CGMS-XXVII EUM-WP-02
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Agenda Item: B.2

STATUS OF THE METEOSAT SYSTEM

This document reports on the status of Meteosat satellites and services, including support to the INDOEX and MAP experiments.

STATUS OF THE METEOSAT SYSTEM

1 INTRODUCTION

This document provides a summary report on the operation of the Meteosat satellites since the last meeting of CGMS, together with details of EUMETSAT's support to the INDOEX and Mesoscale Alpine Programme (MAP) experiments. Detailed information about routine satellite operations are not included in this document since they are provided in the EUMETSAT Quarterly Operations Reports which are regularly distributed to all CGMS Members. Some more recent details are, however, provided.

EUMETSAT is currently operating three satellites, Meteosat-5, 6 and 7. At the time of writing, the 0° Service is provided by Meteosat-7, with Meteosat-6 as an in-orbit spare at around 9° West. Meteosat-5 is located over the Indian Ocean, and provides the 63° East Service (originally in support of the INDOEX experiment).

It will be recalled that the EUMETSAT Council has agreed that the operation of the current generation of Meteosat satellites will continue until at least the end of the year 2003, in order to allow time for many thousands of users to transfer to the Meteosat Second Generation (MSG) system, and to provide a "back-up" satellite throughout the transition from Meteosat to MSG.

Further details of Meteosat Operations can be found at the EUMETSAT Web site :
http://www.eumetsat.de

2 SERVICE PERFORMANCE

Tables showing the overall performance of Operational Services in the period March – July 1999 are shown in Attachment 1 and a table of more notable key Operations events in Attachment 2.

2.1 Image Interference

At CGMS XXVI, EUMETSAT reported the very occasional loss or corruption of certain HRI image formats by a few of its users. This problem, which is most likely caused by an external interference source, was investigated without any conclusive results. In the meantime, the users in question have informed EUMETSAT that the interference in question has all but disappeared.

However, since early June 1999, Image Acquisition of both Operational Services has been affected by an anomaly resulting in very occasional lost image lines. After intensive investigation, this anomaly was attributed to Radio Frequency (RF) interference occurring at the Primary Ground Station (PGS) in Fucino, Italy. An action plan to investigate this problem has been agreed with the PGS Contractor. The last reported occurrence of this interference was on 3 August 1999.

The current level of RF interference observed on the Meteosat-7 dissemination transponders is

very low, with very few High Resolution test format bit errors being reported by the User Station Display Facility in Darmstadt.

By the end of August 1999, a total of 2009 SDUS and 421 PDUS were registered with EUMETSAT.

2.2 Data Collection System (DCS)

At the end of August 1999, 27 Regional Channels and 9 International Channels were in regular use. A total of 1591 DCP were registered, of which around 641 are currently regularly reporting. The average monthly system performance remains very high at around 99 %.

Regional DCP channels R15 (Alert), R16 and R18 are currently affected by RF interference and, accordingly, no platforms are allocated on these channels. Details of the operation and performance of the IDCS can be found in document CGMS-XXVII-EUM-WP-07/08, which will be presented separately.

Because of higher priority satellite operations activities, a system to monitor the interference on International channels had not been implemented. It is foreseen that such a system will be implemented within the MSG Ground Segment.

At the time of reporting, 3 DCP users are receiving their data directly via the Mission Data Reception System (MDRS) via ftp data transfer.

2.3 Meteorological Data Distribution (MDD)

During the reporting period, MDD dissemination from the up-link sites at Bracknell, Rome and Toulouse has remained generally stable. Bracknell has continued to disseminate a free-running schedule of graphical products (general forecast and aviation) and including some input from ACMAD and African Drought Monitoring Centres. Bracknell channel occupancy is about 75%.

Rome continuously broadcasts a wide selection of alphanumeric data, transmitted as soon as possible after receipt via its RTH together with some GRID data. GRIB bulletins from ECMWF are also relayed in this broadcast. The current average loading of the Rome up-link is about 58%.

The Toulouse up-link provides a free-running schedule of graphical and alphanumeric products. Currently the loading of the Toulouse up-link channel is about 82%.

By the end of August 1999, there were 106 registered MDD data users located in 74 countries.

3 SATELLITE STATUS

3.1 Meteosat-5

Meteosat-5, located at 63°E over the Indian Ocean, provides the 63° East Service. Originally this Service supported the INDOEX experiment, the field phase of which ran from January to May 1999.

The orbital inclination of the satellite is no longer controlled, and by the end of December

1999 it will have reached 3.3°. Following an internal study to evaluate the effect of continuing to provide an operational service from a spacecraft with such a high inclination orbit, it was agreed that the satellite would continue to provide the 63° East Operational Service until the end of 2001, when the inclination will have reached approximately 5°.

The spacecraft configuration status has remained stable since the failure of a Power Amplifier in July 1998.

3.2 Meteosat-6

Meteosat-6, located around 9°W, has remained the standby spacecraft for the 0° Operational Service throughout the reporting period. In addition to nominal standby spacecraft operations, the spacecraft has supported the testing and validation of the ground segment modifications implemented to support rapid scanning. The spacecraft configuration status remains stable.

3.3 Meteosat-7

Meteosat-7 continues to provide the full 0° Operational Service. No new spacecraft anomalies have been detected in the last six months, however the performance of the on-board batteries has been the subject of analysis as a lower than nominal battery capacity was observed after the Spring battery reconditioning and eclipse cycle. This observation has been confirmed by the battery reconditioning recently performed prior to the Autumn eclipse.

Operationally, the impact of this is, that for most eclipses, Meteosat-7 has to be configured such that DCP messages are not received for the duration of the eclipse (approx. 70 minutes). For this time, it is possible to configure the ground segment to receive DCP messages using Meteosat-6. This operational sequence was tested during the Spring eclipse, and will be used again during the 1999 Autumn eclipse season.

The spacecraft configuration status remains stable.

4 GROUND SEGMENT

4.1 Meteorological Archive and Retrieval Facility (MARF)

Following the successful integration of the new archive management system within the MARF, needed to ensure Year 2000 compliance, the task of migrating the old Sony optical disk-based archive to the new Digital Linear Tape (DLT) archive medium is underway. This migration began in March and is anticipated to be completed by the end of September 1999.

In parallel with the archive migration, the transcription of historic data is continuing. It was noted that when transcribing data from the early to mid 1980s was attempted, a significant number (10%) of tapes were found to be unreadable. This problem has been found to be exacerbated when attempting to transcribe older archive data, where 15-20% of the tapes were found to be unreadable. As a consequence of this, the procurement of a tape recovery service has been initiated, which is planned to start recovering data from unreadable tapes early in 2000. By the beginning of August 1999 the number of image and product files transcribed was around 70% of the total.

Additionally, investigations have been carried out to improve the performance of the off-line rectification component of the MARF. Testing of a significantly more powerful workstation concluded that replacement of the two existing workstations with a more powerful multi-processor model will bring significant improvement in performance.

4.2 Meteorological Product Extraction Facility (MPEF)

The manual quality control for all MPEF products was discontinued on 7 September 1998, made possible by the continuous improvement in automatic quality control procedures. Since all MPEF products are now produced, quality controlled and distributed in a fully automated way, system capacity can be exploited to the full and the frequency of product distribution can be increased. Typical examples are the new operational wind products, which are now distributed 16 times a day. Operators in the Control Centre now handle MPEF operations alongside the operation of the remainder of the System. Reporting schemes for the new automated operations mode have been developed and are continuously being enhanced to ensure a rapid reaction to problems with product quality, calibration, distribution, etc.

On July 1 1999, a minor upgrade to the wind algorithms was performed, introducing a multi-channel spatial consistency and also modifying the cloud-base height reassignment parameters for low-level clouds to give more realistic height adjustments in subtropical areas with no strong low-level inversions.

Also on July 1 1999 routine 1.5 hourly distribution of the prototyped High Resolution WV Winds product started to UKMO and ECMWF for initial validation. Also validation of the 80km Clear Sky Radiance Product, distributed routinely since January 1999, continued at ECMWF. It is expected that these two new products will be declared as operational in the near future.

4.3 MPEF Reprocessing

The reprocessing of Meteosat-5 data from 1996 was completed in August 1999 and the complete set of Meteosat Surface Albedo products delivered to JRC/ISPRA for initial validation. After completion of this initial validation it is planned to release the product to a set of beta-testers, with the aim of providing the product as a fully operational product available from the MARF.

Also within the context of the reprocessing, the implementation of an off-line geometrical accuracy assessment scheme was completed. The scheme includes a geometrical shift correction, which gives significant improvements in geometrical quality for the historical image data.

Preparation for the reprocessing of wind products from Meteosat-2 are ongoing, and it is expected that this be completed by mid 2000.

5 YEAR 2000 PREPARATIONS

For EUMETSAT's operational systems, activities have continued with the Year 2000 testing phase, involving the ground segment as well as service providers and the user community. This phase is scheduled to be completed by September 1999 with a Final Review in November 1999.

Full details of EUMETSAT testing for Year 2000 compliance are presented in document CGMS-XXVII-EUM-WP 16, which will be presented separately.

6 SUPPORT TO THE MESOSCALE ALPINE PROGRAMME (MAP)

The Mesoscale Alpine Programme (MAP) is an international project conceived to coordinate and integrate top quality basic research on mountain meteorology with direct practical applications for numerical weather prediction. The programme aims at improving knowledge of precipitation mechanisms and three-dimensional circulation patterns in the Alpine region of southern Europe. Such knowledge is considered applicable to other major mountain ranges around the world. MAP is currently in a 13 months field phase, which includes a shorter intensive Special Observing Period during August - November 1999.

EUMETSAT has agreed to support MAP by using its in-orbit stand-by satellite, Meteosat-6, to perform special limited scans (six times per half hour) of the Alpine region during the Special Observation Period. When intensive convective activities are present, these scans will provide the MAP science team with additional satellite observations.

In preparation for MAP support, testing of Meteosat-6 rapid scanning operations has continued over recent months. The operational validation of the latest version of the Imaging Processing System (IPS), which includes modifications needed to enable rapid scan image data to be processed, has been completed. The operational validation of the latest version of the IPS off-line rectification system, which supports the retrieval and rectification of archived rapid scan image data, is ongoing. Validation of the rapid scan system procedure has been completed.

7 USER SERVICE

The EUMETSAT User Service provides the primary interface with the users. From 2000, the future U-MARF User Interface will be consolidated within the overall framework of the EUMETSAT User Service.

The preparation of a wealth of material describing the future satellite systems has continued over the last twelve months and much of this information, either in the form of user documentation, or topic based Web pages, is now freely available from the EUMETSAT Web site (**http://www.eumetsat.de)**. A key objective of this activity is to ease the transition of many thousands of users from the current Meteosat system to the future MSG and EPS systems.

The User Service is also responsible for the execution of User Training activities agreed by the EUMETSAT Council. The main focus of attention for much of the training is now turning towards the preparation of meteorological services for use of the new satellite data and the consequential development of new data applications (further details of EUMETSAT training activities are provided in document CGMS-XXVII-EUM-WP-10).

Additionally, over the last six months there has been a significant increase in the number of EUMETSAT Web pages providing users with details of many aspects of day to day satellite operations, such as INDOEX, MAP and the Solar Eclipse.

The number of enquiries from users over the last twelve months has steadily risen, with use of the Web pages expanding dramatically in the same period.

Attachment 1

SATELLITE SERVICE PERFOMANCE

Performance figures are expressed in percentages.

0° Service Performance

	Mar	Apr	May	Jun	Jul
Image Acquisition	99.13	99.57	99.26	99.58	99.40
Dissemination Wfx	99.75	99.74	100.00	99.75	99.92
Dissemination HR	99.42	99.39	99.79	99.42	99.86
FSDR	99.87	100.00	100.00	100.00	100.00
DCP	99.26	99.50	99.86	99.82	99.78
MPEF distribution	94.87	96.08	98.97	99.70	99.97

63° Service Performance

	Mar	Apr	May	Jun	Jul
Image Acquisition	99.06	99.79	99.46	99.58	99.40
Dissemination HR	99.53	99.25	99.65	99.53	99.53
MPEF distribution	99.72	96.96	99.40	99.52	99.89

Attachment 2

SUMMARY OF KEY OPERATIONS EVENTS

The main events in the period March - August were:

Date		Event
1999 Mar	01	Meteosat-5 Sun - Satellite - Antenna collinearity finished.
	02	Meteosat-6 configured for one day rapid scan tests.
	03	Meteosat-7 attitude manoeuvre.
	08	Meteosat-6 configured for one day rapid scan tests.
	11	DCP Mission moved to Meteosat-6 during eclipse due to Meteosat-7 eclipse configuration.
	15	Meteosat-6 configured for one day rapid scan tests.
	23	Meteosat-7 east-west station-keeping manoeuvre.
	30,31	Meteosat-6 configured for one day rapid scan tests.
1999 Apr	08	Meteosat-5 east-west station-keeping manoeuvre.
	09	Meteosat-6 configured for two-day rapid scan tests.
	16	Meteosat-6 configured for one-day rapid scan tests.
1999 May	03,10,17	Meteosat-6 Power Amplifier 1 (PA1) imaging mode, one-day rapid scans.
	19	Meteosat-6 Y2K test - reconfiguration for imaging.
	19	Meteosat-5 Y2K test - dissemination.
	26	Meteosat-5 Y2K test - control in Validation Core Facility.
1999 Jun	02	Meteosat-6 attitude manoeuvre.
	12	Meteosat-6 rapid scanning for pre-MAP testing.
	15	Meteosat-6 east-west station-keeping manoeuvre.
	16	Meteosat-6 solar eclipse scan preparation - configuration to imaging.
	18	Meteosat-6 solar eclipse scan preparation.
1999 Jul	06	Meteosat-5 A1 Hard Limiter off for missing lines investigation
	06	Meteosat-7 East-West station keeping manoeuvre.
	07	Meteosat-7 Y2K test - MST Ranging.
	07	Meteosat-5 A1 Hard Limiter off for missing lines investigation.
	12	Meteosat-7 Y2K test - MST Ranging.
	20	Meteosat-5 East-West station keeping manoeuvre.
	23	Meteosat-6 configured for rapid scans
	28	Meteosat-6 configured for rapid scans.
1999 Aug	06	Meteosat-6 configured for imaging. Solar eclipse rehearsal.
	11	Meteosat-6 lunar eclipse
	11	Meteosat-6 configured for imaging. Solar eclipse.
	11	Meteosat-7 lunar eclipse.