

## **EPS PROGRAMME AND DEVELOPMENT STATUS**

This document presents the status of the EPS programme as of end of August 1999.

## **EPS PROGRAMME AND DEVELOPMENT STATUS**

### **1 PROGRAMME SCOPE AND COOPERATIONS**

The EUMETSAT Polar System (EPS) is the European contribution to the Initial Joint Polar System (IJPS) established with NOAA, and the first European contribution to the follow-up Joint Polar System (JPS) expected to be formed with the US “Converged” NPOES system. The IJPS and JPS will provide global meteorological and climate data from a series of European and American sun-synchronous polar orbiting satellites, replacing the current NOAA K-L-M series.

EPS is an end-to-end system dedicated to the acquisition, processing and dissemination of observational data from the morning orbit. It provides also capabilities for cross-support and data exchange with the NOAA POES system which covers the afternoon orbit service. The EPS system is composed of a space segment, based on three successive METOP satellites, and a ground segment. The application component of the ground segment that will generate a variety of level-2 products, is based on the combination of central facilities and a distributed network of satellite applications facilities developed and hosted by several EUMETSAT Member States.

The first METOP satellite (METOP-1) is being developed in the framework of the METOP-1 Programme of the European Space Agency (ESA), in co-operation with EUMETSAT. The development and procurement of the three METOP satellites is under the responsibility of a joint ESA-EUMETSAT Single Space Segment Team. In addition, EUMETSAT is directly responsible for the delivery of the MHS, IASI, ARGOS-DCS, SEM, AMSU-A, HIRS-4 and AVHRR-3 payloads. MHS is directly procured from industry, while the IASI advanced infrared sounder and ARGOS-DCS are procured through Centre National d’Etudes Spatiales (CNES). The other instruments are contributed by NOAA, under the IJPS co-operation agreement, which covers also the establishment and operation of the Initial Joint Polar System and provision of MHS instruments to be flown on NOAA N and N’.

The EUMETSAT EPS Programme is the legal framework for the development and implementation of the EPS system. Its financial envelope covers contributions to the development of the METOP-1 satellite and the IASI-1 instrument, co-funded by ESA and CNES, respectively. It also covers other major procurements including those of the MHS sounders to be flown on the NOAA-N/N’ and METOP satellites, two recurring METOP satellites and IASI instruments, three launch services and the EPS Ground Segment. Last but not least, it covers operation of the EPS system over 14 years.

EUMETSAT has established cooperations with ESA, for the development and procurement of the three METOP satellites, with NOAA, for the exchange of instruments, data and operation cross-support, and with the CNES, for the provision of IASI and ARGOS-DCS payloads.

## **2 PROGRAMME STATUS**

The ESA METOP-1 Programme and the EUMETSAT EPS Programme, which form the basis for the development and implementation and operations of the EPS System as part of the IJPS, were approved in 1998 and 1999, respectively. The METOP-1 industrial activities started in 1998 under an Authorisation to Proceed jointly released by ESA and EUMETSAT.

The full start of the EPS activities was authorised on 7 September 1998, in anticipation of the full approval of the EPS Programme, finally confirmed at the 42<sup>nd</sup> meeting of the EUMETSAT Council on 22 June 1999. The legal basis for the implementation of the EPS Programme being consolidated, EUMETSAT and NOAA signed the IJPS Agreement on 16 November 1998 and the related Programme Implementation Plan on 8 July 1999. The 42<sup>nd</sup> meeting of the EUMETSAT Council also agreed that the GOME-2 ozone monitoring instrument, already approved for flight on METOP-1 and METOP-2, would be flown on METOP-3 as well. Discussion is underway with NOAA on the provision of AVHRR-3, AMSU-A and SEM payloads for METOP-3, as this is not explicitly covered in the signed IJPS Agreement.

Co-operation with ESA and CNES is underway on the basis of agreed draft co-operation agreements that EUMETSAT, ESA and CNES are expected to formally sign by the end of 1999. The METOP contract is also expected to be signed in this time frame. The IASI development contract was approved by EUMETSAT and signed by CNES and the prime contractor.

## **3 EPS DEVELOPMENT STATUS**

### **3.1 Space Segment**

The METOP satellite is a 4.5-ton class satellite carrying a payload of about 900 kg. Its orbit is sun-synchronous with an inclination of 98.7 ° and an Equator local crossing time at 09.30 hrs. It communicates with ground in S, L and X bands, for command and control, local dissemination and global acquisition.

The satellite design is based on the heritage of the SPOT-5 and ENVISAT programmes. The payload consists of a suite of 10 instruments, including a visible and IR imager (AVHRR-3), microwave (MHS, AMSU-A and GRAS), IR (HIRS and IASI) and UV (GOME-2) sounders, a C-band dual swath scatterometer (ASCAT), data collection (ARGOS) and S&R transponders and the Space Environment Monitor. The satellite is also equipped with a solid state recorder (SSR) enabling to dump all payload data at full resolution, including AVHRR-3 data.

The development of the METOP satellite started in early 1998 based on an Authorisation to Proceed (ATP) released to industry. The satellite PDR held in May-June 1999 confirmed the soundness of the satellite design of the satellite. The development is proceeding further on that basis, with the PDRs for the GOME-2 and GRAS instruments

scheduled in the second half of 1999. The satellite Critical Design Review (CDR) is planned in March 2001.

The IASI instrument, developed by CNES, passed successfully its Preliminary Design Review, leading to the approval of a phase C/D Contract in June 1998. Subcontractors have then been selected for all subsystems, based on open competition. All these subsystems have now successfully passed their Preliminary Design Reviews (PDR), except the built-in imager. The PDR of the imager is scheduled in September 1999. The instrument design and configuration has been consolidated as a result of the subsystem PDRs, leading to an improvement of the estimated performances in some parts of the spectral range.

After successful interface test with the NOAA N satellite, the MHS Engineering Model was shipped back to Europe. In June 1999, the first two flight models of the instrument, to be flown on NOAA N and METOP-1, successfully passed their Acceptance Review. Their ownership was transferred to EUMETSAT. The ultimate tests have confirmed that the radiometric performances are above specifications.

### **3.2 Ground Segment**

The Ground Segment requirement consolidation phase initiated in early 1998 has produced a reference architecture and breakdown of the EPS Overall Ground Segment (OGS). The OGS is composed of the Core Ground Segment (CGS), which performs the acquisition, control, pre-processing and dissemination functions, and additional facilities, including the U-MARF multi-mission archiving facility, the network of Satellite Applications Facilities (SAFs) and external support facilities, e.g. for external calibration/validation. Based on a procurement approach agreed in 1998, the CGS will be procured as an end-to-end system from a Prime Contractor leading a European industrial consortium.

The CGS technical documentation, including the CGS Requirements Document, external Interface Requirements Documents and Product Generation Specifications were drafted and made available on the web in June 1999. It was submitted in parallel to an external CGS Requirements Review, which concluded that, subject to satisfactory closure of agreed actions, the technical requirements could serve as a basis for the CGS Invitation to Tender. After closure of all actions, the CGS Requirements Document was consolidated and approved in July 1999, in parallel to the elaboration of the Statement of Work and other contractual and interface documents. The ITT was released in the third week of August, with a deadline for bids set to 6 January 2000. After evaluation, a Contract Proposal will be submitted for approval to the EUMETSAT Council. The objective is to kick off the contract in the first half of 2000.

### **3.3 System**

In 1999, system activities focused on the close out of all actions from the System Requirements Review, which were found indispensable to derive Ground Segment Requirements, and on the consolidation of all space segment information required to support the procurement of the ground segment. A dedicated review was organised to

assess the system and ground segment implications of a GRAS near-real time data service. After the release of the Invitation to Tender (ITT) for the EPS Core Ground Segment, the EPS system team has concentrated on the preparation of the delta-SRR planned in early 2000 and on the planning of critical system activities, in particular those related to processing algorithms and prototyping.