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STATUS OF THE METEOSAT SYSTEM

This document reports on the status of the Meteosat satellite system 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. 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 more recent months are presented in this document.

EUMETSAT is currently operating three satellites, Meteosat-5, 6 and 7. At the time of writing (August 2001), the 0° Service is provided by Meteosat-7, with Meteosat-6 as an in-orbit spare at around 9.5° West. Meteosat-5 is located over the Indian Ocean at 63° East and provides the Indian Ocean Data Coverage (IODC) Service.

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

2 SYSTEM STATUS

The main events taking place in the period April 2001 – July 2001 were:

April	01, 09, 12	Meteosat-5, 6 and 7 Eclipse Season ends, respectively.
	03	Meteosat-5 East-West Station Keeping Manoeuvre.
May	08	Meteosat-5 East-West Station Keeping Manoeuvre.
	15	Meteosat-7 East-West Station Keeping Manoeuvre.
	23	Meteosat-5 Moon Eclipse.
June	06	Meteosat-5 Earth Model Calibration Change.
	21	Meteosat-6 Moon Eclipse Scanning Operation.
	26	Meteosat-7 Attitude Manoeuvre
July	02	Meteosat-5 IR & WV Gain Change
	20	Meteosat-5, 6 and 7 Moon eclipse

2 SERVICE PERFORMANCE

The following tables show the overall performance of the operational services in the period Feb- July 2001. All the performance figures are expressed in percentages.

2.1 0° Service Performance

	Apr	May	Jun	Jul
Image Acquisition	99.58%	99.46%	99.38%	99.60%
Dissemination (Wefax+HR)	99.31%	98.63%	98.78%	99.66%
FSDR	100%	100%	99.60%	100%
DCP	99.15%	99.77%	99.70%	99.81%
MPEF distribution	99.94%	98.75%	98.60%	99.41%

2.2 63° Service Performance

	Apr	May	Jun	Jul
Image Acquisition	99.65%	99.66%	99.51%	99.60%
Dissemination (HR)	99.25%	98.27%	97.44%	98.11%
MPEF distribution	99.93%	98.13%	99.57%	99.29%

2.3 RF Interference

The current level of RF interference observed on the dissemination transponders is 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 13, 14, 15, 16, 17 and 18 (see CGMS XXIX EUM-WP-07/08 for details).

3 ARCHIVE & RETRIEVAL AND USER SERVICE

3.1 MARF Availability

	Apr	**May**	**Jun**	**Jul**
Ingestion Availability	100%	100%	100%	100%
Product Availability	100%	99.78%	99.74%	99.61%
Retrieval Availability	99.40%	100%	100%	100%

3.2 MARF Transcription Status

These figures are the percentages of images and products that have been transcribed:

	Apr	**May**	**Jun**	**Jul**

Image files transcribed	76.30%	76.35%	76.50%	76.78%
Product files transcribed	98.00%	98.50%	99.00%	99.31%

3.3 MARF Customer Enquiries

	Apr	May	Jun	Jul
External Customers	8	36	21	23
Internal Customers	7	10	14	15
Image Prints	5	5	12	71

3.4 General User Enquiries

	Apr	May	Jun	Jul
Member state enquiries	102	140	88	95
Non-member state enquiries	33	57	54	71

4 SYSTEM STATUS

4.1 Space Segment

4.1.1 Meteosat-5

Meteosat-5 has been used to support the Indian Ocean Data Coverage (IODC) Service following EUMETSAT's support to the INDOEX experiment, which commenced in July 1998. No DCP or MDD services are provided via Meteosat-5.

The orbital inclination of the satellite at 1st August 2001 was 4.39° and increasing. The remaining hydrazine fuel on board is estimated to be 5.46 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. The spacecraft configuration status has remained stable since the failure of Power Amplifier 3 in July 1998.

Orbit			**Attitude**	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
4.39852°	63.2106°	-0.0241°	342.356°	85.705°

Meteosat-5 Orbital Parameters for 1st August 2001

4.1.2 Meteosat-6

Meteosat-6 has been used both as an in-orbit spare at around 9.5°W, to support Rapid Scan trials,

and to support validation of the re-engineered Meteosat-6 correction system (in addition to, or in place of, routine weekly imaging).

The inclination of the satellite at 1st August 2001 was 1.36° and increasing. The remaining hydrazine fuel on board is estimated to be 8.715 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. The on-board satellite configuration remains stable.

Orbit			Attitude	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
1.3660°	-8.8618°	-0.0095°	332.693°	88.837°

Meteosat-6 Orbital Parameters for 1st August 2001

4.1.3 Meteosat-7

During the reporting period, Meteosat-7 has been used to provide the nominal 0° Operational Service. Black body calibrations are performed once per day on slot 24.

The inclination of the satellite at 1st August 2001 was 0.29° and decreasing. The remaining hydrazine fuel on board is estimated to be 26.757 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. The spacecraft configuration status remains stable.

Orbit			Attitude	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
0.2911°	0.0193°	0.0144°	247.502°	89.803°

Meteosat-7 Orbital Parameters for 1st August 2001

4.2 Ground Segment

In general, the availability of all the ground segment facilities has been good during the reporting period and there have been no significant failures. The relocation of the MDD up-link station in Rome and the introduction of new frequency monitoring and control systems in this station caused some problems, which led to a lower performance in June. Additionally, the MDD up-link station in Toulouse experienced some network connectivity problems in June, which had a negative impact on the overall message transmission performance.

Routine operations within the Primary Ground Station in Fucino Italy, have typically included the weekly activation of the Back-up Ground Station in Cheia, Romania, and the weekly activation of the Back-up Spacecraft Control Centre in Fucino, Italy. All other operations, including the rapid scan support with Meteosat-6 and eclipses with Meteosat-5, 6 and 7 respectively, were carried out as

scheduled.

4.2.1 Meteorological Archive and Retrieval Facility (MARF)

No significant changes to the MARF have taken place during the period. In recent weeks the MARF has been supplying rectified image data from the early 1980's for the Reprocessing Project. It was decided to use this opportunity to also archive the rectified data, thereby contributing to the long-term target of having the complete data set archived in rectified as well as raw form.

Progress with the transcription of historic data has been somewhat slower than expected due to temporary staff shortage, however, the important milestone of the completion of the transcription of all MIEC (predecessor of MPEF) products has been achieved. In addition the overall total of image files transcribed has risen to 82% with by far the greatest number of outstanding files being those from the ADC service. After a negotiation with the staff at SSEC, Wisconsin, the tapes containing the so-called X-ADC data (Meteosat-3 at 75 degrees west) were shipped to EUMETSAT and will be transcribed in due course. Since these data did not feature in the catalogue inherited from ESOC they will be in addition to the 18 % outstanding files
mentioned above.

Additionally, the MARF continued to support the development of the Rapid Scan Service (RSS) although, as mentioned in CGMSXXIX EUM-WP-21, the MARF will no longer be the prime source of data for the near-real-time users in the operational phase of the service.

4.2.2 Meteorological Product Extraction Facility (MPEF)

On 31st May 2001 the calibration of the Meteosat-5 thermal channels was switched to cross-calibration with Meteosat-7. For every image cross calibration coefficients are determined by the Image Processing System from the overlap area between the satellites. The MPEF performs additional quality checks on cross-calibration coefficients, namely:

- Flagging of suspect cross-calibration coefficients
- Averaging of remaining cross-calibration coefficients.
- Updates twice daily.

The overall biases remain, but the WV bias is now stable.

On 5th June 2001 a first-guess independent quality control was implemented for the wind products. Users (e.g. International Winds Workshop) have requested quality control information independent of first guess data. The BUFR code allows multiple discreet quality control values to be sent. All wind products now have two sets of quality control, calculated with and without first guess data. The initial feedback from ECMWF has been positive, but extensive impact studies are only just starting. Also on this date a Clear Sky Radiances quality control scheme was implemented. Individual quality indices are calculated based on cloud cover and standard deviation of temperature and combined into an overall quality indicator.

Also in June 2001, the MPEF hardware was replaced by new HP workstations. The hardware update was required as part of the MTP ground segment compression to enable the use of the main control room for the EUMETSAT Polar System, and because of the non-maintainability of existing hardware. Data processing has, therefore, been concentrated onto fewer hosts with higher processing power and state-of-the-art software for redundancy switching.

5 PROJECTS

5.1 Meteosat-6 Cross-Calibration Project

5.1.1 Background

The Meteosat-6 radiometer anomaly causes the brightness of the IR and WV images from this spacecraft to vary in an unpredictable manner. The Meteosat-6 Anomaly Correction System (M6C) generates corrections for this anomaly. These corrections are derived by a set of 3 algorithms, each of which requires the presence cloud-free sea regions in the image in order to work. Experience with Meteosat-6 operations at 0 degrees has shown that these algorithms are able to correct for the anomaly with an acceptable level of accuracy. However, the possibility of operating Meteosat-6 at 63°E at a future date has been raised. Since a spacecraft at this location sees very few sea regions in the Northern Hemisphere, and since the sea regions in the Southern Hemisphere are relatively prone to cloud, the performance of the existing algorithms is expected to degrade if used to correct Meteosat-6 images taken from 63°E.

As a result, it has been decided to replace or supplement the existing algorithms with a new algorithm based on cross-calibrating Meteosat-6 images with data from the (anomaly-free) Meteosat-7 satellite located at 0 degrees. The new algorithm will also be used to calibrate Meteosat-5 images taken at 63°E.

Experience with Meteosat-5 operations at 63°E has shown that the calibration of the WV images is relatively inaccurate. The new anomaly correction system will therefore be configurable so that the new cross-calibration algorithm can be used to generate calibration data for Meteosat-5 rather than anomaly corrections for Meteosat-6.

The final stage of the project, involving an operational validation of the new Meteosat-6 correction algorithms, came to an end in March. Validation results look promising and no significant problems have been identified. Validation results are being summarised in a report, which will be issued soon.

5.2 Regional Meteorological Data Communications Network Project

5.2.1 Background

The European Centre for Medium-Range Weather Forecasts (ECMWF), in collaboration with the World Meteorological Organisation (WMO), have now completed the initial phase of the Regional Meteorological Data Communications Network (RMDCN. The RMDCN now replaces the leased line links between ECMWF and its Member States, and the GTS-related links serving GTS Regional Association VI members (Europe).

The planned network architecture has been discussed together with the connectivity to the Meteosat Ground Segment. The bandwidth is however compatible with the combined MTP and MSG requirements and the architecture is also compatible with the MSG architecture, apart from some minor modifications. Therefore an implementation for MSG is foreseen when the related Ground Segment schedule allows, and when the current Meteosat implementation is operational and mature RMDCN network procurement has been approved and ECMWF is being contacted to provide the installation and configuration of the RMDCN connectivity.

5.3 Rapid Scanning

Further details can be found in CGMS XXIX EUM-WP-21.

6 CONCLUSION

CGMS Members are invited to take note of the status of the Meteosat System.