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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. More detailed information is provided by EUMETSAT to CGMS Members on a regular basis via its half-yearly (from 2006) Operations Reports.

CGMS Members are invited to take note.

Status of the Meteosat System

1 INTRODUCTION

This CGMS working paper summarises the status of Meteosat and EARS operations over the last 6 months. CGMS members will recall that more detailed information is provided by EUMETSAT to CGMS Members on a regular basis via its half-yearly Operations Reports.

2 OPERATIONS STATUS-AN OVERVIEW

2.1 Overview – Meteosat 5, 6, 7, 8 and 9

The Meteosat-5 satellite was imaging in parallel with Meteosat-7 till 6 Feb 07 to allow a smooth transition of the IODC Service to Meteosat-7. Meteosat-5 also supported the acquisition of IODC DCPs until the end of the Spring 2007 eclipse season. After that the satellite was successfully re-orbited (see below section 2.1.3) before the end of April 07 as planned.

The configuration of Meteosat-6 was stable until 8 Jan 07 when the Rapid Scan Service (RSS), started on 18 September 2001, was terminated. On 23 Jan 07, Meteosat-6 started a drift manoeuvre towards its final orbital position at 67.5°East where it arrived on 26-27 April 07. Met-6 currently supports the acquisition and dissemination of IODC DCPs.

The configuration of Meteosat-7 was modified to resume imaging and Direct Dissemination after it reached the final orbital position at 57.5° East on 10 Oct 06. Met-7 is the prime satellite for IODC operational services since 5 Dec 07.

Meteosat-9 is currently the prime operational spacecraft for the services at 0°. The transition of the 0° services from Meteosat-8 to Meteosat-9 took place on 11 April 07 and Meteosat-8 parallel dissemination was terminated on 10 May 07 as planned. Meteosat-8 suffered a major anomaly on 22 May 07 as described below. Meteosat-8 is now used to prepare the Rapid Scanning Service.

2.2 Meteosat-8 to Meteosat-9 transition

The transition of the 0° services from Meteosat-8 to Meteosat-9 took place as follows:

- Metosat-8 remained prime operational satellite from 12 March 07 till 11 April 07, with Meteosat-9 providing parallel dissemination (EUMETCast Europe only).
- On 11 April 07 at 13:00 UTC Meteosat-9 took over all 0° services and Meteosat-8 continued parallel dissemination till 10 May 07 (EUMETCast Europe only). GERB and SAR services were also transferred from Meteosat-8 to Meteosat-9 before 10 May 07.

- On 10 May 07 at 10:00 UTC, Meteosat-8 parallel dissemination ((EUMETCast Europe only) was stopped.

The transition was performed with minimum impact on the 0° services.

2.3 Met-5 end-of-life operations

After several end-of-life tests performed on Met-5 that aimed at checking the status of a few pieces of equipment on board after so many years in orbit, the proper re-orbiting operations started on 16 April 2007 as planned.

In compliance with the space debris mitigation guidelines of the Inter-Agency Space Debris Coordination Committee (IADC) the objective was to raise the orbit of Met-5 at least 250 km above the geostationary ring and, at the same time, to reduce the satellite spin rate. The reduction of spin rate minimises the risk that satellite debris re-enter the geostationary ring should the satellite decompose itself in fragments in the very long term. For the re-orbiting operations a fuel budget of 3.9 kg was estimated based on a book keeping method. Seven manoeuvres followed by venting of the fuel pipes and tanks were performed from 16 April till 24 April 07 to achieve a final orbit of 500 km (perigee) x 540 km (apogee) above the geostationary ring together with a final spin rate of 45 rpm (starting from a spin rate of about 99.9 rpm). The actual fuel mass was found to be about 3.7 kg (i.e. about 200g difference between estimated and actual mass). The satellite deactivation was then completed on 26-4-07 when the last command to Meteosat-5 was sent at 08:05 UTC, marking the end-of-life of this satellite that has been operated for more than 16 years.

Thus, the Meteosat-5 re-orbiting operations were successful, the fuel budget was accurate and the IADC recommendations were fulfilled with some margin.

2.4 Meteosat-8 Unexpected Orbit Change on 22 May 2007

On Tuesday 22/5/07 at about 00:50 UTC, Meteosat-8 experienced an orbit change which was not the result of a commanded manoeuvre. Initially detected by the Image Processing Facility as a change of satellite state, this orbit change event included a decrease in spin rate, a change in attitude, some nutation, a temperature change on thrusters and fuel lines, and a small drop in solar array power.

An Incident Review Board was immediately established and after intensive investigations with the support of Industry and ESA/ESTEC, it seems that damage has been sustained in the area of one of the radial thruster pairs. The hypothesis that Meteosat-8 has suffered a collision with an object crossing the geostationary orbit, and/or lost some mass, remains the most likely one. Collision with either a micro-meteorite or a particle of space debris appears a possible cause of this damage. Less likely is loss of mass from the spacecraft, as no further spacecraft anomalies have been revealed by testing so far.

Since this event was detected several tests have been performed aimed at establishing the status of the Unified Propulsion Sub-system (UPS), the Thermal Control Sub-system (TCS), and the Electrical Power Sub-system (EPS). To help in the investigation, the Meteosat-8

imaging system has been used in both full earth and in rapid scan mode. The imaging system appears not to have been affected by the incident.

Investigations have revealed that the Unified Propulsion Sub-system, the Thermal Control Sub-system and to a lesser extent the Electrical Power Sub-system have been affected by this incident. In particular, the nominal radial thruster R1 used till now for the East-West station keeping manoeuvres seems damaged, while the redundant thruster R2 providing the same function is still functional as demonstrated by a test performed on 26 June 07.

On the Thermal Control side, the external surface of the satellite has been damaged and some internal parts of the satellite are now exposed both to cold space and sun illumination as the satellite spins. This has caused a new thermal equilibrium to be reached inside the satellite, an equilibrium that will change with the season and could be significantly modified during the eclipse crossing. For this reason a new thermal configuration is likely to be required to minimise the impact on the satellite and to allow safe operation during eclipse.

Our understanding of the impact of this incident on Meteosat-8 is still evolving. As the redundant branch of thrusters is functioning and as it appears that there is sufficient margin to develop a new thermal configuration, especially for the eclipse season, there should be no impact on Meteosat-8's ability to serve as the in-orbit backup satellite, and to provide the Rapid Scanning service. However, a level of redundancy has been lost which could have a longer-term impact on Meteosat-8's availability. Investigations are currently proceeding to identify a new thermal configuration, to optimise the usage of the Unified Propulsion sub-system and improve our understanding of the incident root cause.

3 SYSTEMS STATUS

3.1 Space Segment

3.1.1 Meteosat-5

The satellite, launched on 2 March 1991 and successfully re-orbited on 26-4-07, is no longer controlled by EUMETSAT (see above for details).

3.1.2 Meteosat-6

The satellite was launched on 20 November 1993.

Meteosat-6 was used in support of the MTP Rapid Scanning Service from 18 September 2001 till 8 January 07 when RSS was terminated. After termination of RSS service, the on board configuration was changed and the satellite moved to reach 67.5°E where it was successfully stopped on 27 April 2007. At 67.5°E Met-6 is now used for IODC DCP acquisition. It also provides an imaging backup function to Met-7. Typically once per week the satellite is used to acquire few images for proper maintenance of the scan mechanism on board.

At the end of July 2007 it is estimated that 4.55 kg of fuel are available. At least 3.9 kg of fuel are reserved for re-orbiting at end of life. Due to the limited amount of fuel left, orbit

inclination manoeuvres can no longer be performed. The available fuel should be sufficient to allow EW station keeping and attitude control until mid 2012.

Orbit			Attitude	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
6.71°	67.6°E	0.058 °/day	338.29°	83.61°

Meteosat-6 Orbital Parameters at end of July 2007

The spacecraft configuration status remained stable. No significant spacecraft anomalies occurred on Meteosat-6 during this reporting period.

3.1.3 Meteosat-7

The satellite was launched on 2 September 1997.

Met-7 is providing the 57°-Longitude Operational Service from 5 Dec 06.

At the end of July 2007 it is estimated that 8.35 kg of fuel are available. At least 3.9 kg of fuel are reserved for re-orbiting at end of life. Due to the limited amount of fuel left, orbit inclination manoeuvres can no longer be performed. It is estimated that the fuel currently available should allow nominal longitude and attitude control well beyond the year 2013.

Orbit			Attitude	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
3.46°	57.45°E	0.025°/day	346.76°	86.55°

Meteosat-7 Orbital Parameters at the end of July 07

3.1.4 Meteosat-8

The satellite was launched on 28 August 2002.

Meteosat-8 is located at 3.4°W and it is now the backup spacecraft for the 0° services. Met-8 is also used to prepare for RSS.

At the end of July 2007 it is estimated that 116.42 kg of fuel are available.

Orbit			Attitude	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
0.69º	3.45ºW	0.098º/day	288.20 º	89.34º

Meteosat-8 Orbital Parameters at the end of July 07

The spacecraft configuration status has been affected by several failures. In addition to the Solid State Power Amplifier (SSPA) C failure in Oct 2002 and the failure of the Remote Terminal Unit (RTU UP) in Jan 2003, in May 06 Met-8 experienced a failure of the Latch Current Limiter (LCL) 08 that powers the nominal side of the Unified Propulsion System (UPS). As a result of the above failures, the satellite cannot provide Direct Dissemination (neither HRIT nor LRIT) and it configured on the redundant side of the Attitude and Orbit Control Electronics (AOCE), on the redundant RTU UP and on the redundant UPS

electronics. Furthermore, on 22 May 07 a new anomaly was detected (Incident #27, see above section 2.1.4) and, after investigation, it appears that the nominal radial thrusther R1 is damaged and cannot be used any longer for the East-West station keeping and spin correction manoeuvres.

In the reporting period two additional anomalies have been found on the Met-8 satellite:

- SEVIRI Main Data Unit (MDU) chain error;
- Anomaly packet sent by the S/C after protected commands are executed.

The MDU chain error anomaly is an intermittent anomaly in SEVIRI that, in average, occurs about three times per day. It affects only channels 9.7, 12.0 and 13.4 and its impact is that, when the anomaly occurs, the same image line is repeated twice in the image as SEVIRI does not refresh the content of the memory with the newly acquired image line. An investigation has been started with Industry and ESA to find the root cause. Although the impact of the anomaly is currently minor, there is a concern about its potential evolution as a increasing trend in the occurrence frequency is clearly noticeable. For this reason a dedicated monitoring has been put in place in EUMETSAT and Industry is carrying out a detailed analysis to find the root cause.

The issue with the Met-8 protected commands (a “protected” command is a command sent using a more complex and safer communication protocol to reduce the risk of command corruption) is that, when such a command is sent, the satellite delivers an anomaly report as if the command had failed. In reality the command executes correctly. An investigation has been started with Thales Alenia Space to find the root cause. The impact of this anomaly is, for time being, minor as the protected commands execute correctly (although they are detected as failed by the S/C) and equivalent commands can be sent with the standard protocol (i.e. non-protected). For these reasons, the investigation of this anomaly has been put on hold to give maximum priority to the investigation of the anomaly covered by Incident #27 (Met-8 Unexpected Orbit Change on 22-5-07).

3.1.5 Meteosat-9

The satellite was launched on 21 December 2005.

Meteosat-9 is on station at 0° and provides all 0° services with Met-8 as a backup.

At the end of July 2007 it is estimated that 176.72 kg of fuel are available.

Orbit			Attitude	
Inclination	Longitude	E/W Drift	Right Ascension	Declination
0.89º	0.22ºW	0.0017º/day	130.57º	89.02º

Meteosat-9 Orbital Parameters at the end of July 07

The spacecraft is in imaging mode, fully configured including DCP and Search & Rescue transponder. No anomalies have occurred in the reporting period.

3.2 MSG Ground Segment

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

Two outages were caused respectively by a problem with the Primary Ground Station and by a power outage in the Mission Control Centres (Incident #28).

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 Met-8 and Met-9 the PGS and the Back-up & Ranging Ground Station (BRGS) in Maspalomas. Standard routine maintenance activities were carried out on the PGS during the reporting period taking advantage of the fact that Met-8 is not imaging continuously.

The Secondary Backup Ground Station (SBGS) located in Cheia is activated routinely to support Met-8 and 9.

3.2.1 Meteorological Product Extraction Facility (MPEF)

The main change to the product generation covering this period is the termination of the product generation over 0^o with Meteosat-8 in April 2007. Meteosat-9 is now the sole provider of the full disc service over the primary mission area.

The following new products, or product formats, have been introduced:

- The Divergence Products are now operationally disseminated is via EUMETCast.
- The operational dissemination of the Active Fire Monitoring (FIR) Product in ASCII Format via EUMETCast has started in Quarter II of 2007.
- The operational dissemination of GRIB-2 encoded MPE and FIR Products via EUMETCast has started in February 2007.
- The Regional Instability Index (RII) for a limited area was introduced in June 2006. The product is only disseminated to the external EUMETSAT FTP server in JPEG and a simple binary format. This product was generated for support to the COPS experiment.

Additionally the following algorithms have been updated:

- The Earth disc coverage for Meteosat-8 and Meteosat-9 products was increased. The new circular area that extends up to from 65 degree north and south along the Greenwich Meridian and 65 east and west along the equator.
- Within the AMV Product a number of changes have been introduced. The impact of these changes are a general increase in the AMV pressure for height assignment, with an increase in the number of AMV's with a high quality indicator. The major changes were:
    - Introduction of dynamic clustering to identify cloud scenes, rather than clustering based on fixed pressure levels
    - Move the location of the AMV's to the location with the largest contrast
- An update of the Total Ozone (TOZ) Product in which new Malkmus Band Model Coefficients have been implemented, which reflect amore recent spectroscopical database for the internal radiation model within the TOZ algorithm. This change, together with some technical changes, decreased the bias between the TOZ product and the ECMWF analysed total ozone field drastic.
- A small update to the Global Instability Index (GII) product, changing the bias correction parameters with respect to the ECMWF forecast
- The validation of an upgraded SCE and CRM algorithm has started in June 2007.

It should also be noted that the Meteosat-9 commissioning activities, including the changes to the Image Processing System for the WV6.2 anomaly, were finalised in February 2007, with a formal Image and Product Validation Review in March 2007.

3.3 MTP Ground Segment

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

The re-orbiting of Met-5 and relocation of Met-6 at 67.5°E to support IODC DCP mission have been the main activities for the reporting period. The preparation of a reallocation plan has been initiated to optimize the MTP ground segment after the end of life of Met-5.

The power outage which occurred on the 5th June 2007 affected the MTP ground segment and was analysed as part of Incident Report #28.

Control Centre operations have been nominal for the reporting period.

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 BGS also continues to routinely support the monthly ranging campaigns for Meteosat-6.

3.3.1 MTP Meteorological Product Extraction Facility (MPEF)

3.3.1.1 Changes

The main change in the IODC service with respect to the Meteorological Product generation was the introduction of Meteosat-7 on 57^0 E as the operational source of image data in February 2007. Meteosat-7 became the prime source for image data in December 2007, at which time period of two month parallel dissemination of meteorological products from both spacecraft via the GTS started.

Within the MTP reprocessing environment, the generation of MPE products has been completed. The products from a trial reprocessing run (March – May 2006) have been delivered to a customer from the University of Lyon.

Reprocessing

The generation of Meteosat Surface Albedo products within the reprocessing project has continued. The following datasets have been archived in BUFR Format.

Spacecraft	Service	Period	Completion
Meteosat-7	0^0 Service	1998-2006	100 %
Meteosat-6	0^0 Service	1997-1998	100 %
Meteosat-5	0^0 Service	1994	5 %
		1995	90 %
		1996-1997	100 %

3.4 Archive and Retrieval Service

The Service has continued in a very stable manner. Since the last reporting period, the amount of retrieval has been increasing greatly; the average retrieval from the archive is well over 32 TB per month, this is up from 28 TB per month in the last reporting period. This increase can be partly put down to the new Metop datasets to that user community. However, it is mostly down to an increased interest in geostationary satellite data.

The number of users has increased significantly since the introduction of the online ordering system. We currently have 1520 registered users, an increase of 419 users from the previous reporting period, and the number continues to grow on an average of 70 new users per month.

The ingestion and retrieval of both Metop and NOAA data into the archive has been successfully completed. The new online ordering system went live to the Metop principal investigators at the beginning of January and we are continuing to improve the system and will add some new features over the next six months.

3.5 Power Infrastructure

The new Uninterruptible Power System (UPS 5+6) dedicated to supply the new Building Phase IV equipment room has been installed and successfully tested in June 2007. It consists of a 2 x 250 kVA UPS, coupled to an 800 kVA Diesel Generator. The new equipment room is now fully operational. The installation of operational equipment in the room has progressed. In particular, among others, the Jason-2 servers and the VAL environment of the MSG Central Facility (Windows 2003) have been installed in the room.

Concerning the UPS system supplying the MSG and MTP equipment installed in Phase II and III (UPS 1+2), it has suffered a short outage during the reporting period. On 5th of June 2007, during the routine monthly activation of the Diesel Generator, a short power outage occurred on the UPS system. All equipment connected to the UPS was shut off. This equipment was subsequently rebooted within a few minutes but, obviously, the full restart of all application software took much longer, causing an interruption of the MTP/MSG/EUMETCast services of about 1h 45 minutes. This has been traced to Operational Incident #28. An Incident Review Board has been established to investigate the root cause and define corrective actions. Based on the results of investigations and analysis carried out so far, also with the support of the companies responsible for the UPS and Diesel Generator and of external electrical experts, it seems that the root cause of the power outage was the high value of the total harmonic distortion at the input of the UPS-system; this value is higher when the UPS is supplied by the diesel generator. This would explain the coincidence between the incident and the diesel generator activation. The final results of the investigations will be available in a few weeks and incorporated in the final version of the Investigation Report.

In the meantime, with the availability of the new operational room in Building Phase IV, it will be also possible to proceed, in the second half of 2007, with the planned upgrade of the UPS 1+2 system, which has suffered the incident. The procurement phase of the new UPS has already started. It will consist of a 2 x 250 kVA system, replacing the old 2x220 kVA system. The new system should become operational in the timeframe Oct-Nov 2007.

The UPS mainly dedicated to EPS (UPS 3+4), installed in June 2006, has performed well during the period without any incident.

3.6 Meteosat RF issues

During the reporting period no new RF issues have been encountered. Regarding the strong DCP interferer identified in the MSG DCP transponder frequency, a new refined measurement campaign took place in June 07. Based on the calculated location of the interferer, the German regulatory authority "Bundesnetzagentur" has sent a “Report on Harmful Interference” to the Russian "General Radio Frequency Centre" with a request to investigate and possibly solve this interference issue. A reply is now awaited from the above authority.

4 EARS STATUS

4.1 Activities and planning

During this period EARS-ATOVS underwent the following reconfiguration of the HRPT stations providing data to the service:

- 2 April - Start of dissemination of ATOVS products from Gander HRPT station. This is a new station to take over from Bedford station that provides improved data quality and capability for receiving Metop-A HRPT.
- 16 April - Dissemination ATOVS products from the Bedford HRPT station were stopped.

Following reactivation of Metop-A HRPT transmissions that took place in January 2007, work resumed on validation of the upgraded systems at INTA, DMI, CMS and KSAT for provision of NOAA and Metop data to the EARS-ATOVS service.

All Metop related validation activities were completed with KSAT for Svalbard station on 30 March and with CMS for Lannion Station on 24 May.

The INTA, Maspalomas station system has some outstanding issues, particularly with the format of the Metop data being provided. These are being addressed by the station manufacturer. The DMI, Kangerlussuaq station is operating well, but the performance/reliability of the Internet link has delayed completion of the validation activities.

The station provider has been selected for the provision on a new station at Athens and this new station should be operational by the end of 2007.

4.2 EARS Telecommunication Network and Broadcast Service

The operational performance of the IP VPN has been good during this period for all links, except to Tromsoe on 30 July. The link to Tromsoe was down and impacted the provision of Svalbard ATOVS and AVHRR products for a period on 7 hours.

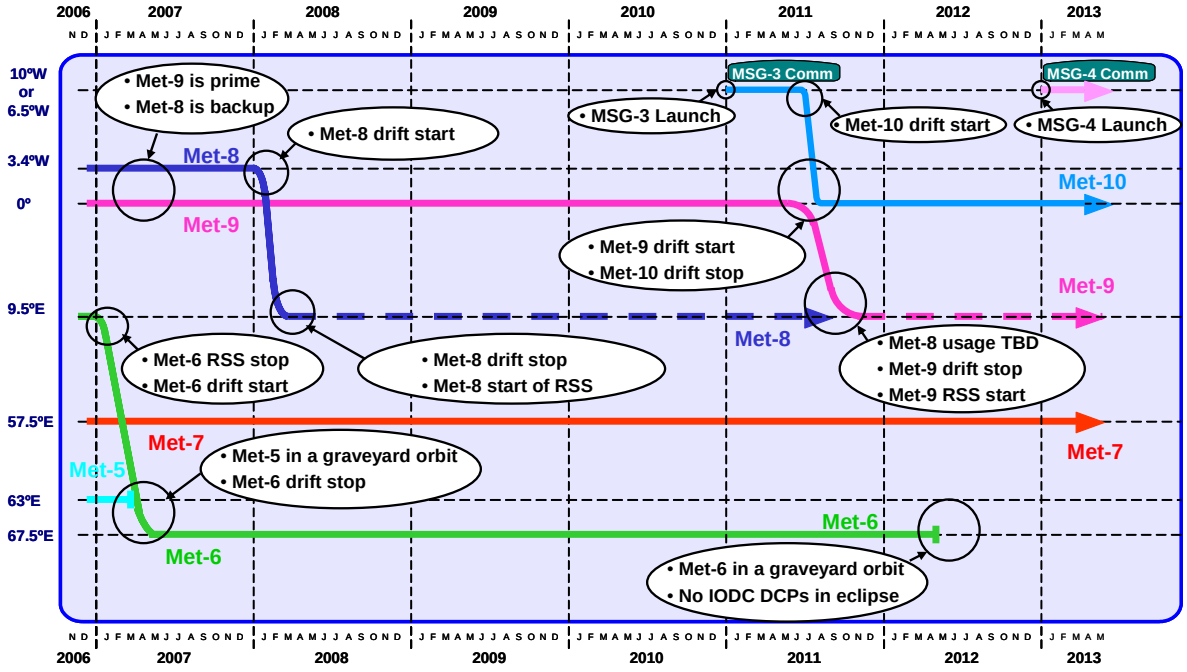
During July various bandwidth upgrades within the network were successfully complete. These upgrades are provided as part of the contract option with the service provider.

The EARS service utilises EUMETCast for the dissemination of data to users, and this continues to perform well.

Some EARS products also continue to be distributed by the GTS/RMDCN and are retrievable at the DWD (Offenbach, Germany) RTH.

5 LONG TERM PLAN FOR THE GEOSTATIONARY SATELLITES

The following figure presents the baseline long term plan for the geostationary satellites.



Long Term plan for the geostationary satellites

The Long Term Plan for the geostationary satellites is built on the following assumptions:

- Met-8 is relocated at 9.5° and starts Rapid Scanning Service in the 1st or 2nd quarter of 2008. This is pending successful completion of all tests on RSS.
- MTP operations are further extended till end of 2013. This is pending approval by the Delegate Bodies in 2010, before the extension already approved expires.
- Met-8 operations are to be defined. Several elements need to be considered in the next years before proposing a scenario for Met-8. Among those there is the satellite reliability (e.g. after the LCL08 failure and the R1 thruster damage – Incident #27), the success of MSG-3 launch and the plans for IODC (if any).

6 PROJECTS

6.1 EARS Continuation and Extension Project

6.1.1 Background

In December 2004, the EUMETSAT Council decided to continue and extend the existing EARS service for a period of four years. In addition to continuation of the ATOVS Retransmission Service, two new services will be added: the pilot ASCAT Retransmission Service and the pilot AVHRR Retransmission Service. In addition to the support of the current NOAA KLM satellites, the continuation of EARS will also support the NOAA N and N' and Metop satellites.

The purpose of the project is to develop and commission the new additions to the service.

6.1.2 Status

Metop-A HRPT has been routinely acquired by the EARS HRPT stations in Svalbard, Lannion, Maspalomas, Greenland, Wallops Island and Gilmore Creek until the Metop HRPT was stopped on 4 July 2007. From the 6 June until the failure of the Metop-A HRPT (4 July), Metop-A ATOVS products from NOAA Gilmore and Wallops stations were disseminated to users. See 6.5 ATOVS Retransmission for further details.

Since July 19, 2006 the EARS-AVHRR trial service has been disseminating AVHRR segment files from Svalbard, Lannion and Maspalomas HRPT stations via EUMETCast-Europe (Ku-band). The EARS-AVHRR data consist of one-minute segments of NOAA17 and NOAA18 satellite from these 3 EARS HRPT stations.

Progress with including EARS-AVHRR from Greenland and Athens is on hold pending resolution of technical issues.

The upgraded Internet bandwidth at Greenland has failed to provide the required network performance to support timely AVHRR data transfers. This has been identified as a bandwidth availability issue from the Internet Provider, TeleGreenland. DMI (who manage this contact) are pressing TeleGreenland to resolve this issue.

The station provider has been selected for the provision on a new station at Athens and this station should be operational by the end of 2007. The new station will take account of the frequency interference environment to provide good quality data for EARS and include the functionality required to support the EARS-AVHRR service.

Dissemination of ERS-SCAT value-added Wind Product via EUMETCast has started as a demonstration of the ASCAT service continued during this period and includes dissemination of data in ASCAT BUFR format that will be used for the EARS ASCAT Pilot service.

KNMI Level 2 processing system for EARS-ASCAT has been partially tested and awaits provision of real Metop data to be provided from EUMETSAT. There have been problems with EUMETSAT development of ASCAT level 1 processing within EARS environment. The problem with running the ASCAT PPF in the EARS IBM AIX environment due to issues with hardware and OS versions have now been resolved. Further issues with the CGS ASCAT

PPF software previously identified during commissioning activities and EPS Metop tools have also been resolved. By the end of July the EARS ASCAT level-1 processing chain for a single HRPT station was completed and is ready to begin testing with KNMI once Metop HRPT operation resume.

6.2 EUMETCast South America Setup Project

6.2.1 Background

Following the bandwidth and coverage upgrades of EUMETCast to disseminate Meteosat-8 data to Users in Europe and Africa, and the start of routine operations of Meteosat-8, the issue of coverage of South America has been addressed in the form of a 3 year trial service.

The solution is a DVB turnaround system of MSG High Rate SEVIRI data from the Ku-band to a satellite providing coverage for users in South and Central America - similar to the C-band turn-around system for Africa. Since December 2005 a C-band South America turn-around service - provided by Globecast - is running using the NSS806 satellite at 40.5° W.

The aim of this project is:

- To operationally integrate the EUMETCast South America turn-around service into the Meteosat-8 dissemination system, thus allowing the start of service before the Meteosat-7 services are terminated at 0°;
- to integrate South and Central American users into the MSG and EUMETCast user community;
- To promote the use of EUMETCast South America and MSG data in the South American region;

To assess the basis for the continuation of the service beyond the trial phase - together with the South and Central American user community and partners such as the WMO, the Spanish and Portuguese NMSes, NOAA, and the European Commission.

6.2.2 Status

The operational implementation of the service is completed. Following past and planned activities are supporting users and promoting the service in the Central and South American region:

April 2007	XIII Brasilian Remote sensing conference in Florianópolis (Brazil) to demonstrate EUMETCast and its potential to convey data of meteorological or environmental nature.
Jul 2007	Manufacturer selected to install the EUMETCast stations - installation expected to start in Autumn 2007
Aug 2007	EUMETSAT training course incorporating a EUMETCast component in Alagoas, Brazil
Oct 2007	EUMETSAT training course incorporating a EUMETCast component in Cartagena, Colombia

6.3 GEONETCast Project

EUMETSAT is a key partner in this GEO initiative, via the operation of its EUMETCast system, described in CGMS EUM-WP-11.

6.4 MSG Rapid Scanning Service Project

The preparations for the start of an MSG Rapid Scanning Service (RSS) in spring 2008 are on schedule.

On-ground Lifetime tests

Regarding the SEVIRI scan mechanism, as reported in the previous period, several tests have been performed on ground by using flight representative models. The tests involve accelerated scans, with the equivalent of one year of operations taking around a week. In the following, the Baseline Repeat Cycle (BRC) equates to a scan of the full earth disc, whereas the Rapid Scan Cycle (RSC) corresponds to a 6 degree scan over Europe. The RSC pattern during the test was with interleaved 28 days of RSC and 2 days of BRC for 11 months per year, the 12th month being entirely of BRC.

The initial test was performed on Life Time Model No. 2 (LTM2) and aimed at simulating the conditions to be experienced by Met-8. LTM2 successfully passed the following scenario:

- 4 years of BRC followed by 3 years of RSC.
- Extension: 2 years RSC followed by 1 year BRC
- Detailed visual inspection of the LTM2 conditions at the end of the test (including dismounting and looking at the lubricant status, amount of debris and other signs of potential degradation).

The above test result confirmed that the Met-8 RSS scenario approved by the 62nd Council (i.e. about 3 years of RSS from 1st quarter 2008 till 2011) can be supported by Met-8 with high confidence that, once the 3 year of RSS are over, the satellite can serve for another several years in full earth scan.

In addition to the above test on the Met-8 RSS scenario, an additional test was performed to simulate a Met-9 RSS scenario, in view of potentially using Met-9 for RSS once MSG-3 has been successfully commissioned in orbit. This further test was executed by using another lifetime model (LTM3) and using the same conventions described above. LTM3 passed through the following test scenario:

- 1 year BRC followed by 5 years RSC followed by 14 year BRC.

The above test scenario for LTM3 was defined to either push the qualification of the bearing in the SEVIRI scan mechanism out past any expected MSG life time extension or identify the real life limit of the bearing. With this logic in mind, it is quite encouraging to see that, after 5 years of RSC and 15 years of BRC, the preliminary analysis of the results shows no significant degradation in the performance of the LTM3.

This confirms the validity of the approved Met-8 RSS scenario and confirms that also the option of performing several years of RSS with Met-9 after MSG-3 successful commissioning is technically viable.

It is worth mentioning that another part, i.e. the spindle of the SEVIRI scan mechanism, is currently undergoing an additional lifetime test that is due for completion in the 1st quarter of 2008. This test will confirm that the bearings are the limiting item in the scan assembly lifetime and that the spindle lifetime is by far longer as expected. This assessment was a conclusion of the analysis performed when the tests on the SEVIRI scan mirror were defined and the main rational is that, differently from the bearings, the spindle is wet lubricated therefore, the expectation for this test is that no wear on the spindle will be observed over the test period.

Service preparation status

The results from the extended rapid scanning campaign performed between 1st June and 31st August in support of the Convective and Orographically-induced Precipitation Study (COPS) have demonstrated the feasibility of the proposed rapid scanning operations cycle (26 days of rapid scanning followed by 2 days of full Earth scanning, for 11 months per year). The only major activities remaining are the evaluation of the behaviour of the rapid scanning system during the eclipse season, the completion of the MPEF modifications to enable the extraction of products from rapid scan images and the procurement of the necessary extra dissemination bandwidth.

6.5 Earth Observation Portal Project

The purpose of this new project is:

- To implement a central service point to provide EUMETSAT users a single point of online access to all EUMETSAT data and dissemination services. This, the EUMETSAT Earth Observation Portal will allow users to discover, search data and to order data or subscribe to dissemination services (in particular to EUMETCast/GEONETCast);
- To expand the above portal to allow EUMETSAT users to discover, search, order/subscribe earth observation data from partner agencies, in particular CNES Altimetry products, NOAA data, ECMWF data, GMES and others as relevant;
- To allow partner agencies to discover, search, order and subscribe to EUMETSAT data and dissemination services via a set of programmatic, interoperable services.

The project is divided in two phases:

- Phase 1, from now till Dec 08, where the first objective in the first bullet above should be achieved;
- Phase 2, from Feb 2008 till Dec 08, where the objectives in the second and third bullets above should be achieved.

The objective of Phase 1 will be achieved by expanding the current UMARF V3 online user services (which already provide the discovery, search and ordering capabilities for

EUMETSAT data, SAFs included, with the EUMETSAT Product Navigator catalogue) to allow users to subscribe to dissemination services (and therefore to EUMETCast).

Of particular interest of the discovery service is the ability to search on purely product type metadata (vs. particular instances) whereby users shall be able to find, for example, where a specific product is archived, what dissemination methods are available for it, data formats available and other characteristics.

The objectives of Phase 2 (bullets 2 and 3 above) will imply an extension of the Portal, available from the Phase 1, towards external partners and agencies via a set of programmatic and interoperable services.

Phase 2 will benefit of the experience gained in Phase 1 and will consider the consolidation of the interoperability standards, the GEO initiative for service oriented interoperability, the ESA HMA project development and the WMO V-GISC project development.

Agreements with the following will be explored:
- CNES and CLS for altimetry and oceanography products (in particular Jason products);
- NOAA for all earth observation products;
- ECMWF for all kind of data exchanges;
- ESA for accessing the ESA Envisat, ERS, Proba and Sentinels data;
- Met services;
- And others as relevant.