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STATUS OF THE METEOSAT SYSTEM

This Working Paper reports on the more recent operations and changes affecting the system of Meteosat satellites. Information is provided by EUMETSAT to CGMS Members on a regular basis throughout the year via its Operations Quarterly Reports

CGMS Members are invited to take note.

STATUS OF THE METEOSAT SYSTEM

1 INTRODUCTION

This paper summarises the status of more recent Meteosat operations and related activities. Reports on the EARS and EUMETCast Services can be found in EUM-WPs-11 and 20, respectively.

2 OPERATIONS STATUS - OVERVIEW

The status of the Meteosat satellites is unchanged and the configurations of all spacecraft have remained stable, with Meteosat-5 located at 63°E over the Indian Ocean, Meteosat-6 located as standby at 10° E and Meteosat-7 located at 0°. Meteosat-8 (formerly MSG-1) is located at 3°W. Over recent months data acquisition and dissemination services have been running mainly above specification

3 SYSTEM STATUS

3.1 Space Segment

3.1.1 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 MDD service has been provided via Meteosat-5.

The DCP acquisition system on Meteosat-5 was activated in January 2005 to support a Tsunami warning system in the Indian Ocean region (see EUM-WP-07 for details).

Fuel Status at end of July 2005:

Estimated hydrazine fuel remaining: 4.39 kg. 3.9 kg of fuel are reserved for de-orbiting the satellite at end of life. The date for the expected end of life was reviewed earlier in 2005 after a more detailed analysis, and might be still subject to some minor changes, as we get closer to the period. The current estimate for end of life is in the 2nd quarter of 2007. The additional lifetime, compared to the previous estimates, originates from a more precise estimation of the expected actual thruster performance during the de-orbiting manoeuvres and a reviewed minimum target height for the final orbit.

Orbit			Attitude	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
7.6890	62.9700	0.0150	331.6680	82.0173

Meteosat-5 Orbital Parameters for 31 July 2005

The spacecraft configuration status has remained stable since the failure of Power Amplifier 3 in July 1998 and no significant spacecraft anomalies occurred on Meteosat-5 during this reporting period.

3.1.2 Meteosat-6

The satellite, launched on 20 November 1993, has been used in support of the Rapid Scanning Service, at 10°E, since the formal start of these operations on 18 September 2001. In addition, the satellite continued to act as the in-orbit backup satellite for the Meteosat-7 Operational Service.

Fuel Status at end of July 2005:

Estimated hydrazine fuel remaining: 6.17 kg. 4 kg of fuel are reserved for de-orbiting at end of life. Due to the limited amount of fuel left, manoeuvres to correct the orbit inclination can no longer be performed and, thus, the reception of direct dissemination from Meteosat-6 (if used) at certain latitudes will become less reliable. It is estimated that the available fuel will be sufficient to allow E-W station-keeping and attitude control until at least the end of 2007, assuming the continuation of the current role.

Orbit			**Attitude**	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
4.9150	9.2690	-0.0020	341.7649	84.7581

Meteosat-6 Orbital Parameters for 31 July 2005

The spacecraft configuration status remained stable and no significant spacecraft anomalies occurred during this reporting period.

3.1.3 Meteosat-7

The satellite was launched on 2 September 1997 and during the reporting period, Meteosat-7 has been used to provide the 0°- Longitude Operational Service, including DCP and MDD services.

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

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 eclipse period, when the voltages approach the threshold of 18 Volts. This is a well known problem and as a preventive measure the satellite was de-configured with only essential loads and the radiometer left on for most of the of the eclipse periods.

Fuel Status at end of July 2005:

Estimated hydrazine fuel remaining: 9.31 kg. 4 kg of fuel are reserved for de-orbiting at end of life. The last Meteosat-7 inclination manoeuvre was performed in May 2003. Without further inclination manoeuvres, the orbit inclination will reach 2 degrees in January 2006. It is estimated that the fuel available is enough to allow nominal longitude and attitude control well beyond 2008.

It is planned to relocate Meteosat-7 to 63° East, to take over the IODC service from Meteosat-5 during 2006.

Orbit	**Attitude**

Inclination	Longitude	E/W Drift	Right Ascension	Declination
1.6130	-0.1250	-0.0070	347.7696	87.9924

Meteosat-7 Orbital Parameters for 31 July 2005

The spacecraft configuration status remained stable and no significant spacecraft anomalies occurred this reporting period.

3.1.4 Meteosat-8

The MSG-1 satellite, launched on 28 August 2002, became Meteosat-8 once it started parallel operations with Meteosat-7, on 29 January 2004 at the position of 3.4°W.

Fuel Status at end of July 2005:

Estimated fuel remaining: 162.30 kg

Orbit			**Attitude**	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
0.8330	-3.5630	0.0010	282.0791	89.3962

Meteosat-8 Orbital Parameters for 31 July 2005

The spacecraft is operating very well and the configuration has remained stable since the failure of a Solid State Amplifier in October 2002.

GERB Detector Damage:

A GERB AutoSAFE mode occurred on 28 February 2005 at 1612 UTC. The GERB's mirror became stuck while in an unprotected position. GERB then viewed the sun during spacecraft rotation and this triggered the AutoSAFE mode. On return to normal mode, the response of 2 detector elements was found to be non-nominal, i.e. certain pixels had a flat response and others exhibited a changed gain. Thus, GERB operations were suspended from 28 February 2005 and resumed at the end of the sun avoidance season, on 23 April 2005.

Due to their location on the earth, the damaged detectors do not seem to seriously affect the scientific value of the GERB products.

3.2 MTP Ground Segment

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

All MDD stations have generally been operating nominally. Maintenance was performed during the reporting period and users were appropriately informed of any necessary downtime.

Primary & Backup Ground Stations: Routine weekly activation of the Backup Ground Station (BGS) in Cheia, Romania and the Backup Satellite Control Centre (BSCC) in Fucino, Italy continues. The routine half-yearly activation of the Backup Mission Control Centre (BMCC) in Fucino was performed in April. The BGS also continues to routinely support the monthly ranging campaigns for Meteosat-6.

Lannion FSDR: The Lannion uplink station continues to provide the service of uplinking foreign satellite data as expected in a stable manner.
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3.2.1 MTP Meteosat Product Extraction Facility (MPEF)

3.2.1.1 Changes

METEOSAT-7 and 5

There have been no significant operational changes.

The new Meteosat Precipitation Estimate (MPE) product has been operational since June 2005 and is presented in near-real time on the EUMETSAT WEB site. Dissemination via EUMETCast is under consideration.

METEOSAT 6: Rapid Scan Service (RSS)

No significant changes have been introduced.

3.2.1.2 Reprocessing

The reprocessing of the period between 1990 and 2000 is 80% complete for Meteosat-6, 50% for Meteosat-5 and 20% for Meteosat-4.

3.3 MSG Ground Segment

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

Major changes during the reporting period included:

- Connection of MSG to the RMDCN, replacing the GTS;

Major upgrades planned:

- Upgrade of the DADF to allow parallel LRIT dissemination from a single chain to EUMETCast and Direct Dissemination (the baseline when MSG-2 becomes operational).

Primary & Backup Ground Stations: Routine operations at the Primary Ground Station (PGS) in Usingen, Germany include the weekly activation of the Backup Satellite Control Centre (BSCC). TTC and Ranging alternate between the PGS and the Back-up & Ranging Ground Station (BRGS) in Maspalomas.

A scintillation effect has been observed at the BRGS in Maspalomas, which can affect the reception of telemetry and commanding of the spacecraft. This effect is predicted to decrease over the coming years and the level is now such that it does not currently affect spacecraft operations.

The SBGS located in Cheia is activated routinely to support MSG.
The MSG system was validated for dual spacecraft operations during 2005.

3.3.1 Unified Archive and Retrieval Service

The U-MARF has been in operation since the launch of Meteosat-8. Since February 2005 the data from METEOSAT 5, 6 & 7 are also ingested directly in the U-MARF. The U-MARF has continued to operate under stable conditions. Since the last reporting period, the amount of retrieval has greatly increased, the archive is now regularly retrieving well over 6TB per month.

The number of users has increased significantly since the introduction of the online ordering system. We currently have around 400 registered users.

The migration of data from the old archive (MARF) to the U-MARF started in November 2004, due the high demand on the retrieval system migration is running slightly slower than first expected. However, it is still estimated that all image data will have been migrated by the end of 2005.

3.3.2 MSG MPEF

On 27 April 2005 a change became operational which fixed a problem with the radiative transfer model. As a result the quality of the Upper Tropospheric Humidity (UTH), as part of the Tropospheric Humidity (THU) product, increased significantly.

The calibration monitoring was extended to compare results of vicarious calibration on radiosonde observations and on forecast data with the operational black body calibration. In the past only one or the other was possible. This allows a better monitoring of the stability of the calibration especially of the two water vapour channels.

The Clear Sky Reflectance Maps (CRM), which are used internally in the MSG MPEF, are since July operationally available in the UMARF. Dissemination of CRM products via EUMETCast started at the beginning of August 2005

The AMV BUFR product now includes winds derived from the HRVis channel (channel 12). An encoding threshold has been introduced, which effectively results in the AMV BUFR products to contain only winds with an overall quality better than 30 %. The observation times in the AMV BUFR product are set to 30 minutes past the whole hour for each AMV (it used to be 45 minutes past the whole hour). This better reflects the true time of AMV derivation.

The CTH and CLAI product format was changed to GRIB-2 in June 2005.

The distribution of the KI, KO and LI index form the new optimal estimation GII algorithm started on 19 July.

3.4 ATOVS Retransmission (see EARS Status Report, EUM-WP- 11)

3.5 EUMETCast (see Update on EUMETCast, EUM-WP- 20)

4 PROJECTS

4.1 Indian Ocean DCP Service Project – see EUM-WP –07.

The aim of this project is to establish a DCP Acquisition Service over the Indian Ocean region, and to disseminate the DCP messages as required by users in the region and elsewhere.

4.2 0° MET-7 Termination

Noting that the direct dissemination of first generation Meteosat services from 0º longitude are planned to cease on **14 June 2006**, this project sets out the activities to be performed in preparation for this event. The project activities include, preparation of new operational baseline configurations, terminating operational and maintenance contracts, updating user information and issuing timely notifications to the user community. It should be noted that any further 'significant' delay in the launch of MSG-2 may impact the schedule.

The following Services will be affected:

- WEFAX and High Resolution Image (HRI) (direct dissemination, Public Internet and FTP delivery)
- Meteorological Products delivered via GTS
- Retransmission of DCP messages to Data Collection Reception Stations
- Meteorological Data Dissemination (MDD) direct dissemination
- Foreign Satellite Data Relay - direct dissemination

Meteosat-7 transition to IODC:
Assuming successful commissioning of MSG-2 (Meteosat-9), Meteosat-7 will begin its relocation to 63° E by the end June 2006. The foreseen relocations of satellites is as follows: