CGMS-XXXI EUM-WP-02

Prepared by EUMETSAT
Agenda Item: B.2
Discussed in Plenary

STATUS OF THE METEOSAT SYSTEM

This document reports on the status of the Meteosat satellite system (including Meteosat Second Generation) and related Services.

CGMS Members are invited to take note.

STATUS OF THE METEOSAT SYSTEM

1 INTRODUCTION

This document provides a summary of more recent operations of the Meteosat satellites together with details of EUMETSAT's support to Indian Ocean Data Coverage. Very 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. Hence, only a summary of events and items of interest occurring in recent months are presented in this document.

EUMETSAT is currently operating four satellites, Meteosat Second Generation (Meteosat-8), Meteosat-7, 6 and 5. At the time of writing (September 2003), the 0° Service is provided by Meteosat-7, with Meteosat-6 as an in-orbit spare, supporting the Rapid Scan Service, at around 10° East. Meteosat-5 is located over the Indian Ocean at 63°E and provides the Indian Ocean Data Coverage (IODC) Service. Meteosat-8, currently located at 10.5° W, being close to completion of commissioning, is expected to commence routine operations in January 2004, when it will be relocated to 3.3°W.

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

2 SYSTEM STATUS

This paper summarises the status of Meteosat operations in the period March – August 2003. The main events occurring in that period were:

17 - Mar	Meteosat-5 E-W Station-keeping manoeuvre.
30	Meteosat-5 Spring Eclipse Season Ends.
03 - Apr	Meteosat-6 Rectification change to 10° E.
05	Meteosat-6 E-W Station-keeping manoeuvre.
07	Meteosat-6 Spring Eclipse Season Ends.
11	Meteosat-7 Spring Eclipse Season Ends.
01 - May	Meteosat-6 and Meteosat-7 Moon Eclipse.
20	Meteosat-7 Inclination and Spin-up manoeuvre.
26	Meteosat-5 E-W Station-keeping manoeuvre.
31	Meteosat-5 Moon Eclipse.
02 - Jun	Meteosat-5 Attitude manoeuvre.
03	Meteosat-6 E-W Station-keeping manoeuvre.
03	Control Centre Relocation completed.
02 – Jul	Meteosat-5 Spin-up manoeuvre.
08	Meteosat-7 E-W Station-keeping manoeuvre.
20	Meteosat-5, 6 & 7 Battery Reconditioning Starts.
27	Meteosat-5, 6 & 7 Battery Reconditioning Ends.
28	Meteosat-6 E-W Station-keeping manoeuvre.
11	Meteosat-5 E-W Station-keeping manoeuvre.

12 – Aug Meteosat-5 Start of Autumn Eclipse Season
22 Meteosat-6 Start of Autumn Eclipse Season
31 Meteosat 7 Start of Autumn Eclipse Season

3 SERVICE PERFORMANCE

The following tables show the overall performance of the operational services in the period Mar 2003 – Aug 2003. The figures are extracted from the Operations Monthly and Quarterly Reports. All the performance figures are expressed in percentages.

0° Service Performance

	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03
Image Acquisition	97.76	98.72	98.31	98.82	99.26	98.52
Dissemination (Wfx+HR)	98.04	99.60	99.48	99.55	99.83	99.48
FSDR	99.20	100.00	100.00	100.00	100.00	
DCP	91.50	95.20	95.60	94.80	N/A*	N/A*
MPEF distribution	97.52	98.89	98.26	98.01	96.29	97.36

* statistics not available due to S/W H/W problems

63° Service Performance

	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03
Image Acquisition	97.63	99.44	98.38	99.51	99.26	98.68
Dissemination (HR)	98.37	99.51	99.06	99.47	99.60	98.56
MPEF distribution	96.65	99.16	97.85	98.52	93.00	96.94

Rapid Scanning Service Performance

	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03
Image Acquisition	76.87	99.40	99.33	97.66	99.92	91.22

March's low performance on all missions – in particular rapid scanning - was due to communication link problems resulting in missing lines and image losses (see section 0).

4 RF Interference

The current level of RF interference observed on the dissemination transponders is very low, with very few High Resolution test format bit errors being reported by the User Station Display Facility in Darmstadt.

For the DCP channels, interference was observed on Regional channels R10, R13, R16, R17, R18 and R25 (see also EUM-WP-08).

5 Archive and Retrieval Service

5.1 MARF Availability

	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03
Ingestion Availability	100.00	100.00	100.00	100.00	100.00	100.00
Product Availability	96.41	99.32	98.13	98.10	99.37	95.97
Retrieval Availability	98.79	99.31	99.33	100.00	100.00	100.00

5.2 MARF Transcription Status

These figures (percentages) represent images that have been transcribed:

	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03
Image files transcribed	94.32	94.32	94.32	94.32	94.77	95.49

Note: Due to software upgrades the transcription was put on hold for several months and was resumed again in July. The transcription status of products has reached 100% already in 2001. The monthly figures will therefore be omitted in this and future reports.

5.3 MARF Customer Enquiries

These figures are actual numbers of customers and numbers of image prints:

	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03
External Customers	24	28	12	17	18	31
Internal Customers	9	4	9	37	26	17
Image Prints	52	45	55	19	71	53

6 User Helpdesk

6.1 User Enquiries

These figures are the actual number of enquiries:

	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03

Member state enquiries	199	230	248	216	211	183
Non-member state enquiries	48	53	49	52	46	64

7 SYSTEM STATUS

7.1 Space Segment

7.1.1 Meteosat-5

Meteosat-5 has been used in support of the Indian Ocean Data Coverage service since the formal start of EUMETSAT support to the INDOEX experiment on 1 July 1998. No DCP or MDD services have been provided via Meteosat-5.

The Spring eclipse season for Meteosat-5 started on the 10th of February and finished on the 30th of March. There was a moon eclipse on the 31st of May. Routine East-West station keeping manoeuvres were performed on the 17th of March, on the 26th of May and on the 29th of July. An attitude manoeuvre was performed on the 2nd of June. A spin-up manoeuvre was performed on the 2nd of July.

There were no gain changes performed during this reporting period. Gain settings remain at: IR1 Gain 5, WV2 Gain 8, VIS1 & 2 Gain 5.

The orbital inclination of the satellite at the end of this reporting period was 6.01° and increasing. The remaining hydrazine fuel on board is estimated to be 4.95 kg, of which a 4kg reserve will be required to de-orbit the spacecraft at the end of its useful life. The on-board fuel reserve limit of Meteosat-5 will be re-evaluated towards the end of 2004.

Orbit			**Attitude**	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
6.0060	63.2654	0.0256	336.9840	83.8270

Meteosat-5 Orbital Parameters for 31st July 2003

The spacecraft configuration status has remained stable since the failure of Power Amplifier 3 in July 1998.

7.1.2 Meteosat-6

Meteosat-6 has been used in support of Rapid Scanning Service, since the formal start on the 18th of September 2001 (see Attachment 2 for further details).

The spring eclipse season for Meteosat-6 started on the 19th of February and finished on the 7th of April. There was a moon eclipse on the 1st of May. Routine East-West station keeping manoeuvres were performed on the 10th of February, on the 5th of April, on the 3rd of June and on the 28th of July.

There was a gain change performed on 21st of January. The new gain settings are:
IR1 Gain 5, WV2 Gain 6, VIS1 & 2 Gain 5.

The inclination of the satellite at the end of this reporting period was 3.08° and increasing. The remaining hydrazine fuel on board is estimated to be 7.00 kg, of which a 4kg reserve will be required to de-orbit the spacecraft at the end of its useful life. The on-board fuel reserve limit of Meteosat-6 will be re-assessed during 2005.

Orbit			**Attitude**	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
3.0838	9.7450	0.0360	347.7520	87.2130

Meteosat-6 Orbital Parameters for 31st July 2003

The spacecraft configuration status remains stable.

7.1.3 Meteosat-7

Meteosat-7 has been used to provide the nominal 0° operational service.

Black body calibrations are performed once per day on slot 24 outside eclipse season. Up to 4 black body calibrations are performed during eclipse season.

The spring eclipse season for Meteosat-7 started on the 25th of February, and finished on the 11th of April. There was a moon eclipse on the 1st of May. The routine reception of DCP messages was transferred to Meteosat-6 during Meteosat-7 eclipses when Power Amplifier 2 was de-configured. This was due to the depth of the eclipse and the available battery capacity.

The Meteosat-7 batteries have been recording low battery voltages in the middle of the autumn 2002 eclipse period. The voltages were approaching the threshold of 18 Volts. As a preventive measure Meteosat-7 was de-configured with only the essential loads and the radiometer left on during the 10 longest eclipses in spring.

Routine East-West station-keeping manoeuvres were performed on the 25th of February and on the 8th of July. An inclination and spin-up manoeuvre was performed on the 20th of May. An attitude manoeuvre was performed on the 18th of February.

There were gain changes performed on 14th of January. The new gain settings are:
IR2 Gain 8, WV1 Gain 11, VIS1 & 2 Gain 6.

The inclination of the satellite at the end of this reporting period was 0.29° and decreasing. The remaining hydrazine fuel on board is estimated to be 9.60 kg, of which a 4kg reserve will be needed to re-orbit the spacecraft at the end of its useful life. It is estimated that the fuel available is enough to allow nominal orbit and attitude control until the year 2005.

Orbit			**Attitude**	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
0.2889	0.3085	-0.0226	229.9650	89.8370

Meteosat-7 Orbital Parameters for 31st July 2003

The spacecraft configuration status remains stable.

7.1.4 Meteosat-8 (MSG-1)

MSG-1 Commissioning

The following activities will be completed during the commissioning phase to determine the functionality and performance of the MSG System (including satellite) after launch, to verify the MSG-1 satellite and system requirements, to determine the calibration factors and operating parameters, to tune algorithms for image and meteorological product processing, to validate the end user requirements and to prepare the system for routine operations, currently expected to commence in January 2004.

The actual commissioning of MSG-1 is being performed in two separate phases as follows:

Phase A (completed) comprised Spinning Enhanced Visible and Infrared Imager (SEVIRI) switch on, instrument check-out and imaging with Image Quality Ground Support Equipment (IQGSE) (see note below for difference between IQGSE and IMPF rectified images), performance monitoring (of SEVIRI & IQGSE), preparations and dry runs for Phase B commissioning tests (Imaging & Calibration).

Phase B (started 30 June 2003) comprises IMPF functionality and performance, performance monitoring (of SEVIRI, & Image Processing Facility (IMPF), short and long-term), comparison of IMPF and IQGSE Level 1.5 Images, IMPF - Flight Dynamics Interaction Test, mini scan and alternative High Resolution Visible (HRV) repeat cycle, Calibration/Validation of Level 1.5 (rectified) images from the IMPF.

Commissioning Schedule since November 2002:

28 November 2002 - first SEVIRI image taking
12 December 2002 - first GERB image taking
January 2003 - further SEVIRI instrument tests conducted and more image datasets acquired to allow for the determination of the Image Rectification system parameters
February 2003 - following the successful rectification of SEVIRI images the first set of images (1 Slot, all 12 spectral channels) have been made available on the web site in native, BSQ, JPEG, and HRIT formats.
30 April 2003 - trial dissemination of level 1.5 images based on IQGSE (rectified images) using alternative DVB broadcast methods
14 May 2003 - full HRIT dissemination via EUMETCast (every repeat cycle)
End June 2003 - end of commissioning phase A.
30 June 2003 - start of commissioning phase B (Core Imaging Tests and Image, Calibration & Product Validation Tests)
07 July 2003 - LRIT SEVIRI dissemination every 30 mins
14 July 2003 - Addition of Meteorological Data Dissemination (MDD)
29 July 2003 - Addition of Foreign Satellite Data (FSD)
11 – 17 August 2003 - MSG-1 Decontamination

01 October - Addition of DCP retransmissions
21 October - Introduction of Meteorological Products (initial product set)
03 November - Addition of Indian Ocean Data Coverage (IODCS) data
November - EUMETCast C-band dissemination trial over Africa
End 2003 - routine dissemination of the core meteorological products (AMV, CLA, CSR, CDS, TH and CAL)

Notes
Satellite Inclination at end of Launch and Early Orbit Phase (LEOP) (early September 2002) was 1.9°. At the time of writing (end September 2003) the satellite inclination was 1.18° and decreasing.

The commissioning of MSG-1 is performed with the spacecraft located at 10.5°W+/- 0.4°. The major impact on commissioning is the behaviour of IQGSE and IMPF. The IQGSE is being used as an intermediate image rectification facility until the final version of the Image Processing Facility (IMPF) becomes available for operational use with MSG images.

The IQGSE rectified images have slight differences from the IMPF rectified images, in particular, some header fields are not to be populated and the availability figure is likely to be lower, since the IQGSE was not designed to operate continuously. The level 1.5 images were initially rectified to the sub-satellite point, around 10.5° West (commissioning longitude) and later moved to 0° after the start of the dissemination trial. IMPF and IQGSE images have a slight offset between their centres of image. No masking was applied to level 1.5 image supplied by the IQGSE (e.g. solid earth) initially, but was implemented after the start of the dissemination trial.

As a result of the failure of an onboard solid state power amplifier, which meant that there could be no direct broadcast from MSG-1 of HRIT and LRIT Services to users, the dissemination of MSG-1 imagery to European "trial" users via EUMETCast started on 30 April 2003, using the Hotbird 6 satellite as carrier (Ku.band), with data being uplinked from Usingen Ground Station. For more information please see section 7.1.5 below.

On Wednesday 14 May, at 09:00Z, dissemination of the repeat cycles was increased to four per hour. Dissemination will continue but some interruptions can be expected from time to time during the commissioning phase.

7.1.5 EUMETCast Dissemination

As part of the preparations for routine operations of MSG-1 (to be renamed to Meteosat-8 for routine operations), a data dissemination trial using EUMETCast commenced on 30 April 2003. The trial will continue until the start of routine operations, with dissemination products being progressively added. Users who intend to utilise the data during routine operations are invited to participate in this trial. Details on EUMETCast can be found in Attachment 1 to this document.

Trial Schedule

The trial covers dissemination to users in EUMETSAT Member and Cooperating States and other users located within the footprint of the EUTELSAT HotBird 6 satellite. Further trials, covering reception in the African continent, will be initiated in November 2003. The addition of products to the EUMETCast broadcast is described in section 7.1.4 above.

During the early stages of the trial the proposed full encryption scheme (eToken decryption unit will be made available from EUMETSAT) will not be in operation. Trials using the full encryption mechanism are expected to begin in December 2003. All those users registered for the trial are being notified accordingly and the issue of EUMETSAT Key Units (EKU) to licensed users has commenced. Full encryption will be permanently activated from March 2004.

Users wishing to take part in the trial should first register with EUMETSAT. Full details can be found on the EUMETSAT Web page together with relevant technical documentation.

Starting 1 January 2004, users wishing to receive the data where access is controlled in accordance with EUMETSAT Data Policy, will need to have completed the EUMETSAT licensing procedure in order to ensure continued access to the data. For further information on licensing procedure and data policy issues, users should contact the EUMETSAT User Service.

8 Ground Segment

8.1 MTP

The availability of the MTP ground segment has mostly been nominal for the reporting period.

MTP Control Centre: Ongoing upgrade activities made several planned rapid-scanning service interruptions necessary. The relocation of the MTP Core Facility was completed with the swap of operations from the former MTP control room to the new control room in the first week of June. The swap was successful, and operations have since run without any significant problems.

Communication Links: The performance of the communication links to the MTP Primary Ground Station (PGS) in Fucino deteriorated on March 17. Although still performing within specification, the degradation of link performance had an impact on the availability of the primary service.

A major outage of all services occurred on March 20 due to problems with the communications system affecting both communication links to the PGS in Fucino. The duration of the outage was approximately 4 hours.

The status of the communication links to the Primary Ground Station in Fucino remained degraded until the transition to the new MTP control room in early June, but thereafter nominal status was restored and has remained so since that time. The degraded links in April and May impacted only marginally on performance targets.

Kourou Ground Station: Both the primary and the redundant Land-Based Transponders (LBTs) were out of action during the period 27 May to 5 June due to a combination of problems, but have been stable since then.

MDD: A second uplink station has been installed and activated in Toulouse at the end of June 2003. This is to take over uplink operations from the Bracknell station in early August, and the latter will then be dismantled.

Primary & Backup Ground Stations: Routine weekly activations of the Backup Ground Station (BGS) in Cheia Romania and the Backup Satellite Control Centre (BSCC) in Fucino continue. The BGS in Cheia also continues to routinely support the monthly ranging campaigns for Meteosat-6.

8.2 MARF

Since the last Status Report, the MARF has continued to operate under stable conditions. The transcription of X-ADC data is on-going, with a planned completion date of December 2003.

The amount of data requested by users has slightly increased, in part due to the new Large Order data policy. We have to date received 33 Large Orders, with requests ranging from a few months to 10 years.

The Archive Direct service has been expanded from 4 to 7 days of rolling archive data.

8.3 MPEF

As of 3 June 2003 a **new pixel based Scenes and Cloud Analysis** (known as SCART) was put in operation. The new algorithm is based extensively on the equivalent MSG method, and uses a series of threshold tests to classify the individual pixels. The new algorithm gives an improvement in the cloud detection and classification, and facilitates a more direct comparison with MSG products during the MSG MPEF Product Validation Tests. More details of SCART can be found at the following URL:
http://www.eumetsat.de/en/dps/mpef/scart.html

Since 1200Z on 1 July, **the speed and direction of the wind components used for calculating the final wind vectors are now also being written into the BUFR encoded wind data**. This was in response to a suggestion of the Operations Working Group, and makes the MTP wind data more comparable to the MSG wind products (AMV) which already have the component information included.

The **Meteosat-5** processing chain has been modified such that **the radiative transfer model runs every hour**. This allows the processing to take account of the variation of the sub-satellite position of the spacecraft, due to the increased inclination of its orbit. Analysis by ECMWF has shown a marked improvement in the clear sky radiances since the introduction of this change.

The derivation of meteorological products from Meteosat-6 Rapid Scan data has been operational since July 2002. The service is performed on a best effort basis and is dependent on the availability of the Rapid Scan data. The availability of the following; Atmospheric Motion Vectors, Clear Sky Radiances and the Climate Data was on average over 96 % in the first quarter of 2003. Further information including availability of the products can be found on the EUMETSAT Web-pages.

During 2003 there has been **major modifications on both system and algorithm level to the Reprocessing MPEF**. These changes were necessary to allow the derivation of Meteosat Surface Albedo (MSA) from Meteosat-5 at 63° East, as requested by the Belgian Meteorological Service. Meteosat-7 MSA for 2001 is already available and year 2000 will be available in autumn. Also MSA for Meteosat-5 at 63° E, year 2001, is expected to be finished before the end of this year.

The **extraction of Atmospheric Motion Vectors and Clear Sky Radiances in support of ECMWF's ERA-40 Reprocessing** has been extended to also provide products from Meteosat-3. The first months of images from this spacecraft have lower quality, and the period October-88 to December-88 cannot be reprocessed at all, as rectified images cannot be delivered by the MARF. Reprocessing of Meteosat-3 1989 is presently on hold due to maintenance activities, but will resume in the autumn.

9 Operations Central Backup System

9.1 Background

The Operations Central Backup System (OCBS) project was established in order to set up a central backup system for the MTP control-centre facilities. The aim is to back-up the development areas for the MPEF and MARF automatically, along with certain operational data areas for the latter and selected Communications-network (COMMS) data on a regular basis. In addition, on-demand backups at system level are also planned such that computers can easily be restored over the network in case of major disasters.

The proposed system includes a small server, an 80-Slot DLT tape library and the network-backup software. An extension to the current system is foreseen, to cover the MSG facilities.

9.2 Status

The OCBS network backbone has been tested, and the MPEF, the MARF and COMMS workstations have been connected to the OCBS. Regular automatic backups of the MPEF, the COMMS workstations and part of the MARF are now being made, and the remainder of the latter will be included in the near future.

The backup scheme incorporates daily incremental and weekly / fortnightly full backups to tape (the frequency of the full backups depending on the candidate system, or component thereof). These tapes are stored on-site in fire-safes at EUMETSAT, and on a monthly basis, a copy tape is transferred to an off-site location for added security.

It is foreseen to connect the MTP CF to the OCBS during the third quarter of 2003, and selected MSG facilities subsequent to that.

Attachment 1

EUMETCast

1 Introduction

EUMETSAT's Data Distribution System (EUMETCast) utilises the services of a satellite operator and telecommunications providers to distribute data files using Digital Video Broadcast (DVB). The current EUMETCast geographical coverage includes most of Europe, Africa, the Caribbean and the east coast of America.

2 Services available via EUMETCast

The following EUMETSAT services are available via the EUMETCast:

- Meteosat-8 (MSG-1) Dissemination Trial (to be followed by routine Meteosat-8 operational services)

- EUMETSAT ATOVS Retransmission Service (EARS)

- Rapid Scanning Service (RSS)

- DWDSAT, the replacement Fax-E service, a meteorological forecast information service for Europe (trials for this service have started with an operational service expected to commence in November 2003).

3 EUMETCast System Overview

Within the current EUMETCast configuration, the multicast system is based upon a client/server system developed by Tellique Kommunikationstechnik GmbH with the server side implemented at the EUMETCast uplink site (Usingen, Germany) and the client side installed on the individual EUMETCast reception stations.

The telecommunications suppliers (T-Systems AG and Telespazio S.p.A.), provide the DVB multicast distribution mechanism. Data/product files are transferred via a dedicated communications line from EUMETSAT to the uplink facility. These files are encoded and transmitted to a geostationary communications satellite for broadcast to user receiving stations. Each receiving station decodes the signal and recreates the data/products according to a defined directory and file name structure.

Figure 1 below shows how EUMETCast fits within the overall EUMETSAT Ground Segment architecture.

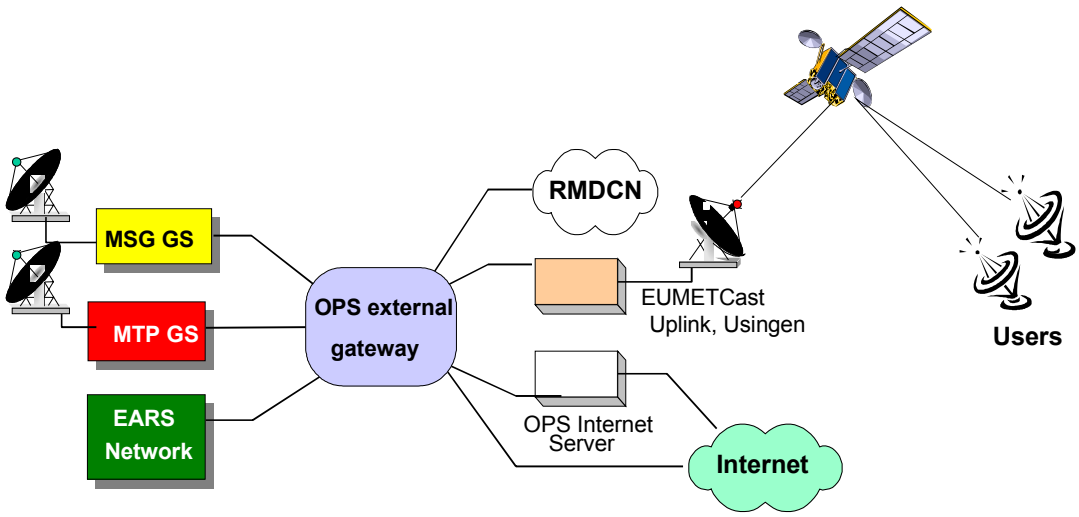

Figure 1 EUMETCast System Overview

A single reception station can receive any combination of the provided services. Data whose access is controlled in accordance with EUMETSAT Data Policy will be encrypted. Decryption at the user station will be performed by decryption hardware, the EUMETCast Key Unit (EKU).

The geographic coverage of a DVB is determined by the characteristics of the spacecraft and its associated antenna beams. In the current operational configuration, EUMETCast reception is available in:

- Ku-band (from November 2002)
- C-band (from August 2003)

4 EUMETCast Coverage in Ku-band

For coverage in Ku-band, the spacecraft selected by the telecommunications provider, T-Systems, is the HotBird series operated by EUTELSAT. This has excellent coverage of Europe and the surrounding area, as shown in Figure 2 below

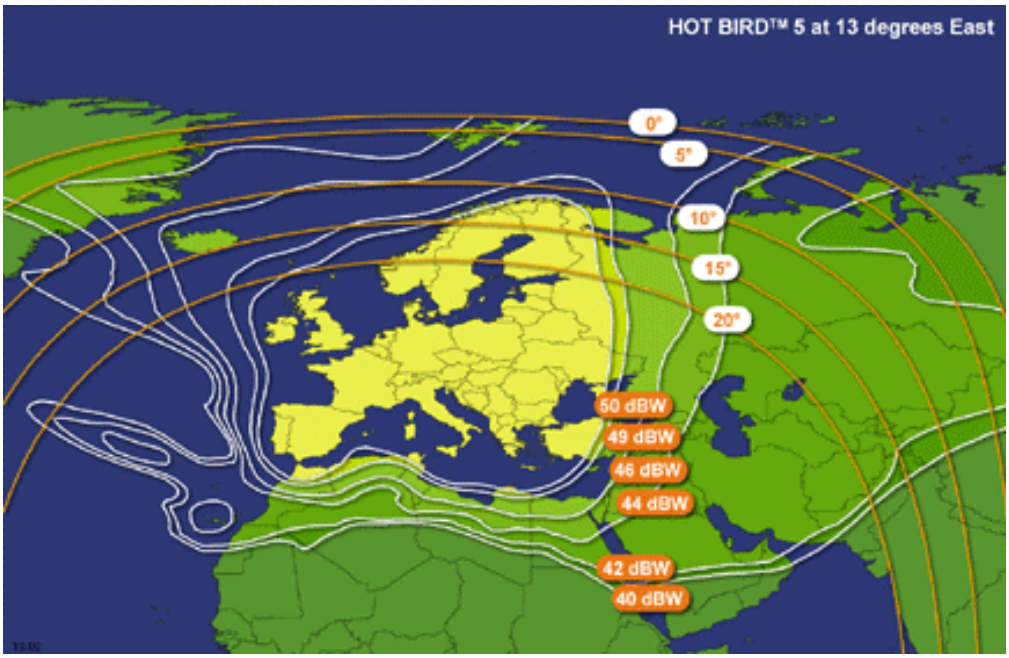

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Figure 2 Hotbird-5 Ku-band Coverage

5 EUMETCast Coverage in C-band

For coverage in C-band, the spacecraft selected by the telecommunications provider, Telespazio S.p.A., is the Atlantic Bird 3 also operated by EUTELSAT. The core coverage zone of the satellite is mainland Africa, see Figure 3 below.

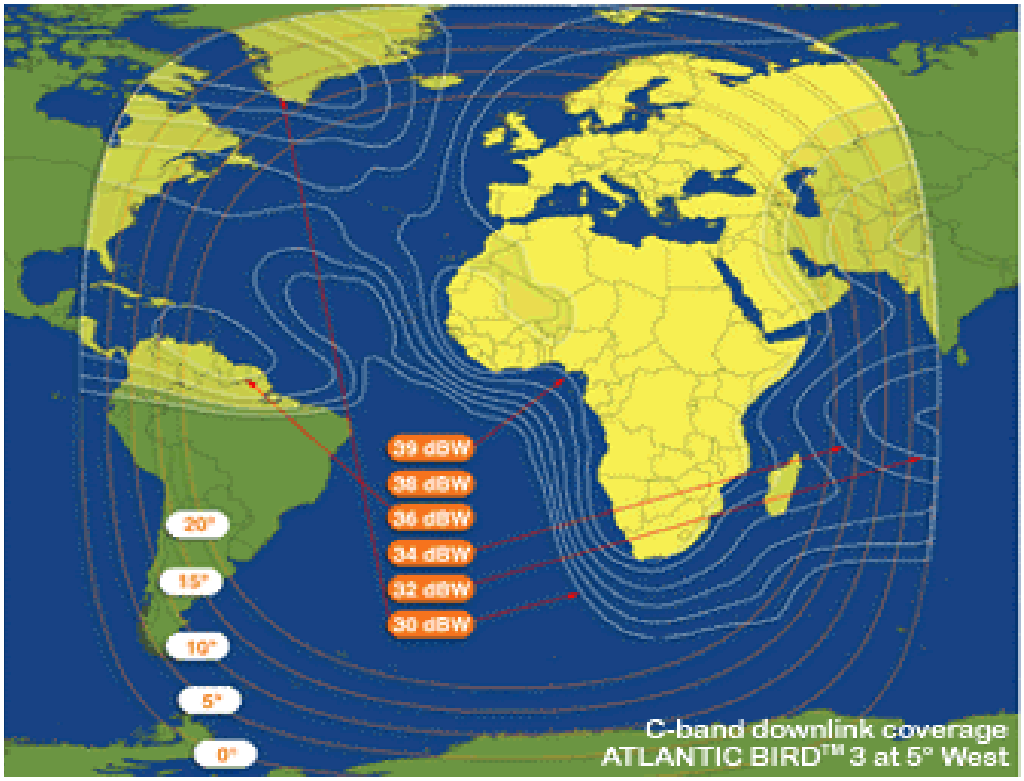

Figure 3 Atlantic Bird-3 C-band Coverage

Additional information on EUTELSAT's HotBird and Atlantic Bird satellites can be found on their web site at: http://www.eutelsat.com

6 Reception Station Requirements

A typical EUMETCast reception station comprises a standard PC with DVB card inserted and a satellite off-set antenna fitted with a digital universal V/H LNB. In addition, users require the multicast client software. As EUMETCast operates a tq®-TELLICAST server, the tq®-TELLICAST client software is mandatory and a licence is required for each user station. The tq®-TELLICAST client software is required for the handling of the incoming DVB and storing it as data files. All components of the reception station are commercially available. The tq®-TELLICAST client software and the EKU (required only for those users wishing to receive data whose access is controlled) are available directly from EUMETSAT.

For detailed information on reception station requirements and set-up procedure, please refer to the EUMETCast Technical Description, EUM TD 15, available from the EUMETSAT web site.

For further information on EUMETCast and the services available via the EUMETCast distribution system, please refer to the EUMETSAT web site or contact the EUMETSAT User Service:

EUMETSAT User Service
Am Kavalleriesand 31
64295 Darmstadt
Germany

Tel +49 6151 807 366
Fax +49 6151 807 379
E-mail: ops@eumetsat.de
Web: www.eumetsat.de

Attachment 2

The EUMETSAT Rapid Scanning Service

1 Introduction

Following the success of the rapid scanning support provided to the Mesoscale Alpine Programme (MAP), and in response to a more general demand from the user community for more frequent imagery, a new operational Rapid Scanning Service (RSS) was started on 18 September 2001 after an intensive test period of rapid scanning service trials which were started already in August 2000.

The RSS will continue to be provided as long as Meteosat-6 is the in-orbit spare spacecraft for the 0° Operational Service. Since the RSS also makes use of parts of the Meteosat ground segment normally used for either stand-by or testing purposes, the availability of the service could be affected if either the space or ground segment change.

2 The Operational Service

The baseline for the RSS is quasi-permanent rapid scan imaging with Meteosat-6. This means that rapid scanning is performed for a certain period and then interrupted for a short time before rapid scanning continues once more. The period between rapid scanning sessions is used to perform full Earth scanning, needed to derive navigation information for the image processing system. In addition, this period is used for spacecraft orbit determination rangings. However, should the equipment used to support the RSS be needed to support either the Meteosat 0º or 63ºE (IODC) Services, this will also lead to interruptions in the RSS. The latest rapid scanning schedule is available on the EUMETSAT Service News web page.

3 Service Interruptions

During the provision of the rapid scanning service, there will be scheduled periods during which the service will be unavoidably degraded. There may also be periods where the service is interrupted without notice. The reasons for this are presented below.

For real-time coordination aspects such as schedule announcements and schedule changes users should visit the EUMETSAT Rapid Scanning Service News web page. In addition, near-real time pull users will be notified via email in the event of service outages of 2 hours or more.

Rapid scanning will be interrupted as described above for full Earth scanning in order to maintain image navigation information. Rapid scanning will also be interrupted as described above for spacecraft orbit determination rangings. Manouevres and the associated post-manoeuvre orbit determiniation rangings will also necessitate a 72 hour interruption to rapid scanning. However, since manoeuvres will normally be timed to coincide with a standard orbit determination outage, the additional outage due to manoeuvres should be minimal. During the eclipse season (around spacecraft local midnight) there will be a break in rapid scanning of approximately 3 hours. During the implementation and validation of the MTP ground system ‘compression’ in support of the pre-deliveries and integration of the EPS CGS, several scheduled outages will occur.

There will also be some unscheduled Interruptions. These would be caused by problems with the ground segment associated with the provision of the rapid scanning service. Problems with the ground segment equipment associated with the provision of either the 0° or the IODC services. Occurrence of serious anomalies on Meteosat-5, 6, or 7, or invocation (by NOAA) of the NOAA/EUMETSAT back-up agreement.

4 Rapid Scanning Regions and Data Formats

Please note that since 4 April 2003 all rapid scan imagery is rectified to 10 degrees East! Previously imagery was rectified to 0 degrees. The Full Rapid Scan Region (FRS) scan area for the RSS covers a latitude range from approximately 10°N to 70°N, as shown in figure 1.

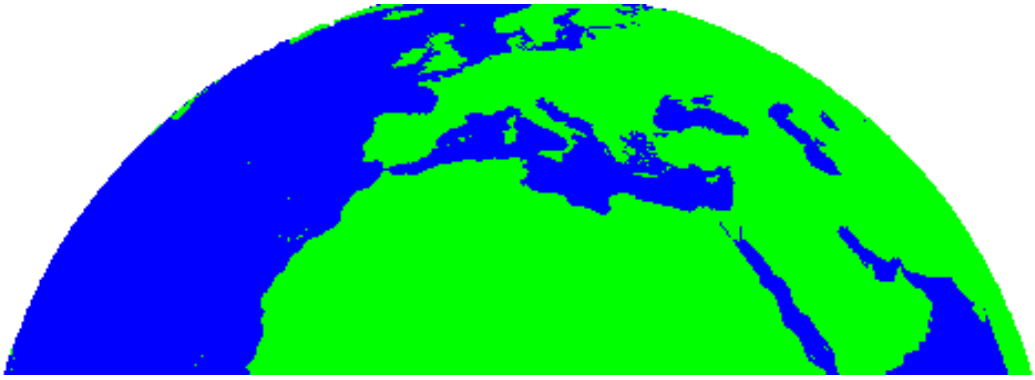

Figure 1 – The FRS region

The data for the FRS are available to the users in OpenMTP, GIF and JPEG formats and covers the following area (in Meteosat pixel co-ordinates):

For IR/WV format, first line 1586, number of lines 833
first pixel 1, number of pixels 2500

For VIS format, first line 3171, number of lines 1666
first pixel 1, number of pixels 5000

The description of the OpenMTP format is available from the EUMETSAT Web site.

A subset of the FRS region that covers the European sector (EUR), as shown in figure 2, is also made available to users.

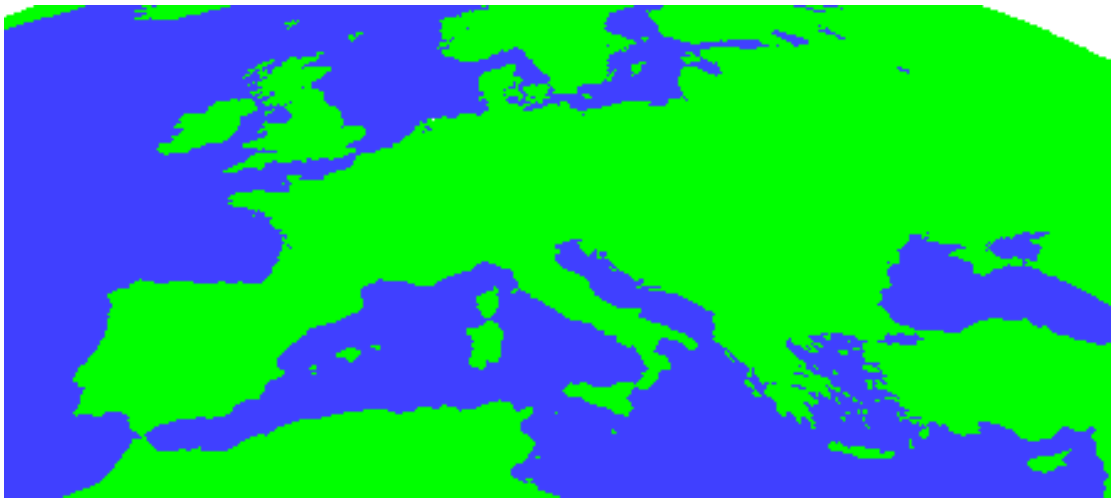

Figure 2 – The EUR region

The data for the EUR region is distributed to users in OpenMTP, GIF and JPEG formats and covers the following area (in Meteosat pixel co-ordinates):

For IR/WV format, first line 1996, number of lines 400
first pixel 761, number of pixels 900

For VIS format, first line 3991, number of lines 800
first pixel 1521, number of pixels 1800

5 Calibration of Meteosat-6 IR and WV Images

RSS calibration data for the Meteosat-6 IR and WV rapid scan images are supplied within the header records of the OpenMTP files. Previously, it had not been possible to calibrate Meteosat-6 IR and WV rapid scan images because of a radiometer anomaly that causes the brightness of these images to vary on a short timescale in an unpredictable manner. For the RSS the effects of the radiometer anomaly are removed from the Meteosat-6 IR and WV images using an algorithm based on a cross-calibration with Meteosat-7. The end result is that the Meteosat-6 IR and WV images are radiometrically stable and have a known calibration since 1 May 2001.

6 Meteorological Products

The Meteosat Product Extraction Facility (MPEF) has been modified to produce the following wind products from the Rapid Scan data:

Cloud Motion Winds (CMW);
High Resolution Visible Winds (HRV);
High Resolution Water Vapour Winds (HWW);
Clear Sky Water Vapour Winds (WVW).

These products are generated every half-hour using the rapid scan data acquired during the half-hour. The distribution of the products is performed via the GTS in the same way as for the

nominal 0° and IODC service products. Figure 3 shows the meteorological product and image dissemination timing for the RSS.

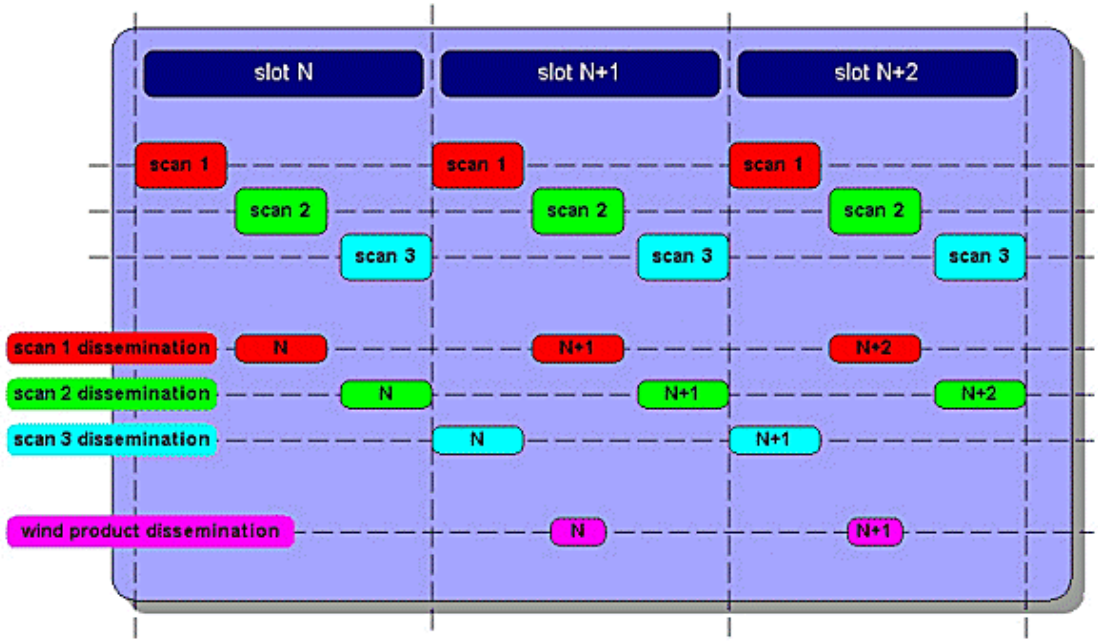

Figure 3 – Image Dissemination and Product Timing

7 Data Archiving

The EUMETSAT Archived Data Retrieval Service archives all rapid scan image data and derived products. As the archived products catalogue structure does not allow the rapid scan image data to be fully defined, the associated meta-data is made available to users separately. To order rapid scan data that is more than one week old (and hence no longer available via the EUMETSAT FTP server) please contact the EUMETSAT User Service.