CGMS

CGMS-37 EUM-WP-05
v1A, 28 September 2009
Prepared by EUMETSAT
Agenda Item: B.2

STATUS OF THE METEOSAT SYSTEM

This Working Paper Reports on the more recent operations and recent changes affecting the System of Meteosat satellites. Ground segment developments and the status of ongoing projects are also described.

Status of the Meteosat System

1 OVERVIEW

This paper summarises the status of Meteosat Operations, and the performance of related services. The status of several operations projects since CGMS36 is also presented. It will be recalled that detailed performance statistics for the services can be found in the regular EUMETSAT Operations Reports to CGMS.

The operational status of the geostationary systems is stable with Met-6 at 67.5º East (Indian Ocean Data Collection DCP), Met-7 at 57.5º East (Indian Ocean Data Collection imaging), Met-8 at 9.5º East (Rapid Scan Service) and Met-9 at 0º (prime 0º Meteosat service). No significant in-flight anomalies have occurred on board the geostationary satellites during the reporting period with the exception of a Met-9 Safe Mode on 17-4-09 which was due to a Single Event Upset (SEU). The anomaly caused a 0º Meteosat service interruption of about 3 hours before the prime mission could be transferred to the backup satellite (Met-8). As a side effect a suspension of Met-8 RSS for about 7 days was necessary. The most significant geostationary satellite operations have been the ones related to the spring 2009 eclipse season and a Met-9 north-south orbit inclination manoeuvre (in May 09).

2 OPERATIONS STATUS

2.1 General

During the reporting period the operations of the Meteosat first generation system have been smooth, including the spring eclipse season during which both Met-6 and Met-7 have shown fully nominal behaviour.

Similarly the Meteosat Second Generation (MSG) system has performed well in this reporting period with the exception of a Meteosat-9 Safe Mode on 17-4-09 which caused an interruption of about 3 hours on the 0° Meteosat service and several days for RSS (as Meteosat-8 was allocated to the 0° service while waiting for the Meteosat-9 recovery to complete).

For both Met-9 and Met-8 the spring eclipse season passed without any major issue. This includes the Met-8 thermal behaviour that was impacted by the two events of Incident #27 -Unexpected Orbit Change (see below for more details). The Met-8 thermal subsystem confirmed again its ability to properly control the satellite temperatures also in eclipse.

A Meteosat-9 north-south orbit inclination manoeuvre was successfully executed on 6-5-09 with a particularly short outage due to the accurate flight dynamics predictions and the efficient image processing corrections.

GERB on Met-9 was operated in nominal imaging mode during the reporting period while GERB on Met-8 is left in a non-imaging mode. As in previous Sun Avoidance Seasons (i.e. between mid February till end of April, when the direct sun light can enter the instrument field of view) GERB was left in imaging mode for just few hours after the eclipse exit and then commanded to a non-imaging mode for the remaining time. This operational practice has been requested by the GERB operations team in the UK to cope with repeated glitches on the scanning mirror mechanism that, if occurring during imaging mode, could lead to the loss of several detectors if the instrument field of view received the direct sun light.

The following outages were observed during the reporting period:

On 14/03/09: EUMETCast total outage (both GEO and LEO mission affected) for about 2.5 hours due to hardware failure in the Uplink Service Provider. This is covered by Incident n°36 and it led to a review and removal of Single Point failures at the Uplink Server provider facilities.

On 17/04/09: Meteosat-9 safe mode. All missions swapped to Meteosat-8 and RSS service interruped till Meteosat-9 was fully recovered. RSS mission resumed on 23-4-09. Outage on 17-4-09 was about 3.75 hours for images and about 7 hours for the meteorological products (before the service was taken over by Meteosat-8) (see below dedicated paragraph).

19/04/09 and 05/05/09: EUMETCast C-Band South America 7-hour Service interruption and 6-hour Service interruption respectively due to problems at the Service Provider facilities.

On 7-5-09 all MTP operational services were interrupted for a total of one hour due to unexpected side effects which occurred during maintenance of the communication network.

Met-9 Safe Mode on 17-4-09

On Friday 17 April 09 at 15:52UTC Met-9 experienced its 2nd safe mode transition from launch. All subsystems controlling the satellite vital functions switched to their redundant units apart the main on-board computer which remained on the nominal side. The payload switched off and all Meteosat operational services at 0° (with the exception of LRIT due to a limitation of Met-8) were swapped to Meteosat-8 with a total service outage of about 3 hours. As a consequence Rapid Scanning Service was interrupted.

After anomaly investigation the conclusion was reached with the support of Thales Alenia Space that this event was most likely caused by a Single Event Upset (SEU) on one component in a circuit that protects the satellite in case of battery under-voltage. The main facts leading to this conclusion were that no other signs of abnormal behaviour were detected before the reconfiguration and that the typical signs of such an anomaly were stored on board in the Buffer of Anomalies and could be retrieved after the event. As neither EUMETSAT nor Thales Alenia Space/ESA identified any risk that would prevent the recovery to start, the recovery was actually started on 20 April 2009 and SEVIRI resumed imaging in the morning of 21 April 2009. However, due to the need to thermally stabilise the S/C platform, Meteosat-9

could not be brought back into service before 23 April 09 and the Meteosat-8 RSS resumed also on this day.
The investigation on the root cause of the anomaly has been performed via an Incident Review Board and it is now close to completion. The investigation confirms the initial assessment that a radiation induced SEU in a circuit that protects the satellite in case of battery under-voltage is the most credible root cause. As a result of this investigation and in view of improving the ground reaction an activity has now been initiated with the support of Thales Alenia Space and ESA. This consists in analysing the most critical functions on board and their sensitivity to space radiation events so that the relevant ground reactions can be prepared in advance both to ensure an increased spacecraft safety and to reduce the recovery time.

2.2 Space Segments

2.2.1 Meteosat-9

The satellite was launched on 21 December 2005.

Meteosat-9 is on station at 0° and provides all 0° services.

At the end of June 2009 it is estimated that 121.76 kg of fuel are available. At least 29 kg of fuel need to be reserved for re-orbiting at end of life. Assuming that only an additional longitude relocation is performed, the last orbit inclination manoeuvre is estimated to take place in 2014. The satellite will then finish its inclination controlled lifetime in 2015. Assuming that the other vital functions are still working as specified, it is estimated that the fuel currently available should allow nominal longitude and attitude control till beyond the year 2019.

It should be noted that the fuel availability is just one element affecting the satellite lifetime, but not the only one. In this respect the Secretariat has undertaken to perform availability analyses to determine the planned launch dates of MSG-3/4, based on the mission availability targets agreed with Delegates. Among other factors, these analyses take into account the fuel budget lifetime, the failures experienced on board and the satellite reliability models.

The spacecraft is in imaging mode, fully configured including DCP and Search And Rescue transponder and no changes to the on board configuration have occurred during the reporting period.

2.2.2 Meteosat-8

The satellite was launched on 28 August 2002.

Meteosat-8 is located at 9.5°E and it is the backup spacecraft for the 0° services. In addition, from 13 May 2008 onwards, Met-8 supports the RSS.

At the end of June 2009 it is estimated that 72.98 kg of fuel are available. At least 29 kg of fuel need to be reserved for re-orbiting at end of life. Assuming that no additional longitude relocations are performed, the last orbit inclination manoeuvre is estimated to take place in 2010. The satellite will then finish its inclination controlled

lifetime in 2011. Assuming that the other vital functions are still working as specified, it is estimated that the fuel currently available should allow nominal longitude and attitude control till beyond the year 2015.

The spacecraft is in imaging mode with the Search And Rescue transponder switched-on (as requested by COSPAS-SARSAT), but without DCP mission.

No changes to the on board configuration and no failures have occurred during the reporting period. However, the error rate of the Met-8 MDU has been increasing (see below).

After the on-board anomalies suffered by Met-8 and in particular after the two events of Incident #27 (Met-8 Uncommanded Orbit Change), the probability to successfully re-orbit Met-8 as a function of its in orbit time is monitored by EUMETSAT, ESA and Thales Alenia Space. A recent assessment indicates that the probability to successfully re-orbit the satellite is above 90% (that is a target proposed by the space debris mitigation regulation) at least till Jan 2013. This probability will be regularly assessed to ensure that the Met-8 status is properly considered in the long term plan for the geostationary satellites.

MDU chain error anomaly

The Main Detection Unit (MDU) of the Met-8 SEVIRI shows an anomaly that is of intermittent nature. When the anomaly occurs, the images of the SEVIRI channels 9.7, 12.0 and 13.4 of Met-8 have one line of the image that is re-delivered to ground in place of the currently acquired and valid image line. Although the impact of the anomaly is minor (at the end of June 09 less than 10 events per day are observed in total for the three affected channels), there is a concern about its potential evolution as an increasing trend in the occurrence frequency has been noticed in the past. In this respect, after several tests performed with Met-8 (March and Nov 08, Jan, Feb and March 09), it has been observed that the frequency of errors is affected by a power cycle (i.e. a switch off/on) of the MDU. In addition it has been observed that a few telemetries reporting the MDU gain setting for the same three channels (i.e. 9.7, 12.0 and 13.4) are affected by an intermittent anomaly which is well correlated to the above one. All this is has been investigated in an industrial study which is now completed. The most credible root cause points to an intermittent self-generated electronic noise inside the MDU itself which is sensitive to the MDU power cycles. A corrective action for the MDU on MSG-3 and on MSG-4 has been proposed by industry and its appropriateness and impacts are under evaluation.

2.2.3 Meteosat-7

The satellite was launched on 2 September 1997.

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

At the end of June 2009 it is estimated that 7.84 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 no orbit inclination manoeuvres can be performed. Assuming that the other vital

functions are still working as specified, it is estimated that the fuel currently available should allow nominal longitude and attitude control till well beyond the year 2013.

The spacecraft configuration remained stable. There has been no evolution of the spacecraft anomaly affecting one of the two methods (MST) to send tele-commands and perform ranging (i.e. no MST ranging is possible and only one MST receiver can lock on the carrier with marginal performance while the other receiver cannot lock at all). All possible measures are already in place to limit the operational risks due to this anomaly.

2.2.4 Meteosat-6

The satellite was launched on 20 November 1993.

Meteosat-6 is located at 67.5°E and it 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 June 2009 it is estimated that 4.096 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 no orbit inclination manoeuvres can be performed. Assuming that the other vital functions are still working as specified, it is estimated that the fuel currently available should allow nominal longitude and attitude control till early 2011..

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

2.3 Meteosat Ground Segments

2.3.1 MSG Ground Segment

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

Image Processing Facility: After that the facility was ported to new hardware platform and operating system (Sun) in October 2008 to cope with obsolescence, the operations have been smooth and reliable. Regular maintenance continues to solve minor software issues and prepare for MSG-3.

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. Both PGS and BRGS are regularly maintained to cope with obsolescence.

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

The **Meteorological Product Extraction Facility** (MPEF) generated products over 0º using Meteosat-9 image data

During the reporting period the following algorithms have been updated:

The Global Instability Index (GII) product has been updated on 16 January 2009. This fixed a small problem in the product generation. There was no impact on the product format or the product values.

A problem in the BUFR encoding of the All-Sky Radiance (ASR) product was fixed on 4 March 2009.

The MPEF generates the following products over 9.5º East with Meteosat-8 Rapid Scan Service image data:

Atmospheric Motion Vector (AMV) Product every 20 minutes

Clear Sky Radiance (CSR) Product every 15 minutes

Global Instability Index (GII) Product every 5 minutes

Multi-Sensor Precipitation Estimate (MPE) Product every 5 minutes

Active Fire Monitoring (FIR) Product every 5 minutes

The RSS GII product is generated as a segmented product on a 3x3 pixel basis. This implicitly covers the Request from 23rd STG-OPSWG to investigate how to achieve a 3x3 pixel RII product, as now the users shall receive a Meteosat-9 pixel based RII product on a limited area and a Meteosat-8 3x3 pixel segmented product over Europe. However, due to the increased CPU load, and the limited CPU resources the following restrictions had to be put in place for the time until MPEF operations has moved to the new hardware:

The product generation area has been limited, and starts just South of Spain, at about 34 degrees latitude.

The AMV Product generation for the WV channels (7.3 and 6.2 µm) and the HRV channel has been stopped.

2.3.2 Meteosat First Generation (MFG) Ground Segment

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

MFG Control Centre: Operations have been nominal for the reporting period.

An unexpected outage affecting all MFG operational services for in total one hour occurred on the 7th May 2009 and was caused by a communication maintenance activity.

During the reporting period, several short interruptions affecting the image processing facility were caused by a hardware intermittent failure which has now been fixed.

Communication Links: The terrestrial E1 link is used as prime link for all traffic between Darmstadt and Fucino.

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. PGS Antenna 1 RF upgrade was performed after the spring eclipse season and completed successfully in June.

In June 2009, the routine activation of the **Backup Mission Control Centre** (BMCC) in Fucino was performed successfully.

The **Meteorological Product Extraction Facility** for the IODC service used Meteosat-7 at 57° E as the operational source of image data.

No significant change to the product generation for MTP has taken place.

The generation of Meteosat Surface Albedo products within the reprocessing project has continued. The Meteosat-5 MSA product generation has been completed in February 2009. The following datasets have up to now 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	1994-1997	100 %
Meteosat-4	0^0 Service	1989-1994	100 %
Meteosat-3	0^0 Service	1988-1989	100 %
Meteosat-2	0^0 Service	1981-1988	100 %
Meteosat-5	IODC Service	1998-2006	100 %
Meteosat-3	ADC Service	1991-1993	0 % (not planned)
Meteosat-3	XADC Service	1993-1995	0 % (idem)

The algorithm software porting to the next generation reprocessing facility RMPEF-2 is progressing and planned to be completed at the end of 2009.

2.3.3 EUMETSAT Data Centre

The EUMETSAT Archive has been rebranded to EUMETSAT Data Centre in order to better reflect the service it provides to the User Community.

The software is more robust and supports more functions requested by the user community. SAF products are now available for ordering from the Archive and more products are planned to be introduced. The NetCDF format is now available as a delivery format for MFG15, MSG15 and IASI 1C data sets. The EUMETSAT Product Navigator has been in operation since 2008 and provides user with useful information on the products offered by the Data Centre and EUMETSAT's real time service (EUMETCast). It is currently being updated to unify the user registration for the Data Centre and all other services offered by EUMETSAT. The central user registration is planned to be available in the 3rd quarter of 2009 (see also EO Portal Project).

Notable recent activities in the Data Centre are the upgrade of all servers to improve overall Data Centre performance and to support several reprocessing campaigns. The LTO-4 tape media has been successfully introduced as a Data Centre deliverable media. LTO-4 with LTO-2 are the most popular media chosen by the users for the delivery of Archive data. Obsolete media types (DDS2, DDS4 and DAT72) have been removed from the Data Centre as delivery options in order to reduce maintenance costs. Archive user information has been improved by including Archive maintenance and other service messages in the User Notification Service (UNS) in addition to placing them on EUMETSAT's Data Centre Internet page.

The design and implementation of the Data Management Server to support the Global Space-Based Inter-calibration System (GSICS – gsics.eumetsat.int) – an initiative of CGMS and WMO – has been completed. The GSICS server is currently being tested pre-operationally by the users. Its purpose is to provide comparable data sets from various satellite sensors so that GSICS users can create inter-calibration products from them. Via standing order processing from the Data Centre, currently collocation data sets IASI 1C, MFG15 and MSG15 are provided on the server and the first sets of inter-calibration products are being generated by the GSICS users/partners (NOAA, NASA, JMA, CMA and KMA).

A constant activity in the Data Centre is to investigate ways of providing more value to the archived data to the benefit our user community.

2.3.4 Building infrastructure

Building infrastructure

The installation of operational equipment in the new equipment room in Building Phase IV (South Wing) has further progressed and is now completed. The migration of MPEF operations to the new HW installed in South Wing is on-going.

In the MSG Equipment room in North Wing, the installation of new 120 cm racks has continued, in order to allow the migration to the new Storage Network Infrastructure equipment. Old racks and equipment are being decommissioned for obsolescence.

The upgrade of infrastructure (power distribution and cooling) in the EPS server room located at the ground floor in North Wing has been completed and the new racks for new EPS Hardware have been installed. In particular, the IBM servers p575, which require water cooling, have been installed and connected to the water supply circuit via dual-pumping system.

New Technical Building

Preparatory work for the ITT for the construction of the new Operational Technical Building has been performed in this period. The operations technical requirements have been collected in a first draft requirements specification document, to be further discussed with the planning team. The next period will be dedicated to the building design, submission of ITT and selection of the building company, to be presented to

Council for approval. The current implementation plan foresees the start of construction works in Q2/2010 and completion during Q3/2011.

3 SERVICES PERFORMANCE

Detailed performance of the Meteosat operational services in the reporting period are available in Centralised Operations Report sent to CGMS. In the following paragraphs only the salient points are briefly discussed for each Meteosat service.

3.1 0° Met-9 Service Performance

The 0° operational services continued nominally throughout the reporting period.

Dissemination interruptions affecting more than one repeat cycle were mainly caused by EUMETCast (see EUMETCast section below), once by the communication network and also by the Meteosat-9 Safe Mode in April 09.

At end of June 2009 there are 1003 DCPs allocated and 563 of them are active (reporting regularly - also includes IODC allocations and reporting). The acquisition and dissemination of 0° DCP was carried out by Meteosat-9. Between 17 and 20 April 2009 – during the Meteosat-9 safe mode - the 0° DCP mission had to be swapped to Meteosat-8 and a different antenna. A drop in the number of received DCPs was observed during this period (ca 20% per day). Investigations into the cause of this DCP reception drop are still being carried out.

3.2 Met-8 RSS Performance

The end to end performance of Level 1.5 SEVIRI product repeat cycles and meteorological products is consistently above 99%, not counting the interruptions due to regular full earth scan interruptions and the Meteosat 9 safe mode.

3.3 IODC Service Performance

The IODC service performance was nominal for the reporting period with monthly availability figures generally above 99.9%.

Only the May figures were 99.3% due to BMCC testing on 15 May.

The IODC DCP acquisition and dissemination service over the Indian Ocean was carried out by Met-6.

In June 2009 there are 43 DCPs allocated and 38 of them are active. The acquisition and dissemination of IODC DCPs was nominal during the reporting period.

3.4 Foreign Satellite Data Service Performance

EUMETSAT receives image data from Meteo-France (Lannion) hourly for retransmission via EUMETCast to end users. Image data is from NOAA (GOES-11 and GOES-12) and from JMA (MTSAT-1R).

For this reporting period (January 2009 through June 2009) the performance of the retransmission service was 99.31% for all data.

There was a large outage of data from GOES-12 due to a spacecraft anomaly. From 01 January 2009 at 00:00 UTC until 06 June 2009 at 10:00 UTC the nominal GOES-12 hourly data was replaced with three hourly data from GOES-10.

3.5 EUMETSAT ATOVS Retransmission Service Performance

During this period EARS-ATOVS, EARS-AVHRR and EARS-ASCAT provided good operational service with high availability. The following major incidents occurred:

No availability of Maspalomas station data on 17 March due to bad system configuration in the INTA system;

Delays of ASCAT data from Svalbard on 29 April due high load on data reception computer in the KSAT system;

Early June, an anomaly occurred on the HIRS instrument onboard NOAA-15 which resulted in the HIRS data not being usable in EARS-ATOVS. As a consequence, only level 1a data are currently distributed to the users for that satellite.

3.6 Jason-2 Service Performance

During the period from 1 January 2009 till 30 June 2009, the Jason-2 System provided good operational service with high availability and good timeliness. Figure 1 shows the weekly performance of the system over the last 6 months, giving an overall performance with respect to the requirements as summarised in Table 1 below.

Data received in:	Requirements	Q1+Q2 2009
Less than 3 hours from sensing:	> 75%	89.62%
Less than 5 hours from sensing:	> 95%	98.19%

Table 1: Overall Jason-2 Service Performance

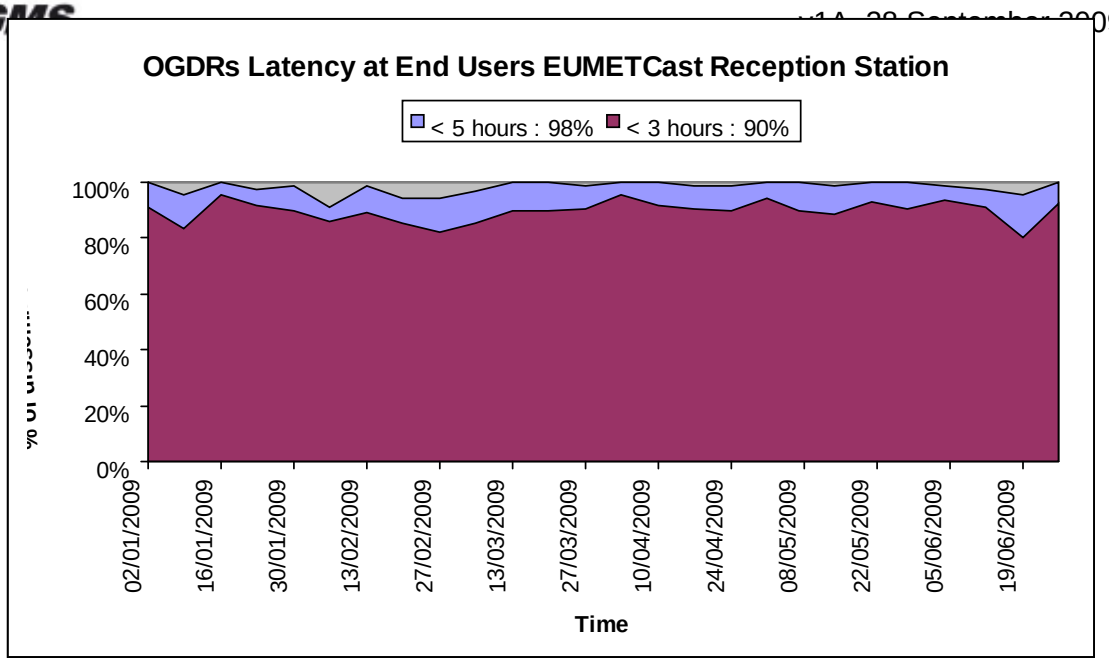


Figure 1: Jason-2 OGDRs Latency

The major events contributing to service degradation are listed below. It is worth mentioning that no data was lost, as data from problematic passes was re-dumped at the first opportunity, only impacting data latency, but not data availability.

Month	Major events
January 2009	- 4 failures of the processing facility (TM NRT), with late re-generation of product (including failure due to leap second); - 8 passes lost at Usingen, requiring a late re-dump of data; - 2 passes lost at Fairbanks, requiring a late re-dump of data; - 2 periods of AMR outages (impact on product quality).
February 2009	- 9 passes lost at Usingen, requiring a late re-dump of data; - 3 additional passes lost at Usingen, due to CCSDS spare PC replacement, requiring a late re-dump of data; - 2 failures of the processing facility (TM NRT), with late re-generation of product.
March 2009	- 1 pass lost at Usingen, requiring a late re-dump of data; - On 5-Mar-09: replacement of faulty equipment in Usingen Ground Station; - 6 passes lost due to problems at the NOAA Control Centre or NOAA Ground Stations (Wallops or Fairbanks); - 1 failure of the processing facility (TM NRT), with late re-generation of product (GPSP instrument time stamp in 2015); - 2 late products from NOAA/ESPC; - Outage on EUMETCast (Incident #36) impacting 1 OGDR latency.
April 2009	- 1 failure of the processing facility (TM NRT), with late re-generation of product; - 6 passes lost due to problems at the NOAA Control Centre or NOAA Ground Stations (Wallops or Fairbanks).

Month	Major events
May 2009	- On 11-12-May-09: New DEM upload to POSEIDON-3. Data gaps during station visibility periods. - 1 failure of the processing facility (TM NRT), with late re-generation of product; - 4 passes lost due to problems at the NOAA Control Centre or NOAA Ground Stations (Wallops or Fairbanks).
June 2009	- On 2-June-09: update to POSEIDON-3 on-board SW. Data unavailable from 06:55 till 15:58 on that day; - 10 passes lost due to problems at the NOAA Control Centre or NOAA Ground Stations (Wallops or Fairbanks).

3.7 EUMETSAT Data Centre Performance

This brief summary shows the most interesting operational figures of the Data Centre. The Archive ingests approximately 280 Gigabytes of data a day. There are currently over 2390 registered Archive users. Their number is increasing on average by about 50 users per month. Approximately 19,000 orders are processed each month retrieving around 1,000,000 files from the Archive. This amounts to 98 Terabytes of retrievals per month, of which around 20 Terabytes are delivered to the user. Based on the current ordering development and the planned activities, we expect these figures to increase substantially in the future. The Data Centre contains 21,000,000 files and is 420 Terabytes in size.

3.8 User Helpdesk

The EUMETSAT User Helpdesk responded to a total of 1868 requests from the user community during the reporting period January to June 2009, of which approximately 80% were from Member and Cooperating States countries.

4 PROJECTS

4.1 EARS Continuation and Extension Project

In July 2008, the EUMETSAT Council decided to establish a new pilot EARS-IASI service in addition to the EARS-ATOVS, EARS-AVHRR and EARS-ASCAT services. The new EARS-IASI service is planned to provide L1C products including 366 selected IASI channels as well as a set of Principal Component scores covering the full IASI spectra.

As the IASI processing requires high CPU and memory availability, the EUMETSAT servers located at the EARS remote stations will be upgraded to support the service. Technical discussions have taken place during the last months, including with the NWP SAF, and a new hardware platform has been selected. The procurement of these new servers will take place in the coming months followed by their installation onsite.

Regarding the EARS-IASI products, it has been agreed with NWP-SAF that the software used to compute the IASI Principal Component Scores and to create the EARS-IASI L1c merged products will be developed by the NWP-SAF and will be integrated in AAPP.

In December 2008, EUMETSAT has opened an ITT for the EARS IPVPN after 2009. The proposals were received and evaluated, and the outcome of the evaluation was presented to Council in June. Once the new contract is active, some hardware upgrades and configuration changes will take place in 2009 and 2010 to support the new services. These changes will be coordinated with the communications network provider to ensure minimal impact to the operations.

Dissemination of ERS-SCAT value-added Wind Product via EUMETCast continues to operate normally.

In parallel, the integration of new stations to the network is ongoing, in particular Oman (Muscat station) and La Reunion (Saint-Denis station).

Due to the limited availability of Metop-A HRPT the EARS system has been configured to use the Fast Dump Extract System (FDES) at Svalbard with the objective of establishing a Metop-A European regional data service with timeliness similar of the originally planned EARS services. A subset of each X-band dump is provided to EARS system and is currently used operationally for EARS-ASCAT. During the last couple of months, redundant equipments have been installed and tested with KSAT to ensure good operations of the service.

The preparations for extending the use of the FDES data for Metop-A ATOVS is well advanced and will be followed by AVHRR and potentially IASI data in due course.

4.2 EPS Global Data Timeliness Project

The EPS Global Data Timeliness Project, based on Antarctic Data Acquisition (ADA) has been newly approved by the 67th Council (see EUM/C/67/09/DOC/26) following the submission from NOAA of a revised proposal for the usage of the Antarctic McMurdo ground station.

A previous proposal based on a co-operation with NOAA, which had been approved by the 63rd Council, was put on hold in early May 2008, following a NOAA announcement that, due to unanticipated fiscal constraints, they were no longer able to support the plan. However, work continued within the U.S., in order to find an alternative solution to support the ADA service, within a reduced cost envelope.

This revised proposal is similar in many respects to the proposal from 2007, but with a few key differences to the service being provided and the schedule for implementation. In particular, the service is now based on a single, refurbished antenna at McMurdo and the schedule is delayed such that the availability of the Demonstration Service will be first quarter 2011 and the Full Service will be first quarter 2014. The number of Metop orbits to be acquired by the Demonstration Service has however increased to a minimum of 9 per day.

As a result of this approval, work has recommenced to ensure the timely upgrade of EUMETSAT Ground Segment facilities supporting the related data reception and processing. The related upgrades and planning will form part of the Metop-B Project upgrade key point review planned for September 2009.

4.3 GEONETCast Project

In the GEONETCast project, the main activity has been the finalisation and operational readiness of the data exchange with CMA in Beijing leading to a the start of the dissemination of some of the exchanged data. The operational data exchange has been realised by using a RMDCN connection between EUMETSAT and CMA and the Internet as a backup scenario which is operated in parallel.

A list of products to be exchanged has been developed in bilateral discussions with CMA - and a technical design for the exchange mechanism agreed. The data exchange itself has been running since mid-March, with the test dissemination of the CMA data stream and products on EUMETCast starting in April.

Discussions regarding the dissemination of EUMETSAT products on CMA's dissemination system, called FENGYUNCast, have started with CMA last summer with agreement being reached on the system set up required. The first trial dissemination of the agreed set of EUMETSAT data via FENGYUNCast to CMA internal users only has started January 2009. A project progress meeting with CMA took place in April during which CMA announced that they intend to re-engineer their dissemination system towards the "New FENGYUNCast". This re-engineering shall be completed by early 2010.

NOAA have set up GEONETCast Americas and procured a service from a USA service provider. They have a C-band footprint covering north, central and south America similar to the EUMETCast Americas footprint. The capacity of GEONETCast Americas is 2 Mbps.

Work on a generic scheme for data exchange between EUMETCast and GEONETCast Americas is in progress as well as between FENGYUNCast and GEONETCast America.

4.4 Earth Observation Portal Project

The EO Portal collections discovery service, which entered routine operations in November 2008, was subject to minor upgrades, in particular the addition of new collections metadata.

The project team is currently working on the second milestone, the implementation of a centralised user registration and management system, whereby EUMETSAT users will be able to register and manage access to all EUMETSAT operational services. These include real time dissemination services, archived data and user notifications. In the meantime, the operations department has taken over the “online registration

tool" from GES and deployed it into the operational EO Portal infrastructure, to ensure that engineering enhancements are not lost and avoid duplication of efforts.

The team is also working in parallel with the HMA (Heterogeneous Mission Access) project at ESA, which will be the basis for the future GMES Data Access implementation (ESA/EUMETSAT). A Federated User Management prototype is presently undertaken to validate the interoperability of the HMA Federated User Management approach with the concepts of the EUMETSAT EO Portal User Management system. Further to this is the EO Product Search prototype (used over the last 2 years in the validation environment) transferred and enhanced into the clearinghouse architecture of the EO Portal.

The enhancements required for climatology support are currently being designed aiming for an implementation in the second half of 2009.

CNES is being approached for a bilateral implementation of the interoperability as to allow data access to altimetry data sets from either side. Initial discussions are also started with NOAA.
The impact of the RETIM project implementation for the EO Portal user management will have also to be analysed shortly. Adaptations in the EO Portal will be required to address these new types of users and the remote administration of them by Meteo France.

4.5 Metop-B Project

The launch date for the Metop B satellite is now planned to take place in the second quarter of 2012. The in-orbit phasing between Metop-A and Metop-B will be close to 50 minutes, i.e. half an orbit, as approved by Council in Autumn 2008.

Following the successful EPS System Definition Key Point (SDKP) review in May 2008, the changes to the EPS Ground Segment to support the operation of two Metop satellites in parallel are proceeding.

Simultaneous Metop-A and B Mission Control Functions (MCF) have been fully functionally tested on the Ground Segment development environment. This ensures that the ground segment will already be able to control two satellites, to cover an earlier Metop-B launch date in case of a critical failure on Metop-A. The MCF changes have also been rolled out to the operational environments. Certain aspects such as performance load testing are postponed until the IBM hardware and operating system versions have been upgraded in mid 2009 (part of planned maintenance activities), since a significant performance improvement is then expected.

In the data processing area, changes are being initiated to the related elements in the Ground Segment, in particular to the Product Generation Facility (PGF) to ensure full Metop-A and -B support is in place. A specific test of the capacity of the PGF to support the worst case scenario of 2 Metop + 2 NOAA satellites is foreseen in August

2009, and the final choice of the PGF upgraded architecture will be based on the results of this test.

A Ground Segment Key Point is foreseen in the September 2009 to review the ground segment design, followed by overall implementation tests in the Ground Segment development environment in early 2010.

The next formal milestone is the System Verification and Validation Readiness Review (SVVRR) at the end of 2010, which authorises the start of the D2 phase with the end-to-end testing of the system and operations.

4.6 Establishment of a Reprocessing Environment Project

The majority of the hardware elements for the reprocessing environment have been procured. These comprise the reprocessing EPS server, which was procured together with the EPS ground segment upgrade so as to benefit from the competitive tender prices, and an amount of storage space for the Storage Network Infrastructure, which was also procured together with the equipment being procured for the SNI upgrade also to benefit from the competitive tender prices. Therefore the major elements of the environment have been or are in the process of being installed and configured.

Additional to the hardware procurements, that proceeded faster than the expected project timeline, the normal paper processes have continued. The system design review will be completed in Q2/2009 with the readiness of the system design document and related project documents. It is expected that the review will take place at the end of July 2009.

The reprocessing MPEF software development process is continuing. The main elements related to the reprocessing framework have been completed such that the algorithms that produce the products can be plugged into the framework, executed and scheduled. The meteorological operations division are porting the algorithms to the new platform. Most of the elements that comprise the calibration chain are completed and are being tested.

The reprocessing IMPF software development process is also continuing. The IMPF changes are the subject of an ECP which will be undertaken by the maintenance contractor Astrium SAS in Toulouse. The ECP work has been delayed owing to the prototyping of performance enhancements to the IMPF software at EUMETSAT. This is both because EUMETSAT has direct access to the reprocessing server, and also because EUMETSAT has experts in the IMPF software that wrote those parts of the software that must be tuned to the reprocessing server. The changes performed were focussed on utilising the server more efficiently. These were necessary as the server actually performs slower than the smaller operational servers with the current software. A combination of system level changes, such as RAM disks, and software changes, such as multi-threading and resource blocking, have lead to significant improvements in the processing performance. As these changes are complex and intricate it was decided to assign Astrium the operational aspects of the changes and

then merge the performance changes produced by EUMETSAT into a release provided by Astrium.

It is expected that the full environment shall be available to run processing software chains by the middle of Q4/2009.

4.7 MASIF Project

The main objective of the project is to provide a **Monitoring and Reporting Portal** to the operational personnel/users.

The MASIF project aims at consolidating a centralized Monitoring & Reporting infrastructure compatible with current multi-missions requirements and scalable for future mission's integration.

The main functions covered by the MASIF project are:

Near-real time Service monitoring

Service Performance Reporting

Therefore, the MASIF project will encompass the operational migration of the existing software:

GEMS - Generic Event Monitoring Software

SMART - Scheduling Monitoring Analysis and Reporting Tool

SMS Viewer - Supervisor Monitor Scheduler

SPRS - Service Performance Reporting System

The approval and Kick-Off of MASIF project was given in September 2008, the completion in the course of 2009.

The initial scope of the MASIF project included additional tools which were removed from MASIF in January 2009 with the intention to cover them within another dedicated project. This allowed MASIF to concentrate on the more urgent operational needs. The second project (called ARGUS) aims at hosting the engineering tools which could not be hosted in the initial MASIF infrastructure design. The ARGUS project will be described in a dedicated section at the next status report.

The procurement, installation of the OPE and VAL MASIF environments were performed in 2008. The dedicated workstations for operators have been installed. The SMART, SMS and SPRS have reached the pre-operational states in spring 2009. In addition, MASIF SMART services have been designated to host the RETIM service monitoring which has been taken on board during this period.

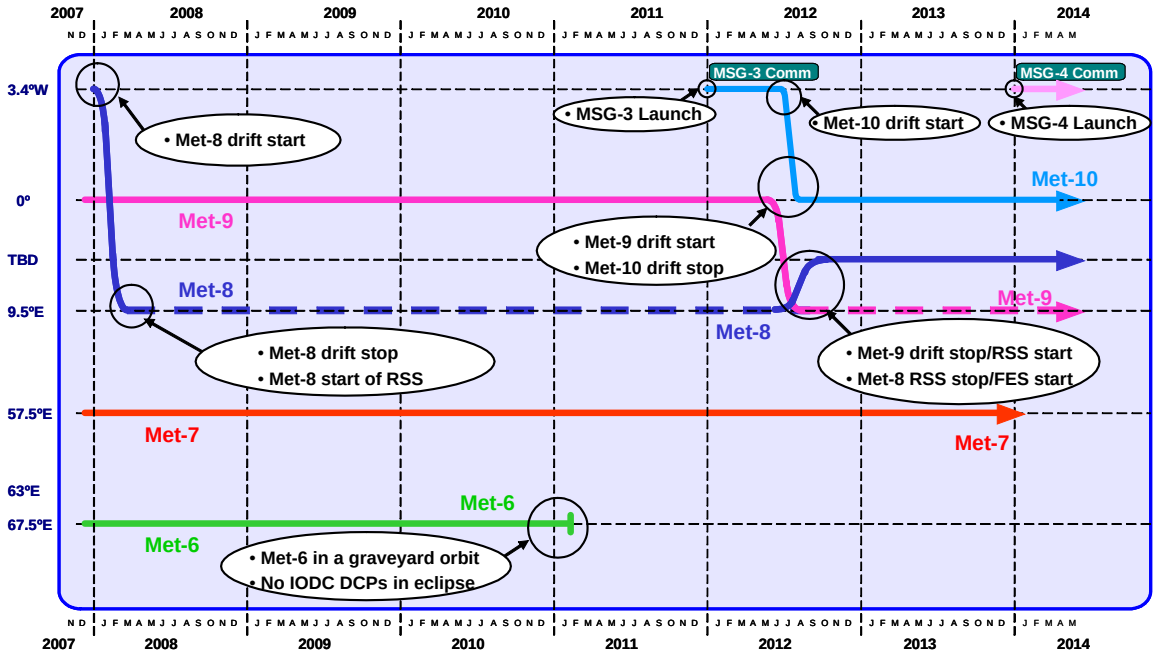
In order to declare MASIF services operational, the last major step of the project aims at migrating the GEMS services and obtains the necessary control on the acquisition chain of the centralized monitoring and reporting portal. It requires careful coordination as it affects multiple facilities and programs. The MASIF planning foresees completion before end of year 2009 as agreed.

Some extended capabilities allowed by this project will directly benefit the operations activities and the end-user community by publishing near-real time service reporting and completing the Operational Service Status Indicator (OSSI) with a detailed view.

4.8 MSG-3 and MSG-4 Ground Segment Upgrade Project

The MSG-3 and MSG-4 Ground Segment Upgrade Project refers to the implementation in the existing MSG Ground Segment of the changes agreed by the 66th Council as part of the MSG-3 and MSG-4 Operational Scenario. The objective of the upgrade is to add a 3rd imaging chain (including an additional antenna) so that the MSG-3 and MSG-4 Operations preparation can be carried out without the two 1-year interruptions to the RSS that would be otherwise unavoidable (see paper EUM/C/66/08/DOC/15).

The availability of a 3rd imaging chain would allow implementing the operational scenario shown in the following figure (in the figure, FES stands for Full Earth Scan).



The operational scenario of the above figure is built on the following main facts and assumptions:

a. Met-6 needs to be re-orbited early in 2011 as, by that time, the fuel level will reach the minimum threshold for a safe re-orbiting as per the space debris mitigation rules;

b. MTP operations have been extended till end of 2013;

c. MSG-3 and MSG-4 launch dates have been postponed to Jan 2012 and Jan 2014, respectively;

d. Met-8 provides RSS till end of MSG-3 commissioning;

e. Meteosat-9 takes over RSS from Meteosat-8 after successful commissioning of MSG-3 (Meteosat-10);

f. Met-8 is retained in orbit at least till end of MSG-4 Commissioning (as opposed to re-orbit it after MSG-3 end of Commissioning). This is to increase the MSG system robustness - i.e. to better cope with a launch failure or a major in flight anomaly. In addition Met-8 is operated in imaging mode at least until 6 months before launch of MSG4 to be a fast backup either for Met-10 or Met-9.

The main elements of the 3rd imaging chain are:

An additional antenna at the MSG Primary Ground Station in Usingen (i.e. next to the existing 2 other PGS antennas) to receive the image data and monitor and control an MSG S/C;

An additional Image Processing Facility instance to process a stream of raw image data;

An additional Meteorological Product Extraction Facility instance to extract the Meteorological Products

An additional Archiving and Retrieval instance

A temporary capability (as this is necessary only during commissioning) to disseminate a 3rd stream of image data and meteorological products derived from the satellite in commissioning

Minor adaptation of other facilities for MSG-3 and MSG-4.

The project, after approval of the related operational scenario at the 66th Council in Dec 08, has completed the design phase and started the procurement and implementation phase after a successful System Design Key Point review which was held in Feb 09. This includes the release of the relevant Request for Quotation for the procurement of the 3rd PGS antenna.

The implementation phase (with the exception of the 3rd antenna) will be completed in early 2010. The 3rd antenna should be available before end of 2010 to allow end to end verification of the MSG ground segment upgrade well in advance with respect to the MSG-3 launch date and before the start of the MSG-3 Operations Preparation phase.

4.9 SARAL Project

SARAL (Satellite with ARgos and ALtika) is a joint CNES/ISRO programme. EUMETSAT has been requested by CNES to consider supporting SARAL in line with the support provided for Jason-2. The potential role of EUMETSAT will essentially be the routing of various data and products, as well as the processing and dissemination of the Near Real Time altimetry products from the mission.

A paper on EUMETSAT's involvement in SARAL has been presented to the spring 2009 round of Delegate Body meetings, starting with the J-STG-AFG. The current situation is that Council unanimously approved, as uncontroversial, the concept for EUMETSAT's involvement in SARAL, as outlined in section 4 of EUM/C/67/09/DOC/24, as a baseline for starting negotiations with CNES.

In addition, Council tasked the Secretariat to negotiate with CNES an exchange of letters establishing EUMETSAT's tasks in the SARAL mission, in the frame of the Jason-2 Cooperation Agreement, notably of Article 17 thereof, based on the elements described in section 4 of the above referenced document. The draft exchange of letters will be presented to the autumn 2009 round of Delegate Body meetings.

As per the paper presented to Council, EUMETSAT's role in the SARAL mission will be as listed below, pending final agreement with CNES:

Provide support to system engineering and operations
Perform NRT processing of Altika payload instrument data
Perform NRT dissemination of the generated products via EUMETCast and GTS/RMDCN
Archive the generated NRT products in the Data Centre
Distribute payload instrument data and auxiliary data to both CNES and ISRO (note: in the case of ARGOS-3 data, they should also be sent to Washington, as for ARGOS data from Metop-A).

More information on the SARAL mission and EUMETSAT's involvement in it can be found in the dedicated paper (EUM/STG-OPSWG/26/09/DOC/11).

4.10 RETIM on EUMETCast Project

The RETIM on EUMETCast Project started early 2009 in response to a request by Meteo France to analyse the feasibility to migrate RETIM onto EUMETCast.
In the first quarter 2009 a rapid prototyping approach has been taken to implement all major RETIM requirements on EUMETCast and define a number of real-time test scenarios. The respective tests have been passed successful and lead to the authorisation of Meteo France to begin with the implementation phase. Parallel to the technical project activities a specific cooperation agreement between EUMETSAT and Meteo France has been developed and finally approved by council in July 09.

5 CONCLUSION

The CGMS-37 is invited to take note.