

CGMS XXIX EUM-WP-03
Prepared by EUMETSAT
Agenda Item: C.1
Discussed in Plenary

EPS PROGRAMME AND DEVELOPMENT STATUS

This document presents the status of the EPS programme as of end of August 2001.

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” NPOESS 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 Meteorological Operational (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, AVHRR/3, HIRS/4, AMSU-A and SEM 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 IJPS 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 Co-operation Agreements 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.

Within EPS, all Cooperation agreements and relevant management implementation documents have been agreed and signed off with the concerned Organisations, namely ESA, NOAA and CNES.

Further to the revision of the EPS schedule (nominal launch date in July 2005), several iterations with NOAA were conducted in order to analyse the impacts of the new situation. NOAA plans to launch NOAA-M in March 2002. With an expected lifetime of NOAA-M of 45 months and respective launches of NOAA-M and Metop-1 in March 2002 and July 2005, there would be no (or little) gap in the morning orbit service.

Contracts were signed in December 2000 with Starsem for Metop launch services and with Alcatel for the EPS Core Ground Segment. Both kick-off meetings took place in January 2001.

3 EPS DEVELOPMENT STATUS

3.1 System

Following the successful completion of the System Requirements Review, the main emphasis is put towards the preparation of the System Wrap up Preliminary Design Review (PDR) planned in fall 2001. This includes the finalisation of the architecture of the EPS system, the generation of the requirements for the remaining facilities and services of the system, and the refinement of the performance budgets.

The two parallel studies on GRAS Precise Orbit determination (POD) were completed and confirmed the capability to process the GRAS data in near real time.

A Flight Dynamics study provided the optimised Metop orbit information and all necessary inputs to define the Metop orbit maintenance approach. The refined satellite fuel budget shows ample margins with respect to the operational lifetime of Metop. The study also allowed to optimise the Soyuz injection orbit.

3.2 Space Segment

The Metop satellite is a 4.3-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 (direct broadcast) dissemination and global acquisition.

The Metop-1 industrial activities started in 1998 and have been proceeding normally since then. EUMETSAT and the Single Space Segment Team (SSST) have formally introduced the revised schedules of the Customer Furnished Instruments to Metop Industry and are negotiating a related contract change.

The MetOp Structural Model programme (SM) was concluded in May 2001. However, further actions are needed to confirm the mechanical compatibility of the AVHRR instrument. This includes ongoing characterisation tests of the AVHRR instruments by NOAA/NASA. Should the AVHRR need to be structurally modified, the Metop schedule would need to be reconsidered. The Engineering Model (EM) testing is well advanced and on schedule with expected completion at the end of August 2001. Protoflight activities are due to start awaiting completion of EM testing.

The Metop Satellite Critical design Review (CDR) will start in September 2001.

Due to the advanced and complex technologies used in the IASI instrument some technical problems have been encountered on the IASI development, leading to a delay in the delivery of the instruments to Metop. The overall schedule was re-worked leading to a delivery end of April 2003. Most of the technical problems encountered at instrument subsystem level are now being resolved by CNES and Industry, enabling the IASI instrument CDR to be held in the fourth quarter of 2001.

The MHS FM4 instrument successfully completed its Acceptance Review in February 2001, and is now in storage awaiting delivery to Metop. The PFM instrument is fully integrated on the NOAA-N spacecraft. The FM2 instrument on the NOAA-N' spacecraft is expected to be fully integrated by mid September 2001. Activities on the MHS FM5 instrument are progressing nominally, with instrument delivery still scheduled for May 2003.

3.3 Ground Segment

The EPS Overall Ground Segment (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.

The CGS is procured as an end-to-end system from a Prime Contractor (Alcatel Space Industries) leading a European industrial consortium. The CGS contract was kicked off in January 2001. The current CGS design phase will be concluded with the formal Preliminary Design Review (PDR) close out planned in September 2001.

The Critical Design Review for Command and Data Acquisition (CDA) Polar Site infrastructure (at Svalbard) has been completed. The CGS contractor anticipates to be utilising the site from May 1st 2002 for installation of the CDA antennas and related equipment. Considering that the NPOESS Programme will also use the Svalbard site,

activities are coordinated with the NPOESS team whenever appropriate to establish optimum synergism.

The requirements on the Launch and Early Orbit Phase (LEOP) and Telemetry, Tracking and Command (TTC) network service, on the Back-Up Control Center site infrastructure are being finalised.