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EPS PROGRAMME STATUS

This document presents the status of the EPS programme as of end of March 2004.

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 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, 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, CNES and NOAA. In June 2003, EUMETSAT and NOAA signed off the Joint Transition Activities (JTA) Agreement, which extends the cooperation to the Metop-3 satellite and the NPOESS timeframe.

The launch period of the first Metop satellite has been set to October-December 2005. With an expected 45-month lifetime of NOAA-M, launched in June 2002, and a launch of the first Metop satellite in 2005, there should be no (or little) gap in the morning orbit service.

All major Contracts for the Space Segment, the Launcher and the Ground Segment were signed and respective developments are well underway. The Launch and Early Orbit Phase (LEOP) service Contract was kicked off in December 2002.

3 EPS DEVELOPMENT STATUS

3.1 System

The second part of the EPS System Critical Design Review (CDR-2) was concluded in March 2004. It was declared successful with no major remaining design or interfaces issues but with however a challenging schedule. Good progress was achieved in the planning and definition of the Integration, Verification and Validation (IV&V) activities. All Calibration and Validation plans could be released except the GRAS Validation Plan that is planned to be released in Summer 2004.

The first Satellite System Validation Tests (SSVT) was held successfully in December 2003. It involved the Metop Satellite Service module and the Monitoring and Control System and allowed the verification of the data flows between them.

The LEOP procurement is progressing well and the LEOP CDR could be closed satisfactorily in February 2004. The activities at LEOP level are now focused on the preparation of the LEOP control system and the preparation of the tests i.e. Radio-Frequency compatibility tests and LEOP-related SSVTs.

The in-house development prototypes for ATOVS and IASI are at the stage of validation and optimisation/correction of identified non-conformances. For ASCAT and GOME-2, the Ground Prototype Processors (GPP) are available. The GRAS Ground Prototype Processor (GPP) has been completed and final delivery is expected in April / May 2004.

The Planning and coordination of the RF interfaces testing is progressing well, even if during the winter period, no further tests at Svalbard could be organised. Good progress is achieved on the preparation of the LEOP TT&C network RF compatibility testing (April 2004) and of

the NOAA G/S compatibility for S-Band and X-Band (April/May 2004). A second series of RF compatibility tests with the Svalbard CDA stations is planned for summer 2004, using the facilities after their acceptance to fully characterise the Metop Space-to-Ground link, including the margins.

The main focus of Operations Preparation activities continues to be the generation of procedures for the operation of the Metop Satellite. After the SSVT-1 test limited to Metop Service Module (SVM) operations, the main effort is currently the preparation for the operations of Payload Module (PLM) and Instruments and corresponding SSVTs.

3.2 Space Segment

During the last period significant progress has been made on both the Metop-1 satellite and Metop-2 module activities.

For the Metop-1 satellite, following the successful completion of the Electromagnetic Testing, the satellite was then transferred to Intespace where it has successfully completed the full mechanical qualification campaign, with acoustic, sine vibration and launch adapter release shock tests being undertaken. In all cases full qualification levels were sustained, consistent with both Soyuz and Ariane 5 launch vehicles. The compatibility between the structural capabilities of both the AVHRR and HIRS instruments and the Metop launch environment has been a concern for some time. The Metop-1 mechanical tests were completed without the need to implement any specific notching for these instruments. Consequently, all the NOAA instruments are now considered to be compatible with the Metop launch environment.

On Metop-2, the Service Module (SVM-2) has completed all module level functional and reference testing, and preparation for the module Thermal Vacuum Testing at Intespace are well advanced.

For the Payload Module (PLM-2) activities have been focussed on the Thermal Vacuum testing which was successfully completed in February. The major new element for this test was the presence of a full flight representative IASI instrument, which required the implementation of a very complex test jig, with cryogenic panel and gas cell/black body targets, to facilitate full instrument testing and performance evaluation. Throughout the test both the instrument and the jig operated faultlessly with both thermal and radiometric performances of the IASI instruments meeting all expectations.

For what concerns the MHS instrument, an anomaly was reported during NOAA-N spacecraft functional testing in November 2003, regarding the signal level on channel H2 of the PFM instrument. Tests confirmed that the problem was within the H2 front-end. EUMETSAT treats the resolution of this anomaly with top priority and the repaired unit is planned to be delivered in May to NOAA.
Following delivery of the IASI PFM, the instrument was successfully integrated on the Metop-2 PLM and has completed all functional, EMC and thermal vacuum testing performed on the PLM without problem. The IASI Qualification Review was held in November / December 2003. No show stopper has been identified. However, as expected, the instrument cannot be declared fully qualified at this point as the IASI PFM with its detectors is not fully flight representative. Consequently, instrument qualification will be achieved using the FM2

with new detectors.

The GOME-2 instrument successfully passed its Qualification Review in October 2003. The GOME-203 instrument has completed all its testing and been delivered to Metop.
Progress on the ASCAT instruments has been nominal. EUMETSAT investigates the possibilities to locate the ASCAT ground calibration transponders in Turkey.
The GRAS instrument successfully passed its Qualification Review in March 2004.

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) leading a European industrial consortium. The CGS development plan consists now of 2 deliveries of the Core Ground Segment (CGS V1 and V2) to be delivered to EUMETSAT respectively in July 2004 for v1 and December 2004 for v2. The CGS v1 was designed to enable the Overall Ground Segment integration and System Verification activities to start as required by the overall EPS programme logic and associated schedule.

The V2-A version of the UMARF, scoped as a first delivery with reduced functionality for the purposes of EPS system integration, has taken place in January 2004; this delivery will now allow the integration activities to progress with the CGS V1 as soon as available on site at EUMETSAT.

The Calibration & Validation facility (Cal-Val) development proceeds on schedule after a successful PDR. The GTS/RMDCN service has also progressed from its design and implementation phase through its testing phase with the PAR foreseen by the end of March. The EUMETSAT central site continues in its preparation to be ready to accept the CGS and OGS elements, as they become available.

The Polar Site in Svalbard successfully entered into the service operations phase in September 2003.