Maritime Policy. This will require close co-operation with and between Member States and the European Defence Agency.

Likewise, the Commission will propose an approach for the contribution of GMES to climate change monitoring, using elements of its atmosphere, land and marine services.

Moreover, GMES has the potential to contribute to the proposed Shared Environmental Information System (SEIS) aims at modernising and simplifying the collection, exchange and use of the data and information required for environmental

policy. In this context, GMES has the potential to improve the provision of services both to public policy makers and to citizens.

To date, GMES services are incomplete. They are not yet fully and permanently globally available. Their sustainability is not yet fully guaranteed. Therefore further investment is necessary including in the space infrastructure to fill the gaps of GMES services and to guarantee their long-term sustainability and reliability. Moreover a number of very different actors of varied institutional nature will have to be brought permanently together, also to ensure a proper representation of the EU and ESA Member States and further countries involved notably through their participation in intergovernmental organisations. For a cost efficient development of GMES it is essential to build the system in a modular or phased implementation approach based on available space and ground-based resources.

3 EUMETSAT FOCUS IN GMES

In GMES, EUMETSAT has decided to focus its participation on the operational delivery of space data to the oceanography and atmosphere user communities.

In addition, EUMETSAT participation in GMES will also support the Climate activities which will be delivered by GMES services.

4 EUMETSAT ACTIVITIES IN GMES

4.1 Contribution through EUMETSAT Mandatory Programmes

EUMETSAT will make the data delivered by its mandatory programmes (MSG and Metop satellites) and its optional programme (Jason-2) available to the GMES services. This would be done according to a Data Policy decided by EUMETSAT Council (See section 4.5.).

4.2 Operations of GMES Sentinel-3 satellite

The GMES Sentinel-3 satellite will carry an optical instrument suite providing data from the visible to thermal infrared at medium (e.g. 250 m) to low (e.g. 1000 m) spatial resolution for ocean colour, sea surface temperature and global land mapping. An altimeter package will continue altimetry ocean observations required by meteorological (e.g. ECMWF) and oceanographic services and will complement Jason and Altika. The combination of the altimeter package and wide swath radiometers will provide a European source of data required for the MCS and LMCS fast track services in particular. It will also satisfy observation requirements of future potential GMES services that would be built upon projects such as Marcoast, GMFS, GlobCover, GlobCarbon, Globcolour, Medspiration, Geoland, Mersea and Gems. It provides continuity to ENVISAT MERIS, (A)ATSR and RA-2 and VGT instruments and will complement MetOp (and NPOESS) series for measurements of ocean surface winds and temperature.

For the time being, two GMES Sentinel-3 satellites have been procured and it is planned to procure at least another recurrent satellite. Their launch is currently planned in 2013 and 2016 timeframe.

For these Sentinels, EUMETSAT will be responsible for the performance the following tasks relating to the development of the Sentinel-3 system:

- a) providing the Ground Segment for Flight Operations (FOS) for routine operations for Sentinel-3A and Sentinel-3B;
- b) providing the Ground Segment for Payload Data Handling (PDGS) for marine services for Sentinel-3A and Sentinel-3B;
- c) supporting ESA for the Sentinel-3 system development, integration, verification and validation including the Overall System Validation (OSV);
- d) supporting ESA for the commissioning up to In-Orbit Commissioning Review (IOCR) for Sentinel-3A;
- e) operating the Payload Data Handling (PDGS) for marine services until In-Orbit Commissioning Review (IOCR) for Sentinel-3A;
- f) preparing for the hand-over from the FOS for LEOP and Commissioning to the FOS for routine operations at EUMETSAT after successful IOCR for Sentinel-3A;
- g) preparing for the routine operations of the Marine PDGS after successful IOCR ;
- h) supporting the preparation of the Sentinel-3 mission management after successful IOCR;
- i) preparing for routine operations of the Sentinel-3A Monitoring and Control after successful IOCR.

4.3 Operations of GMES Sentinel-4 and Sentinel-5 satellites

The missions for monitoring atmospheric composition will cover three major areas: ozone and UV radiation, climate change forcing and air quality. The instruments are based on the heritage of GOME, IASI, the ENVISAT chemistry payload (Mipac, Sciamachy, Gomos) and other missions with European / Canadian participation. In their baseline configuration in 2008, they will need to operate in geostationary orbit to obtain a higher revisit time over Europe, providing frequent observations in the optical domain (UV, visible and thermal infra-red) with moderate spatial resolution, as well as in low Earth orbit to offer global coverage, higher signal and better observation geometry. They will be coordinated with EUMETSAT (current EPS for GOME-2 and IASI, preparation of MTG and post-EPS missions) and will be based on the service requirements from the EC on atmospheric composition monitoring.

For the time being, two Sentinel-4 instruments are planned to be procured and will fly onboard the EUMETSAT MTG-S satellites, planned to be launched in 2018 and 2026.

The decision on the procurement of the Sentinel-5 instruments is planned to be taken in the 2011 / 2012 timeframe, at the time of approval of the EUMETSAT post-EPS programme.

4.4 Interface with Oceanography and Atmosphere User Communities

In addition to its role as operational agency of GMES Sentinels, EUMETSAT will also support the European Commission in interfacing with the operational oceanography and atmosphere monitoring user communities in Europe.

It is planned that for the definition of future infrastructure, EUMETSAT, for and on behalf of the EU, would consolidate user needs for spaceborne observations, interacting with ESA as necessary for the preparation of the system architecture.

This EUMETSAT role has been confirmed by the last European Space Council in May 2009.

4.5 Contribution to GMES Data Policy

The EUMETSAT data will be made available free of charge to the GMES Core Services under the understanding that GMES users will sign a free of charge licence with EUMETSAT and will get access to the data through the normal EUMETSAT data dissemination modes (EUMETSAT EO portal, EUMETCast).

In reciprocity, EUMETSAT Member States are expecting to get access to all GMES Sentinel missions operated by EUMETSAT.

The final GMES Sentinel Data Policy has not been agreed yet, but preliminary discussions are on-going in Europe, under the leadership of the European Commission supported by ESA.

5 CONCLUSIONS