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STATUS OF THE METEOSAT SYSTEM

This paper reports the status of the Meteosat System from Oct 09 till June 10.

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 Meteosat satellites during the reporting period.

It should be noted that Met-6 will need to be re-orbited in April 2011.

In view of the Met-6 re-orbiting, a different configuration for Met-7 has been tested in the 1st half of the spring 2010 eclipse season to confirm the capability of Met-7 to take over the IODC DCP mission from Met-6. This test was successful and has increased the confidence on the capability of Met-7 to support the IODC DCPs also during eclipse crossing. Further tests are planned in the autumn 2010 eclipse season to confirm these positive findings.

Status of the Meteosat System

1 INTRODUCTION

This paper reports the status of the Meteosat System from Oct 09 till June 10.

2 OVERVIEW

During the reporting period the operations of the MTP system have been smooth, including the spring 2010 eclipse season during which both Met-6 and Met-7 have shown fully nominal behaviour. In particular a different on board configuration has been tested for Met-7 during the first half of the spring 2010 eclipse season. The objective was to verify the capability of Met-7 to support the IODC DCP mission (currently assigned to Met-6) during eclipse crossing in view of the Met-6 re-orbiting which is planned in April 2011. This Met-7 test was quite encouraging and, although not conclusive as a second test session has to be performed during the autumn 2010 eclipse, it gives good perspective for the continuity of IODC DCP service (and the Tsunami Warning System) with Met-7.

Similarly the MSG system has performed well in this reporting period and for both Met-9 and Met-8 the spring eclipse season has passed without any major issue.
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 and from mid August to end of October, 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 a recurrent issue in the instrument scanning mirror control loop that, if occurring when the direct sunlight is visible, could lead to the burning of several detectors.
The following outages were observed during the reporting period:

On 9 Oct 09 at 14.21 UTC the Meteosat-8 Mission Communication Payload (MCP) electronics unexpectedly changed mode from Normal to Fixed with the effect that the Met-8 SEVIRI raw image, although acquired, was no longer received on ground. The anomaly was immediately correlated with a similar one (which occured on Met-8 on 14-6-03) and after confirmation with Thales Alenia Space the satellite was commaded back to its nominal configuration. The RSS outage caused by this occurrence was from 14:20 till 15:10 UTC.

On 5 May 10, three Met-9 SEVIRI Repeat Cycles were not fully received on ground due to an anomaly on the Primary Ground Station which led to de-point the Met-9 antenna away from the satellite. This also caused the loss of the corresponding meteorological products.

3 SPACE SEGMENT

3.1 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 2010 it is estimated that 121.42 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 one 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. If 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 or significant anomalies have occurred during the reporting period.

3.2 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 2010 it is estimated that 56.10 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.

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 some of the space debris mitigation regulations) at least till Jan 2014. 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.

Met-8 MDU chain error anomaly

The Main Detection Unit (MDU) of the Met-8 SEVIRI shows an anomaly that is of intermittent nature. Each time the anomaly occurs, the images of the SEVIRI channels 9.7, 12.0 and 13.4 of Met-8 have the current and valid line of the image is replaced by the previously acquired image line (i.e. the same image line is down-linked twice by SEVIRI). Although the impact of the anomaly is minor both because these events are not very frequent (at the end of June 10 less than 150 events per day are observed in total for the three affected channels) and because the ground processing removes the duplicated line and replaces it by an interpolated image line, there is a concern about its potential evolution as an increasing trend in the occurrence frequency has been noticed in the past. This is has been investigated in orbit by means of MDU switch off/on cycles. The in orbit test results and the design of the MDU have been analysed in an industrial study which is now completed. The study concludes that most credible root cause is an intermittent self-generated electronic noise inside the SEVIRI MDU itself. As part of the study, industry considered a corrective action for the MDU on MSG-3 and on MSG-4. However, as the corrective action does not remove the root cause but rather it hides the effects of it, there is a concern to implement this fix on MSG-3 and 4 as the side effects could be worse than the anomaly to fix. In addition, the Redundant MDU of Met-8 does not show the anomaly and a MDU power cycle seem to greatly reduce the rate of occurrence. In view of the above and jointly with ESA and industry it has been decided to not modify the MSG-3/4 MDUs and some operational recommendations have been agreed to cope with this in orbit anomaly for MSG-1 and MSG-2.

3.3 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 2010 it is estimated that 7.62 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 (called MST) to uplink satellite commands. However, recent testing has shown that MST ranging is possible with the only available MST receiver which still locks on the ground station carrier. This is good

news as it increases our flexibility and reliability both at S/C and ground station level. All measures are in place to limit the operational risks due to this anomaly.

On 8 Feb 10 at 22.20 UTC the Meteosat-7 radiometer detection electronics unexpectedly changed gain for both infrared and water vapour channels. This caused about 15 slots with degraded image in these two channels. This is a re-occurrence of an anomaly which is caused by a SEU on the radiometer detection electronics. As this anomaly is not visible via the standard telemetry of the satellite, a detection algorithm based on the image brightness is currently under test to provide alarms in case of re-occurrence so that the duration of the outage can be reduced.

After re-orbiting of Met-6 (in April 2011, see below), the IODC DCP mission should be taken over by Met-7. However, due to the weakness of the Met-7 batteries as reported in several past occasions, ensuring continuity of the IODC DCP mission with Met-7 also during eclipse crossing is a challenge. Therefore an activity has been initiated to define a Met-7 on-board configuration which allows the IODC DCP mission to continue with minimum electrical power load. After investigation the most promising configuration is the one using the Power Amplifier 1 (PA1) and the Toroidal Pattern Antenna (TPA). This Met-7 configuration should allow to support the IODC DCP mission during eclipse despite the net power load increase of about 40% with respect to the current one. To confirm these analyses, a first test was performed with Met-7 on 19 Nov 2009. The test was successful and confirmed that the above configuration actually allows reception and transmission of IODC DCPs. Following this, a second and more important test has been performed during the 1st half of the spring 2010 eclipse to verify the impact of the increased power load on the Met-7 batteries. This second test was also successful and confirmed the validity of the S/C configuration used in eclipse. A last set of tests will be performed during the autumn 2010 eclipse to remove any residual concern regarding the Met-7 batteries. If this last test is also successful, the IODC DCPs after Met-6 re-orbiting will be provided by Met-7 also during eclipse crossing. As usual, the trend of the Met-7 battery performance during eclipse will need to be closely monitored in the future to detect any sign of degradation due to the increased power load to support the IODC DCP mission

3.4 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 2010 it is estimated that 3.86 kg of fuel are available. In general 3.9 kg of fuel are reserved for re-orbiting at end of life, however, for Met-6 after joint EUMETSAT/Industry analysis it has been found that an inaccuracy in the calibration factor of the thrusters is likely to have led to an over-estimation of the fuel consumption. A detailed analysis of the errors on the fuel budget has been executed taking into account not only the history of fuel consumption, but also Met-6 on ground calibration data provided by Thales Alenia Space. Following such a detailed analysis a final decision about the Met-6 re-orbiting date has been taken and Met-6 will be re-orbited in April 2011.

Due to the small amount of fuel left no orbit inclination manoeuvres can be performed and only nominal longitude and attitude control will be performed till April 2011.
The spacecraft configuration status remained stable. No significant spacecraft anomalies occurred on Meteosat-6 during this reporting period.

4 METEOSAT GROUND SEGMENT

4.1 Meteosat Second Generation (MSG) Ground Segment

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

Image Processing Facility: operations have been smooth and reliable. Regular maintenance continues to solve minor software issues and prepare for MSG-3.

Primary and 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 of Met-8 and Met-9 are performed in alternance with PGS and Back-up and Ranging Ground Station (BRGS) in Maspalomas. Both PGS and BRGS are regularly maintained to cope with obsolescence. Preparation is on going to include a 3rd antenna in PGS to avoid interruptions of Rapid Scanning Service at the time of MSG-3 commissioning.

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 no further updates to the operational MPEF have been performed. The available resources have been concentrated on the MPEF hardware change from HP-workstations to SUN servers. Due to the changed operating system and compilers the software did undergo significant changes. At the end of the reporting period the system shall be ready for system verification followed by a validation phase.

To support the users within the 2010 summer convective season, a part of the system has been made ready to generate the global instability index (GII) and the regional instability index (RII) for Meteosat-9 at higher resolution. The global product has a 3x3 pixel resolution, while the regional product is a pixel product for Europe. These products are disseminated via EUMETCast Trial Service as GIIHD and RIIHD products. The renaming was required to avoid interference with the operational GII and RII products. However, when the new MPEF becomes operational the GIIHD and RIIHD shall be renamed to GII and RII, respectively.

4.2 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.

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

Primary and 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.

In June 2010, 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.

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-7	IODC Service	2006- present	0% Planned
Meteosat-3	ADC Service	1991-1993	0 % Planned
Meteosat-3	XADC Service	1993-1995	0 % Planned

The algorithm software porting to the next generation reprocessing facility RMPEF-2 has completed. The above planned activities shall be performed using the Geostationary Surface Albedo (GSA) algorithm. The GSA is a modified version of the MSA algorithm. While the GSA algorithm generates exactly the same product as the MSA algorithm, the interface has been modified to be able to cope with image data from various spacecraft and from various positions. This change was mandatory in the framework of the SCOPE-CM, where the GSA algorithm is also used by JMA for historic GMS data. The verification of the GSA algorithm has been completed. In addition the verification of the MFG clear sky radiance and cloud motion vectors is near completion.

4.3 EUMETSAT Data Centre

After six months of operations from the beginning of 2010, the Data Centre Archive is still experiencing increasing retrieval rates, currently yielding 695 Terabytes. If this continues, the estimated yearly retrieval amount will be 1.36 Petabyte, a 36% increase compared to the 1 Petabyte milestone in 2009. The amount of data retrieved in the first half of 2010 already exceeds the size of the Data Centre Archive (523 Terabytes). These values not only highlight the growing user demand but also demonstrate the importance of the Data Centre for our users and that the Data Centre is more than a safe data store.

Numerous archive software upgrades have been released, improving the robustness and performance of the Archive. Most notable updates benefiting the Data Centre Archive users are:

New Product, Format and Delivery (PFD) Servers; these servers will substantially improve the processing performance of user orders.

Implementation of a PFD server dedicated to the planned reprocessing of EUMETSAT data sets. The first reprocessing campaign will reprocess the MSG15 data set. The reprocessing environment is still in development but the Data Centre Archive is now ready to support this activity.

Data Centre Archive upgrades to support MSG 3/4 data streams.

Integrating the Data Centre user registration into the Earth Observation (EO) Portal.

The following 2 new products have been made available from the Archive in 2010:

New Data Centre Product	Product Supplier	Product Navigator Reference
LSAET: Evapotranspiration - MSG	Land SAF	EO:EUM:DAT:MSG:ET
OSIDRGB: Low Resolution Sea Ice Drift - Multimission	OSI SAF	Update in progress.

The following future activities are currently in progress or being planned:

The EUMETSAT Format Advisory group, a cross organisational EUMETSAT working group, recommended netCDF as an additional delivery format for the Data Centre to the STG OPS-WG. This was positively received so the Data Centre is planning the resources needed to support the activity of providing a netCDF format for Archive products.

An external study has been commissioned by the Data Centre Engineering team to introduce OGC WMS/WCS (Open Geospatial Consortium Web Map Services/Web Coverage Services, see http://www.opengeospatial.org/) services into the Data Centre applications. The study will result in the development of proof-of-concept prototypes to confirm the use of these standards for improving the operational services offered by the Archive. These prototypes are then evaluated and those deemed to be operationally useful will be used to upgrade the services offered by the Data Centre Archive.

For security and redundancy, all images and products in the Data Centre Archive are stored on minimum two types of media. The primary copy is stored on T1000 tapes and it resides 'near-line' in the Archive robots. The secondary copy, known as the 'backup/off-line copy' is stored on LTO-4 tapes which are then transported offsite to a secure location for storage. To ensure both types of media do not degrade over time, automated 'media health check' solutions are currently being evaluated to ensure the integrity and recovery of all data sets in the Archive. The recommended solution will then be introduced into the routine operations of the Data Centre Archive.

The EUMETSAT Global Space-based Inter-Calibration System (GSICS) Data and Product server (http://gsics.eumetsat.int) has been operational for over 1 year. The server provides a platform where international partners can upload observational data sets of comparable spectral, geographic and temporal sampling in a common format. These can be used by global experts to create inter-calibration products to improve the accuracy of data received from current operational satellites. The

products themselves can then be uploaded to the server for user application. Demonstrational GSICS calibration products are now available on the server for validation. It is expected that validated and operational useful data sets will be available from this server and the Data Centre Archive in the near future.

The Data Centre online FTP 'push' delivery is to be replaced by an online 'pull' service. User orders will no longer be transferred directly to their FTP servers but to a Data Centre administered Internet server ensuring server and disk resources availability. Users will be notified by Email once their orders have been transferred to the server and they can download the orders at their convenience.

4.4 Power and Building Infrastructure

All the UPS systems (UPS1+2, UPS 3+4 and UPS 5+6) have performed nominally during the period.

Building infrastructure

The detailed design phase of the new Operational Infrastructure Building is now completed. The ITT process initiated early 2010 allowed to select a clear winner and the corresponding Contract Proposal was approved at the June Council. The detailed preparation work has reached a level allowing the actual construction work to start. The construction permit has been obtained in the course of spring 2010. According to the current planning, the construction work should start end September 2010 and the building should be completed by the end of 2011.

5 SERVICES PERFORMANCE

5.1 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) and were mainly weather related.

At end of June 2010 there are 1020 DCPs allocated and 590 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.

5.2 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 planned interruptions due to the regular full earth imaging periods performed to preserve the Met-8 SEVIRI scan mechanism.

5.3 IODC Service Performance

The IODC service performance was nominal for the reporting period with monthly end to end availability figures above 99%.

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

In June 2010 there are 48 DCPs allocated and 41 of them are active. The acquisition and dissemination of IODC DCPs was nominal during the reporting period.

5.4 Foreign Satellite Data Service Performance

EUMETSAT receives image data from Météo France (Lannion) hourly for retransmission via EUMETCast to end users. Image data is from NOAA (GOES-11 and GOES-13) and from JMA (MTSAT-2).

For this reporting period (January 2010 through June 2010) the performance of the retransmission service was 99.27% for all data.

There were no significant data outages of any of the Foreign Satellite Data Service spacecraft.

5.5 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:

03/01/2010 - 19/01/2010	Miami station outage
01/10/2010	NOAA17 AVHRR Scan Motor Instabilities causing data drop-outs
19/01/2010	Athens, Kangerlussuaq, St Denis and Svalbard station outage – scheduling software problem at the station
10/03/2010 - 14/03/2010	EARS-ATOVS producing incomplete NOAA17 product sets (related to NOAA17 instrument problem)
20/03/2010 & 20/03/2010	FDES outage impacting EARS-ASCAT and ATOVS - antenna issues
16/05/2010	EARS-ATOVS service outage for 3 hours - delay in delivery of products. EUMETSAT server issue
23/05/2010	Svalbard station outage – Antenna control hardware issue at the station
11/06/2010 - 14/06/2010	Edmonton station outage during system upgrade

There is an ongoing 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.
There is very poor quality data from Ewa Beach and Miami stations. Particularly NOAA16 as it is being received using incorrect polarisation. NOAA is planning to upgrade the station.
NOAA schedule information is generally unreliable - especially for Ewa Beach and Miami stations.

NOAA15 and NOAA18 data from NOAA Gilmore Creek and Wallops Island stations are generally provided late (low priority spacecraft).
From January the NOAA17 AVHRR instrument began suffering scan motor issues and as consequence, degraded product quality. In March NOAA considered the NOAA17 AVHRR data as unusable due to increased degradation of the Scan Motor's performance.

5.6 Jason-2 Service Performance

During the period from 1 January 2010 until 30 June 2010, the Jason-2 System provided good operational service with high availability and good timeliness. Table 1 gives the performance of the system over the last 6 months with respect to the requirements.

Data received in:	Less than 3 hours from sensing (requirement is >75%)	Less than 5 hours from sensing (requirement is >95%)
January	91.13%	99.76%
February	92.54%	99.50%
March	91.11%	99.78%
April	90.94%	99.68%
May	85.71%	96.67%
June	85.61%	99.05%
Overall Q1+Q2	89.51%	99.07%

Table 1: Overall Jason-2 Service Performance

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 2010	- 3 problematic passes at Fairbanks, requiring a late re-dump of data; - Disconnection between EUMETSAT and NOAA, resulting in late delivery of products.
February 2010	- 1 problematic pass at Fairbanks, requiring a late re-dump of data; - 2 problematic passes at Wallops, requiring a late re-dump of data; - Link outage between EUMETSAT and Usingen, resulting in a lost pass at Usingen, requiring a late re-dump of data.
March 2010	- 2 problematic passes at Wallops, requiring a late re-dump of data; - 3 passes lost at Usingen due to an Earth Terminal anomaly, requiring a late re-dump of data; - Delay processing data at NOAA/SOCC, impacting timeliness of one OGDR.

April 2010	- 2 problematic passes at Fairbanks, requiring a late re-dump of data; - 2 problematic passes at Wallops, requiring a late re-dump of data; - 1 problematic pass at Usingen, requiring a late re-dump of data; - Problems at NOAA/ESPC, one OGDR delivered late; - EUMETCast problem, one OGDR delivered late.
May 2010	- 1 problematic pass at Wallops, requiring a late re-dump of data; - Several occurrences of NOAA/SOCC connection problems to Fairbanks and Usingen, 5 passes lost requiring a late re-dump of data; - Near-real time processor anomaly at EUMETSAT resulting in 4 OGDRs being delivered late.
June 2010	- 5 passes lost at Usingen due to an Earth Terminal anomaly, requiring a late re-dump of data; - 3 passes lost at Fairbanks, requiring a late re-dump of data; - EUMETCast problem, one OGDR delivered late.

5.7 EUMETSAT Data Centre Performance

This brief summary provides some operational figures for the first half of 2010. The Data Centre Archive ingests on average 270 Gbytes of data per day depending on satellites configuration, reprocessing activities and SAF products ingestion. After 6 months, the Data Centre Archive contained approx. 25,727,500 files and was 523 Terabytes in size. 3043 users were registered increasing on an average of 61 users per month. These users ordered a monthly average of 17,710 orders retrieving around 50,504 files. This amounts to 115.88 Terabytes of retrievals per month of which 23.6 Terabytes were delivered to the user.

5.8 User Helpdesk

The EUMETSAT User Helpdesk responded to a total of 2103 requests from the user community during the reporting period January to June 2010, of which approximately 80% were from Member and Cooperating States countries.

6 PROJECTS

6.1 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 are ongoing to select the hardware platform. The procurement of these new servers will take place in the coming months followed by their installation onsite.

Within the EARS IPVPN, hardware upgrades and configuration changes took place during early 2010.

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

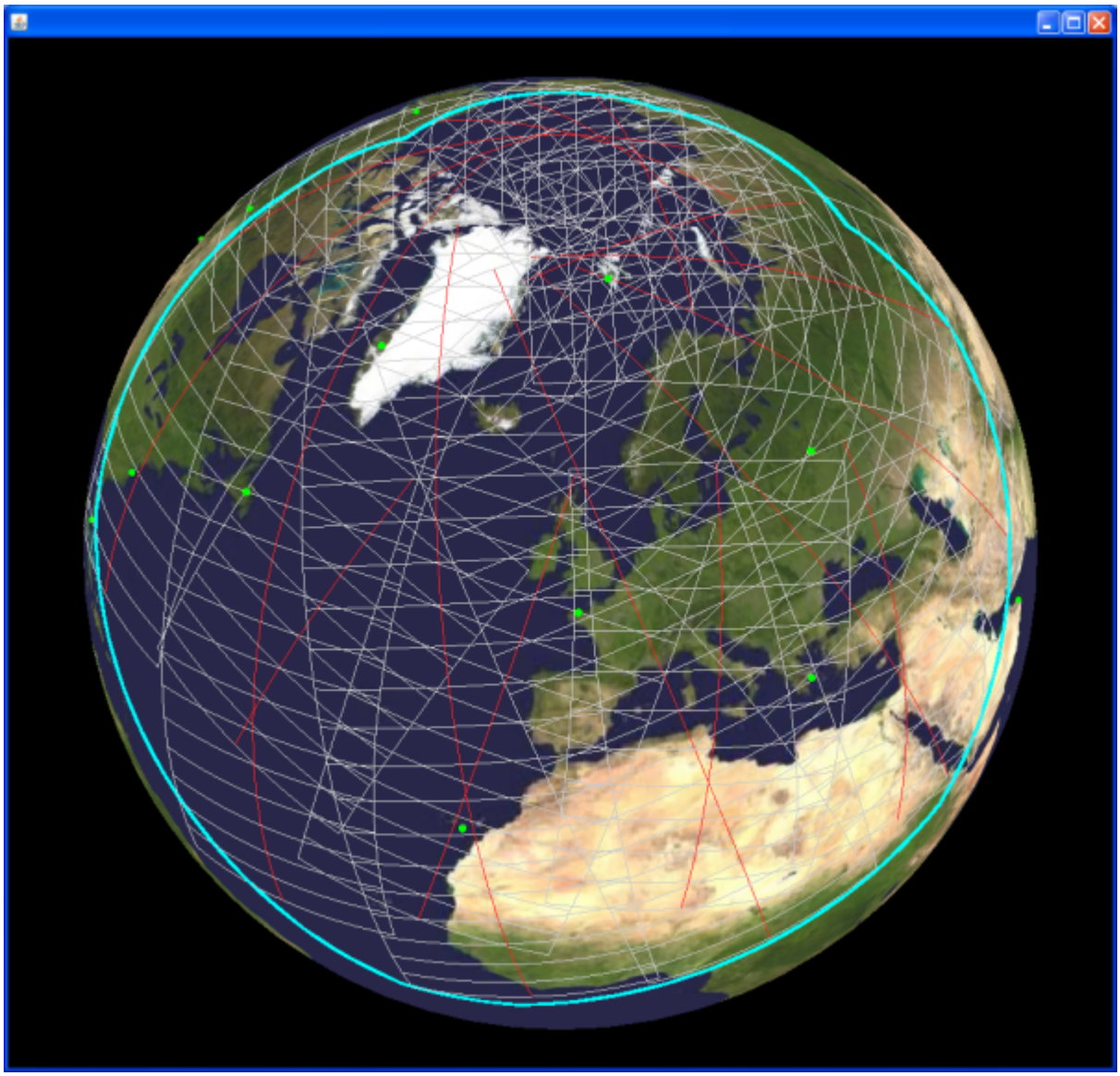
Metop-A HRPT data was integrated into the EARS-AVHRR service on 16 March with data from the Lannion, Maspalomas and Athens stations.

The Moscow station data provided by Roshydromet (SRC Planeta) were successfully integrated into EARS-ATOVS service and dissemination to users started on 11 February. This was followed by integration into EARS-AVHRR service on 14 April.

Work on the integration of Muscat station into the network continues.

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. This system has already been used to support the EARS-ASCAT service. During this period further use of the FDES data took place with integration into the EARS-ATOVS service on 9 March and EARS-AVHRR services on 23 June.

The EARS-AVHRR Metop-coverage (FDES plus HRPT stations) is illustrated by the figure below:



24 hours of EARS-AVHRR Metop-A : HRPT stations and FDES.
Each white rectangle represents a 1-minute AVHRR segment as distributed by EUMETCast.

Extending the use of the FDES data for IASI will follow in due course.

6.2 EPS Global Data Timeliness Project

Work is continuing on the upgrade of EUMETSAT facilities to support the extra global data stream (half–orbit) to be acquired via the McMurdo Antarctic station and to ensure the overall robustness of the EUMETSAT system to any data reception problems. Preliminary interface compatibility testing is on-going between the US Front End Processor (which will be sent to McMurdo) and the EUMETSAT DEW interface unit. In addition work has commenced on the detailed design and implementation of changes in the domain of mission control and planning to ensure proper planning and control of McMurdo dumps.

A Ground Segment Design and Implementation Key Point (GSDIR) has been completed in June 2010 together with the Metop-B project incorporating the Critical Design Review of the EUMETSAT site facility upgrades. The review highlighted the criticality of the schedule to achieve readiness for data downlink over McMurdo from December 2010 and data processing validation from January 2011, with a target start of the dissemination of high timeliness operational products from May 2011. In particular, the interface definition with the McMurdo station and with the operations and planning entities in the US are not yet formalised. Noting that the both EUMETSAT and NOAA had progressed significantly to define these interfaces and that there are clear plans to achieve their formalisation by the end of the summer period, the review found that it remains viable to include the timeliness improvement upgrades in the validation ground segment, together with the Metop-B support upgrades. The progress will be formally reviewed again at the SVVRR in Q4 of this year.

NOAA/NASA will hold the Pre-Shipment Review at end August 2010 for ground station equipment required for support of Metop at McMurdo, coupled with an all party coordination meeting prior to the departure of US engineering teams to the McMurdo site.

Regarding the transition to high (but variable) timeliness data and product delivery from EUMETSAT to end users, a separate presentation has been prepared for the STG-OPS WG.

6.3 Earth Observation Portal Project

The EO Portal collections discovery service, which entered routine operations in November 2008, was subject to minor upgrades, in terms of functionality:

- the extended search was enhanced to include a drop down list for 'parameters';
- the metadata is now available directly in XML format for download;
- thumbnail images are displayed in a more optimal way;
- minor fixes on the GEONETCast distributed version;

Generally new collections metadata is continuously added the keep the collection discovery service up to date.
The enhancements required for climatology support have not been addressed due to lack of input.

The centralised user registration and management function, whereby EUMETSAT users are able to register and manage access to all EUMETSAT operational services, entered routine operations in January 2010. Work has been continued for the integration of the Data Centre into the user registration tool, which is aimed to be completed by September 2010. Automating the interface to the EUMETCast Administration tool (still a manual activity but transparent to the end users) and the integration of the UNS is to be followed after the Data Centre integration, still within 2010.
The implementation of the OGC interoperable HMA Ordering service implementation has been completed. It is still required to integrate/ test this service within ESA HMA Portal (DAIL).
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). Input was provided for metadata extensions and improvements such as for Radar Altimetry products and features specific to EUMETSAT data.

Work was continued on the prototype for the enhancement of the web image visualization system to provide meteorological data using WMS (Web Map Services)/ WCS (Web Coverage Services). The prototype is planned to be finalised in September 2010. The results from this will be used for the enhancement of the IPPS system.

The EO Portal clearinghouse was enhanced to host for the WMO/ WIS project an SRU (Search/Retrieve via URL) adapter to the Collection Catalogue CSW interface.

6.4 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.

The changes to the EPS Ground Segment to support parallel operations of the Metop-A and Metop-B satellites are proceeding nominally.

A Ground Segment Design and Implementation Key Point (GSDIR) was successfully held in June 2010, reviewing the results of the Metop-B testing performed on the development ground segment (GS-3). These tests included the mission control and data processing functions as well as the corresponding hardware and operating system upgrades; a number of anomalies were found but it is anticipated that they will be fixed by system tuning. The review confirmed that the ground segment configuration can be rolled out onto the validation ground segment (GS-2) for system testing.

On the satellite side, the Metop-B Payload Module is currently undergoing thermal vacuum testing in ESTEC.

The next major 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.

6.5 Establishment of a Reprocessing Environment Project

The implementation and verification phases of the Reprocessing Environment are complete. The hardware has been fully integrated and maintenance verified. The servers have been handed over to their intended users with the intension that they perform operational validation at a time when they are ready to start major reprocessing operations. Each operational validation step will be preceded by an Operational Readiness Review. Once all of these ORRs are completed, the project shall be closed.

The MTP MPEF reprocessing system is awaiting a test readiness review prior to the start of reprocessing the MTP MPEF products. This is scheduled to task place in Q3 2010.

The MSG IMPF reprocessing system is awaiting the delivery of release 1.2.10.0, the release of the IMPF software produced by both EUMETSAT and Astrium and tuned for 30 times near real-time performance. This is scheduled for Q3 2010.

The EPS reprocessing system is awaiting the next GOME reprocessing operation, scheduled for early 2011.

6.6 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 encompasses 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 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 involved the migration of all GEMS services permitting the necessary control on the acquisition chain of the centralized monitoring and reporting portal. This required careful coordination since it affected multiple facilities and programs.

After a cautious parallel operations period, the migration of operational monitoring to MASIF took place in mid November 2009. Followed by a noticeable amount of individual configuration changes of GEMS clients/servers to be migrated to MASIF, the last client was migrated in January 2010.

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. The

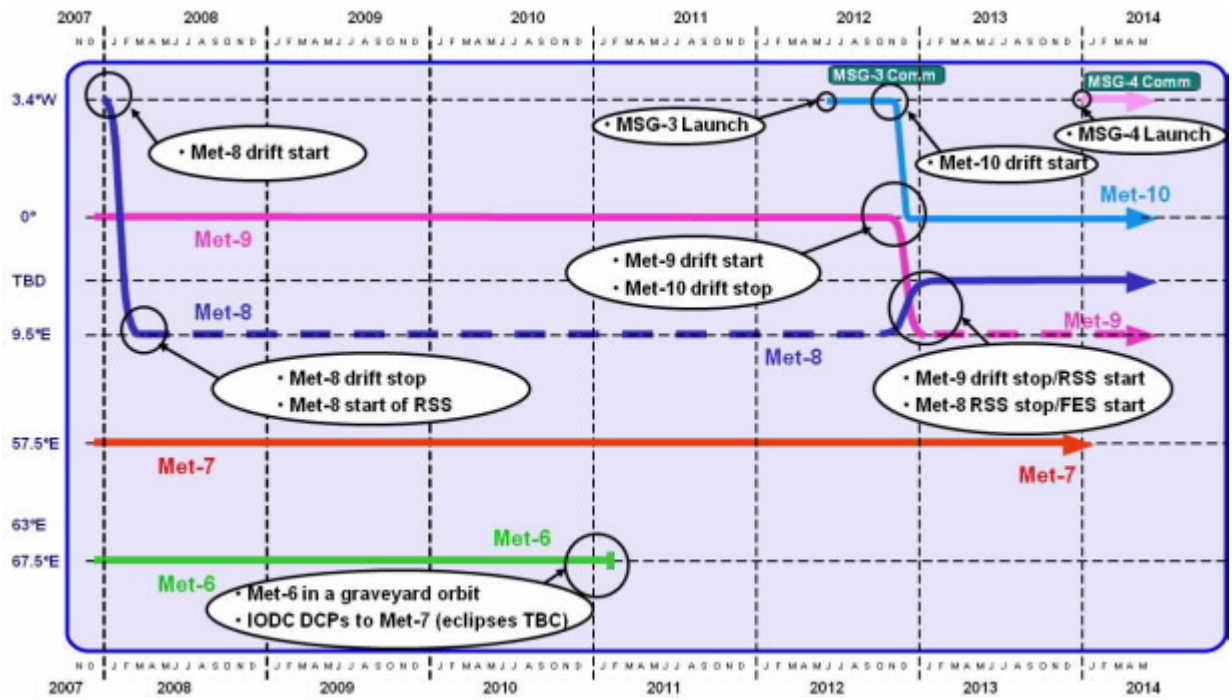
prototyping phase and requirements consolidation effort have started and will lead to an implementation in 2010.

The MASIF project closure is awaiting documentation completion and a final Operational Readiness Review which is currently planned for August 2010.

6.7 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 will be re-orbited in April 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 launch date has been postponed to June 2012 following discussions with Arianespace as this is the first launching opportunity for MSG-3 in 2012;
d. MSG-4 launch date is in Jan 2014;
e. Met-8 provides RSS till end of MSG-3 commissioning;
f. Meteosat-9 takes over RSS from Meteosat-8 after successful commissioning of MSG-3 (Meteosat-10);

g. 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 implementation phase (with the exception of the 3rd antenna) is near to completion and a Verification Readiness Review will be held in Sept 10 after which testing of the 3rd imaging chain will start. Once the 3rd PGS antenna will be available (in Dec 2010) a second testing campaign will take place in Spring 2011 to complete the final end to end verification of the MSG ground segment upgrade. This is well in advance with respect to the MSG-3 launch date and allows to start the MSG-3 Operations Preparation phase in time for a MSG-3 launch in June 2012.

6.8 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 role of EUMETSAT in the SARAL mission will be to provide:

- NRT processing of AltiKa payload instrument data;
- NRT dissemination of the SARAL products via EUMETCast and GTS/RMDCN;
- Archiving of the SARAL products in the Data Centre;
- Coordination with CNES for the set-up, validation and operations of the SARAL ground segment at EUMETSAT.

Since December 2009, design activities started at EUMETSAT, as well as the hardware procurement. In April 2010, CNES delivered the near-real time processor to EUMETSAT, and integration and validation tests have been successfully performed. The implementation of the Ground Segment is on-going, and the first integration/compatibility tests with CNES, the ground station in Kiruna, and ISRO have already been performed.

It is expected that the Ground Segment Overall Validation Tests involving all project participants (CNES, ISRO, SSC and EUMETSAT) will be performed towards the end of 2010.

6.9 RETIM on EUMETCast Project

The RETIM on EUMETCast Project started early 2009 in response to a request by Météo France to analyse the feasibility to migrate RETIM onto EUMETCast.

The RETIM on EUMETCast Project passed the Operational Readiness Review in February 2010 and started operations on 01st of March 2010. By end of August 2010, when the old RETIM2000 will be finally switched off, Meteo-France will have migrated all their users to EUMETCast.

7 CONCLUSIONS

This paper reports the status of the Meteosat System from Oct 09 till June 10.

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 Meteosat satellites during the reporting period.

It should be noted that Met-6 will need to be re-orbited in April 2011.

In view of the Met-6 re-orbiting, a different configuration for Met-7 has been tested in the 1st half of the spring 2010 eclipse season to confirm the capability of Met-7 to take over the IODC DCP mission from Met-6. This test was successful and has increased the confidence on the capability of Met-7 to support the IODC DCPs also during eclipse crossing. Further tests are planned in the autumn 2010 eclipse season to confirm these positive findings.

CGMS-38 is invited to take note.