CGMS

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PLANS FOR POST-EPS

EUMETSAT is running a Phase 0 for the definition of the Post-EPS Programme, in line with established preliminary mission requirements and with the support of ESA whose Pre-Phase A competitive studies are planned to start in early autumn 2007.

Plans for Post-EPS

1 INTRODUCTION

This paper shortly presents the status and planning for the preparation of the EUMETSAT Post-EPS Programme, providing some information on the addressed applications and the process leading to consolidation of mission requirements.

2 STATUS OF ACTIVITIES

The EUMETSAT Post-EPS Programme is under preparation at EUMETSAT and in its Phase 0. whose Activities are focused on the User Consultation process and the definition and consolidation of mission requirements.

Post-EPS mission requirements and programmatic assumptions and requirements have been preliminarily established, following the completion of a first phase of the Users Consultation process.

To support the generation of mission requirements, a Post-EPS Mission Experts Team (PMET) has been set-up, largely based on the Applications Experts Groups of the User Consultation.

Mission and programmatic requirements have been documented in relevant documents (MRD and PARD), reviewed within the Secretariat and with the support of the PMET and ESA. The documents provide the basis for Phase 0 industrial studies led by ESA on sensor and system architecture concepts going to be started in early autumn 2007.

In the meantime, some progress is registered in terms of preliminary discussions with NOAA on the future cooperation in view of establishing a Joint Polar System (JPS) following the Initial Joint Polar System (IJPS), to which EUMETSAT contributes with EPS. These discussions focused on the requirements management framework to be setup to support cooperation and the planning for the activities of a Working Group devoted to the preparation of the draft of the future agreements for the JPS.

The ESA Phase 0 studies, following a logic similar to the one adopted for the Meteosat Third Generation (MTG) Phase 0 activities, will cover all the elements of the Post-EPS mission at Phase 0 level and address the end-to-end system concept definition and implementation including:

- The critical analysis and consolidation of the mission technical and programmatic requirements;
- The definition of candidate system concepts for the implementation of all elements of the system architecture, with trade-offs focussing on elements of technical maturity, system dependability and affordability in line with the operational nature of the system as specified via the relevant programmatic constraints;
- A more detailed analysis of selected implementation concepts up to a pre-feasibility level, with provision of relevant programmatic elements and rough order of magnitude

cost estimates, as well as consolidation identification of required technology pre-developments.

The results of the study shall allow EUMETSAT and ESA to consolidate the missions, the system and programmatic requirements, and to narrow down the architectural options prior to more detailed feasibility studies in Phase A.

The outcome of the Post-EPS user consultation process, particularly the number of candidate observation missions, required to perform a preliminary selection and to adapt the logic of the industrial studies in order to limit the detailed analysis of the observation missions to those showing the potential to satisfy the relevant programmatic constraint, taking into account the associated priorities.

A first selection step of the candidate Post-EPS observation missions has been performed jointly by ESA and EUMETSAT in the definition of the scope of the studies based on the following criteria:

1. Missions implemented in GMES, i.e. oceanography missions on Sentinel-3 and atmospheric chemistry missions on Sentinel-5, do not require a specific effort, apart from the study of the accommodation of Sentinel-5 payload (as agreed between EUMETSAT and ESA for the implementation approach of the space component of GMES).
2. Missions already addressed in the framework of Earth Explorer follow-on studies will be considered at programmatic and possibly system level only.
3. Missions will not be addressed when their potential for operational implementation cannot be proven prior to the Post-EPS Implementation Phase.

Referring to the candidate observation missions identified in the Post-EPS Mission Requirement Document (MRD), the above criteria led to the selection and study approach described in the following table.

Observation Mission (strikethrough if not in scope of studies)	**Study Approach (limitations are in bold character)**
High-Resolution Infrared Sounding (IRS)	Full scope including sensor and system aspects
Microwave Sounding (MWS)	Full scope including sensor and system aspects
Scatterometry (SCA)	Full scope including sensor and system aspects
VIS/IR Imaging (VII)	Full scope including sensor and system aspects
Microwave Imaging (MWI) – Precipitation	Full scope including sensor and system aspects
Microwave Imaging (MWI) – Ocean and Land	**Based on SMOS for 1.4 GHz channel**
Radio Occultation Sounding (RO)	Full scope including sensor and system aspects
Nadir viewing UV/VIS/NIR - SWIR Sounding (UVNS)	**Accommodation only, payload from Sentinel 5**
Doppler Wind Lidar (DWL)	**Based on ADM Follow-on study**
Multi-viewing, Multi-channel, Multi-polarisation Imaging (3MI)	Full scope including sensor and system aspects
~~Dual View Radiometry (DVR)~~	**Not to be addressed, part of Sentinel 3**
~~Radar Altimetry (ALT)~~	**Not to be addressed, part of Sentinel 3**
Cloud and Precipitation Profiling Radar (CPR)	**Based on EarthCARE**
Microwave Imaging (MWI) - Cloud	Full scope including sensor and system aspects

Observation Mission (strikethrough if not in scope of studies)	**Study Approach (limitations are in bold character)**
Radiant Energy Radiometry (RER)	Full scope including sensor and system aspects
~~Limb Infra-Red Sounding (LIR)~~	**Not retained, not yet demonstrated in orbit**
~~Limb Millimetre-Wave Sounding (MMW)~~	**Not retained, not yet demonstrated in orbit**
~~Ocean Colour Imaging (OCI)~~	**Not to be addressed, part of Sentinel 3**
Aerosol Profiling Lidar (APL)	**Based on EarthCARE**
~~Differential Absorption Lidar (DIA)~~	**Not retained, not yet demonstrated in orbit**

Table 1 Candidate Missions and Study Approach

The Nadir viewing UV/VIS/NIR - SWIR Sounding (UVNS) mission, in line with the assumption that GMES Sentinel 5 will be implemented as a payload in Post-EPS, will be studied at the level of payload accommodation only, the payload itself being analysed and defined in the frame of the GMES Sentinel 4/5 Phase 0 study.

The Doppler Wind Lidar (DWL) mission, due to its specific nature requiring an implementation on dedicated platform(s) flying in a lower orbit, will be assessed at system and programmatic level only, the relevant definition (technical and programmatic) being available from the ADM follow-on study.

An Aerosol Profiling Lidar (APL) is currently flown on the CALIPSO spacecraft and another one will be part of EarthCARE by 2013. Considering that the APL payload technical definition is available from EarthCARE, the APL mission will be studied at system and programmatic level only. A combined DWL/APL mission will be explored at system and programmatic level on the basis of the current requirements and definition of the ADM and EarthCARE payloads. This will include an assessment of the impacts on the ADM follow-on concept of including the APL mission.

A similar approach is foreseen for the Microwave Imaging (MWI) - Ocean and Land – mission as concerns the 1.4 GHz channel which is being implemented for the SMOS mission and most likely needs to be implemented on a dedicated spacecraft.

The Dual View Radiometry (DVR), Radar Altimetry (ALT) and Ocean Colour Imaging (OCI) missions will not be considered in the context of the Phase 0 study as they will be implemented in the frame of GMES Sentinel 3.

The Differential Absorption Lidar (DIA), the Limb Infra-Red (LIR) and Millimetre-Wave (MMW) sounding missions will not be considered as they will not reach a demonstrated maturity status for operational implementation in Post-EPS. DIA was presented twice as Earth Explorer core mission and finally was not selected. The limb sounding missions are not considered in the frame of Sentinel 5 on the same ground.

3 PLANNING

The following main planning elements are assumed for the preparation of the Post-EPS Programme:

Phase 0:	2004-2008, on-going
Phase A:	2009-2010, planned
Phase B:	2011-2012, planned
Phase C/D:	2013-2018
Need date:	2018, for the first in-orbit elements for priority missions.
Phase E:	Operations and Utilisation: 15 years after commissioning of the first in-orbit elements.

4 CONCLUSIONS

CGMS is invited to take note of the progress of preparation of the Post-EPS Programme at EUMETSAT.