

Plans for EPS-SG

This document presents the status of the Programme Preparation of the EPS Second Generation (EPS-SG), currently in Phase A.

The roadmap for approval of the Programme at EUMETSAT and ESA level has been consolidated, and interactions with the International and European National Partners intensified to negotiate draft cooperation agreements.

The ESA industrial competitive studies, started in January 2011, and addressing Phase A and Phase B1, are running for completion in late 2012. The ESA Phase A Preliminary Concept Reviews (PCR) have been held in July 2011, consolidating the main trade-offs and thus focusing the work in the remaining part of the Phase A, which will be closed by the Space Segment Preliminary Requirements Reviews (PRR) in spring 2012, after the EPS System level Preliminary Requirements Review planned to be held in January-February 2012.

The major decision expected at EUMETSAT level is the approval of the EPS-SG Space Segment scope and Payload Complement in early 2012 to be used as baseline for the ESA Metop-SG Development Programme to be approved at the ESA Ministerial Council end of 2012 (ESA C-MIN-12).

Action/Recommendation proposed:

*This document also answers **Action 38.04** on new operational sensors for cryospheric variables (snowfalls).*

CGMS to take note of the Status of the Preparation of the EPS-SG Programme.

Plans for EPS-SG

1 INTRODUCTION

Phasing of the EPS-SG Programme is planned as follows:

Phase 0	Mission Analysis	2005 – 2009
Phase A	Feasibility	2010 – Q2 2012, running
Phase B	Preliminary Definition	2012 –2014
Phase C, D	Detailed Definition, Production	2014 – 2020
Phase E	Utilisation	from 2020

Phase A activities continued as planned and the following main achievements are reported:

The Trade-off on the satellites configuration to be analysed in Phase A, and elaborated in 2009/2010 in cooperation with ESA, with a proposed two-satellite configuration was endorsed by the EUMETSAT Council in June 2010;

The EUMETSAT Phase A activities at mission, system and ground segment level progressed as planned, with draft End-User Requirements being established and with preliminary System Requirements, Space to Ground Interface Requirements and Interface Requirements for the Instruments that will be provided by EUMETSAT via Cooperation with partners established;

The ESA Phase A Activities progressed as planned, and the PCRs of the two parallel, competitive industrial studies have been conducted in summer 2011.

The EUMETSAT System level PRR will be conducted in early 2012 (January-February) to establish the system level Phase A Baseline, as a major input to Phase B work;

The ESA PRRs will be conducted in the spring 2012 timeframe for the space segment activities.

The work also continues at CNES for the studies on the IASI New Generation Instrument and at DLR for the METImage Instrument.

The successful completion of the PRRs will conclude the Phase A work and enable start of the Phase B activities at EUMETSAT and of the ESA Phase B1 work by the parallel industrial studies.

2 EPS-SG PROGRAMME PREPARATION

2.1 Overall Status of Preparation of the EPS-SG Programme

EUMETSAT has produced and maintains with ESA a joint EPS-SG Roadmap taking into account the articulation between ESA and EUMETSAT activities and decision processes, and required agreements with other partners, in particular CNES, DLR and NOAA.

Preparation of the EUMETSAT Phase B continues and being addressed at the 73rd Council meeting on 5 October 2011.

The latest version of the EPS-SG Programme Approval Roadmap was also submitted to the 73rd meeting of Council, to take full advantage of the progress of ongoing Phase A studies and consolidate plans for the approval by Council of the EPS-SG Space Segment Scope and Payload Complement, as an essential step to enable ESA to consolidate by June 2012 the proposal for the Metop-SG Development Programme to be approved at the ESA C-MIN-12.

The EUMETSAT full Programme Proposal will be elaborated during the Phase B for submission to Council mid 2013.

The drafting of the Joint Polar System (JPS) cooperation agreement with NOAA progressed well, leading to shared views by the two organisations addressing the system definition and areas of cooperation with a number of key points subject of current technical and programmatic discussions. An overall approach to the cooperation with all partner agencies in the future phases of Post-EPS has been elaborated taking into account the lessons learnt from EPS and related cooperation agreements are being drafted.

2.2 Status of Phase A Activities

EUMETSAT continues the activities for consolidation of the draft End User Requirements Document (EURD), the System Requirements Document (SRD), and the Space-to-Ground Interface Requirements Document (SGIRD) in strict coordination with ESA.

Work is also continuing at EUMETSAT on assessment of driving requirements, the system architecture and the mission implementation concepts, the performance budgets, timeliness aspects, feasibility of the ground segment (with parallel conceptual studies started in spring 2011) and aimed to draw a conceptual design and estimate the costs.

The Post-EPS Ground Segment will provide mission management, spacecraft monitoring and control, payload data acquisition, processing, archiving and distribution, and associated user services. It will have a strong heritage from the existing EPS system and from other elements of the EUMETSAT infrastructure in support of current programmes, to be evolved as necessary; the data processing and generation of meteorological products will be based on a network consisting of a central processing facility at the EUMETSAT Headquarters and the EUMETSAT Satellite Application Facilities (SAFs); the functions of near real time data distribution, archiving and offline retrieval will be based on an evolution of the EUMETCast and EUMETSAT Data Center systems.

2.3 EPS-SG Candidate Missions

The EPS-SG mission requirements baseline for the Phase A, as resulted from the user consultation process, the Mission Definition Review (autumn 2009), and the requirements de-scoping undertaken with the EPS-SG Mission Experts Team (PMET) until mid of 2010, encompass a total of nine candidate observation missions, which are:

Infrared atmospheric sounding mission (IAS), 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 ;

Visible/Infrared Imaging mission (VII), 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;

Microwave sounding mission (MWS), providing all-weather microwave sounding in the spectral range from 23.4 to 229 GHz, at a spatial sampling of 10 to 20 km;

Scatterometry mission (SCA), providing back-scattered signals in the 5.9 GHz band at a spatial resolution of 25 km;

Radio occultation sounding mission (RO), providing high vertical resolution, all-weather soundings by tracking GPS (Global Positioning System) and Galileo satellites;

Microwave imaging mission (MWI), 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 ultra-violet visible near-infrared shortwave infrared sounding mission (UVNS), 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;

Multi-viewing multi-channel multi-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;

Radiant energy radiometry 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 as given in Table 1.

Mission	Rank
IAS	Very High
VII	Very High
MWS	Very High
SCA	Very High
RO	High
MWI	Medium
UVNS	Medium
3MI	Medium
RER	Low

Table 1 – Ranking of EPS-SG Observation Missions

The IAS, MWS, VII, RO, SCA, and UVNS missions provide continuity and improvements to currently delivered EPS services. The 3MI, and MWI missions would be new services for EPS-SG, combining user experiences from other experimental or operational missions. In addition to serving the operational meteorological core user service and climate monitoring needs, the EPS-SG candidate missions will also provide services to atmospheric chemistry, operational oceanography, and hydrology.

In relation to CGMS Action 38.4, it should be noted that:

New operational optical and microwave imaging sensors will be part of the EPS-SG, which offer extended capabilities to measure cryospheric variables. The Visible/Infrared (VII) Imaging mission, to be implemented through the 20-channel METimage instrument, will provide surface variables in cloud-free situations. These include snow and land ice detection, cover, snow surface temperature, and snow albedo. Over sea

imagery of sea ice will provide information on sea ice coverage and sea ice drift as well as sea ice surface temperature and sea ice melt-pond fraction. Further variables to which the VII mission contributes important information will be glacier cover, frozen soil and permafrost extent.

The Micro-Wave Imaging (MWI) mission will provide all-weather surface imagery including cryospheric variables such as sea ice coverage, type, and motion, snow coverage, depth, status, and water equivalent. Atmospheric variables to be observed by the MWI mission and dedicated to precipitation measurement will include snow fall over land and sea.

2.4 Other Missions

Other mission part of EPS-SG baseline in phase A and documented in the PARD and MRD are

Level 2 product extraction mission;

Support and Data services to users, including:

- Near real-time service to Users;
- Direct broadcast service to users;
- Non real-time service to Users;
- On line service to Users;

The Data Collection Mission, for collecting and transmitting observations and data from surface, buoy, ship, balloon or airborne Data Collection Platforms;

The space environment monitoring mission (SEM), which will continue the respective EPS mission to monitor space weather;

The Search and Rescue mission: similarly to EPS, the EPS-SG system will have the capability to accommodate a SAR terminal, enabling the operations of the mission under the aegis of the COSPAS-SARSAT System, should be this confirmed in Phase A by this Partner as a need.

3 CONCLUSIONS

CGMS is invited to take note of the Status of the Preparation of the EPS-SG Programme.