DOCUMENT

MERIS CYCLIC REPORT 48TH

22ND MAY 2006 – 26TH JUNE 2006

North of Hudson Bay – CA
Ice-pack thaw around the Coats Island

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1 INTRODUCTION

The MERIS Cyclic Report is distributed by ESRIN- DPQC (Data Processing Quality Control) to keep the MERIS Community informed of any modification regarding the processor, updates of auxiliary products, anomalies of the instrument behaviour, data acquisition and processing, and finally the status of the calibration, validation, and quality control activities.
The Cyclic Report collects the inputs coming from different groups involved in MERIS data exploitation:

- ESRIN- Product Control Facility (PCF)
- Quality Working Group (QWG)
- MERIS/AATSR validation team (MAVT)
- Brockmann Consult (BC)
- ACRI-st
- Laboratoire d'Océanographie de Villefranche (LOV)
- Centre National d'Études Spatiales (CNES)
- Frei Universitat Berlin (FUB)
- Laboratoire Interdisciplinaire en Sciences de l'Environnement (LISE)

The main objective of the Cyclic Report is to provide the users community with useful information regarding the instrument performances, the data production chain, the results of calibration activities and validation campaigns, at the end of each ENVISAT cycle, which represents 501 orbits, about 35 days.

1.1 Acronyms and abbreviations

ADF	Auxiliary Data File
ADS	Auxiliary Data Server
ARF	Archiving Facility (PDS)
CNES	Centre National d'Études Spatiales
CTI	Configuration Table Interface
CR	Cyclic Report
DAC	Diffuser Ageing Calibration
DMOP	Detailed Mission Operation Plan
DOY	Day Of Year
DS	Data Server
DSD	Data Set Descriptor
EDAC	Error Detection And Correction
FR	Full Resolution
FUB	Freie Universitat Berlin
GS	Ground Segment
IAT	Interactive Analysis Tool
IDL	Interactive Data Language
IECF	Instrument Engineering and Calibration Facilities
IPF	Instrument Processing Facilities (PDS)

INV	Inventory Facilities (PDS)
JRC	Joint Research Centre
LAN	Local Area Network
LISE	Laboratoire Interdisciplinaire en Sciences de l'Environnement
LOV	Laboratoire d'Océanographie de Villefranche-sur-mer
MERIS	Medium Resolution Image Spectrometer
MPH	Main Product Header
OP	Operational Phase of ENVISAT
OCL	Offset Control Loop
PAC	Processing and Archiving Centre (PDS)
PDCC	Payload Data Control Centre (PDS)
PDHS	Payload Data Handling Station (PDS)
PDS	Payload Data Segment
PEP	Payload Exploitation Plan
QC	Quality Control
QWG	Quality Control Working Group
QUARC	Quality Analysis and Reporting Computer
RGC	Radiometric Gain Calibration
RR	Reduced Resolution
SEU	Single Event Upset
SPH	Specific Product Header
SQADS	Summary Quality ADS
WV1	Wavelength type 1 calibration
WV2	Wavelength type 2 calibration

2 SUMMARY

Cycle #48 starts on the 22nd of May 2006 and stops on the 28th of June 2006.

- No auxiliary files were disseminated during the reporting period.
- Three routine Radiometric Gain type calibrations have been successfully executed in the reporting period
- No Instrument unavailability has occurred during the reporting period.
- Two data unavailabilities have occurred during the reporting period.

Details about the start and stop of the cycle can be found in the table below.

Cycle number	48
Start time	22 May 2006, 21:59:29
Stop time	26 June 2006, 21:59:29
Start orbit	22099
Stop orbit	22599

Table 1 – Cycle Characteristics

3 PROCESSOR VERSION AND PROCESSING CONFIGURATION

3.1 MERIS Processor Release

No changes in the IPF have been performed during cycle #48. The current MERIS processor configuration is described in the table below:

IPF Version	Validity	Reference Documents
4.10	→ 2006/05/08 08:00 UTC Orbit # 21889	1. ENVISAT Product Specification [Iss_4_Rev_A / PO-RS-MDA-GS-2009] 2. MERIS Input/Output Data Definition [Iss_6_Rev_1a_010914 / PO-TN-MEL-Gs-0003] 3. MERIS Level 1b Detailed Processing Model [Iss_6_Rev_1a_010914 / PO-TN-MEL-GS-0002] 4. MERIS Level 2b Detailed Processing Model [Iss_6_Rev_1a_010914 / PO-TN-MEL-GS-0006]

Table 2 – MERIS processor parameters – version 5.02

3.2 Auxiliary data files (ADF)

Product description	Product name	Comment
Level 1 aux files		
Instrument Characterization Data	MER_INS	No changes
Processing Level 1 Control Parameters data	MER_CP1	No changes
Radiometric Calibration data	MER_RAC	No changes
Digital Roughness Model	MER_DRM	No changes
Digital Elevation Model	AUX_DEM	No changes
Land Surface Map	AUX_LSM	No changes
Attitude data file	AUX_ATT	No changes
Level 2 aux files		
Aerosol Climatology data	MER_AER	No changes
Atmosphere Parameter data	MER_ATP	No changes
Cloud Measurement Parameters data	MER_CMP	No changes
Processing Level-2 Control Parameters data	MER_CP2	No changes
Land Aerosols Parameters data	MER_LAP	No changes
Land Vegetation Index parameters data	MER_LVI	No changes
Ocean Aerosols Parameters data	MER_OAP	No changes
Ocean I parameters data	MER_OC1	No changes
Ocean II parameters data	MER_OC2	No changes
Water Vapour Parameters	MER_WVP	No changes

Table 3 – Auxiliary Data Files in use for the cycle #48

Note: The other files not included into the list change every time (ECMWF).

3.3 Level 1/Level 2 Configuration (SciHiO2)

The current operational ADF files, used in the processing from Level 0 data to Level 1b or Level 2 products, are listed in the following tables. Note that no new auxiliary files were disseminated during Cycle #48.

- Level 1 ADF configuration:

Product name	Start Validity
MER_INS_AXVIEC20030620_120000_20020321_193100_20121008_190821	21/03/2002
MER_CP1_AXVIEC20030620_120000_20020429_040000_20120920_173421	29/04/2002
MER_RAC_AXVIEC20030620_120000_20021224_121445_20121224_121445	24/12/2003
MER_DRM_AXVIEC20020122_083343_20020101_000000_20200101_000000	01/01/2002
AUX_DEM_AXVIEC20031201_000000_20031201_000000_20200101_000000	01/12/2003
AUX_LSM_AXVIEC20020123_141228_20020101_000000_20200101_000000	01/01/2002
AUX_ATT_AXVIEC20020924_131534_20020703_120000_20781231_235959	03/07/2002

Table 4 – MERIS Level 1 Auxiliary Data Files

- Level 2 ADF configuration:

Product name	Start Validity
MER_AER_AXVIEC20030620_120000_20020321_193100_20200101_000000	21/03/2002
MER_ATP_AXVIEC20030620_120000_20021224_121445_20121224_121445	24/12/2002
MER_CMP_AXVIEC20030620_120000_20021224_121445_20120321_193100	24/12/2002
MER_CP2_AXVIEC20031120_104149_20021224_121445_20121224_121445	24/12/2002
MER_LAP_AXVIEC20030715_151450_20020321_193100_20120321_193100	21/03/2002
MER_LVI_AXVIEC20030620_120000_20020321_193100_20130224_164916	21/03/2002
MER_OAP_AXVIEC20030620_120001_20020321_193100_20120321_193100	21/03/2002
MER_OC1_AXVIEC20030620_120000_20020321_193100_20120321_193100	21/03/2002
MER_OC2_AXVIEC20030620_120000_20020321_193100_20120624_174339	21/03/2002
MER_WVP_AXVIEC20030620_120000_20020321_193100_20120321_193100	21/03/2002

Table 5 – MERIS Level 1 Auxiliary Data Files

3.4 Configuration Table Interface (CTI)

No new CTI disseminated during cycle #48.

3.5 Level 1/ Level 2 RR or FR products

During cycle #48 no format changes or algorithm modifications regarding MERIS RR and FR products were implemented into the operational processor.
REMINDER:
In the middle of cycle #47, some format changes or algorithm modifications regarding MERIS RR and FR products were implemented during the operational processor upgrade from v4.10 to 5.02.
The data changes decided within the Data Quality Working Group are listed below:

- New Chlorophyll 1 polynomial characterisation from LOV (Laboratoire d'Océanologie de Villefranche – France)
- Chlorophyll 1 validity range set to [0.01,30.], no PCD raise when out of range
- Troposphere-free MAR99 replaces BLUE-⟨=1.5 (from previous BOMEM runs)
- Gothic R Look Up Table from LOV (Laboratoire d'Océanologie de Villefranche – France)
- Chlorophyll 2 conversion factors from GKSS (revised with latest Neural Network delivery)
- Yellow Substance coding offset and scaling factor changes (linear to log scale, same range)
- Chlorophyll coding range changes([-2,2] in log10 scale instead of [-3,3] previously)
- Whitecaps threshold set to 10 $m.s^{-1}$
- New Case 2 Neural Network from GKSS (with and without linear reflectances as input)
- White scatterer threshold set to 4.8
- MTCI threshold on B13-B8 difference set to 0.05, on B10-B8 to 1e-6 (numerical purpose only), ceiling for B8 set to 0.3, floor for B9 to 0.1
- Preliminary version of LARS Look Up Tables from Hygeos

For further details concerning the changes, please refer to the documentation available at:
http://earth.esa.int/pcs/envisat/meris/documentation/MERIS_IPF_evolution.pdf

4 PDS STATUS

The statistics resulting from the query to the PDS inventory facility (INV) for the MERIS products availability are presented in the following paragraphs.

4.1 MERIS Level 0 products availability

The table below shows the statistics regarding the RR L0 availability (compared to the planned production).

Week	MER_RR__0P %	
	Inventoried	Missing
From 22/05 to 29/05	98.99	1.01
From 29/05 to 05/06	95.10	4.90
From 05/06 to 12/06	100	0
From 12/06 to 19/06	100	0
From 19/06 to 26/06	93.02	6.98

Table 6 – Reduced Resolution Level 0 products availability

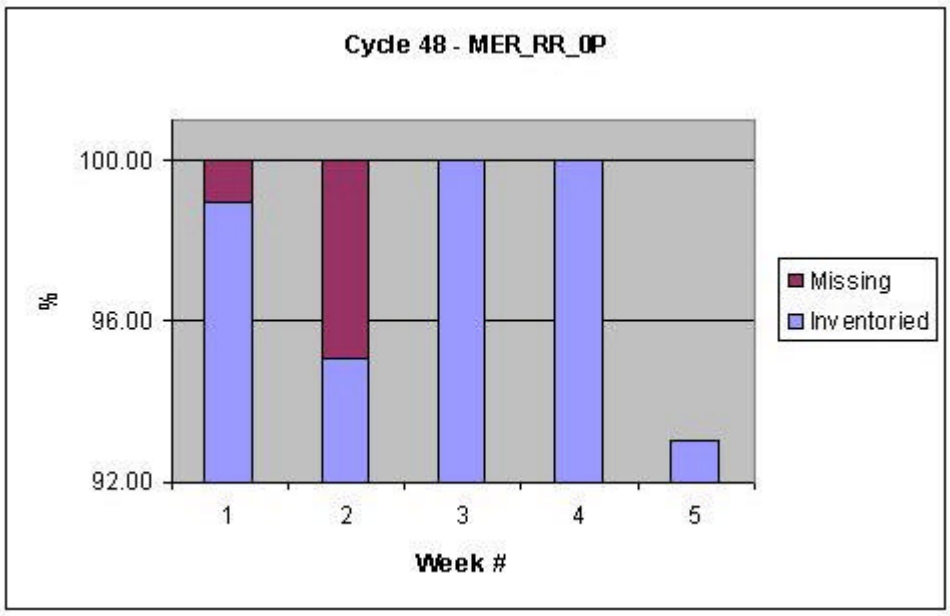

Figure 1 - MER_RR__0P generated/missing by the ground segment during cycle #48

The number of RR Level 0 products acquired during the cycle is about 98.80 % of the planned ones.

The table below shows the statistics regarding the FR L0 availability (compared to the planned production).

Week	MER_FR__0P %	
	Inventoried	Missing
From 22/05 to 29/05	89.92	10.08
From 29/05 to 05/06	84.62	15.38
From 05/06 to 12/06	91.56	8.44
From 12/06 to 19/06	90.85	9.15
From 19/06 to 26/06	84.60	15.40

Table 7 – Full Resolution Level 0 products availability

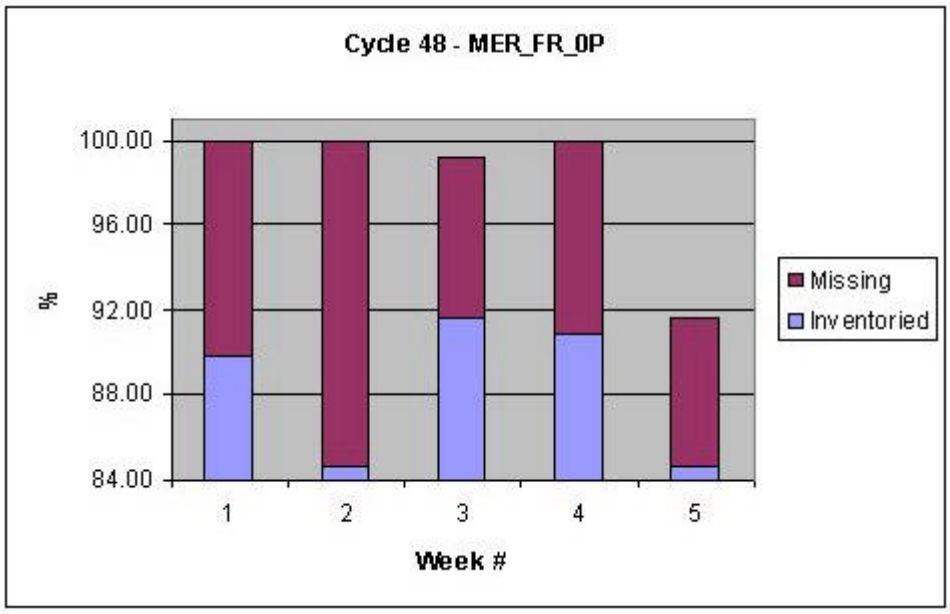

Figure 2 - MER_FR__0P generated/missing by the ground segment during cycle #48

The number of FR Level 0 products acquired during the cycle is about 89.96 % of the planned ones.

4.2 MERIS FR acquisitions

The pictures below show the MERIS Full Resolution global coverage for the reporting period. As specified for this type of MERIS products, all lands and coastal areas are covered by MERIS FR acquisitions.

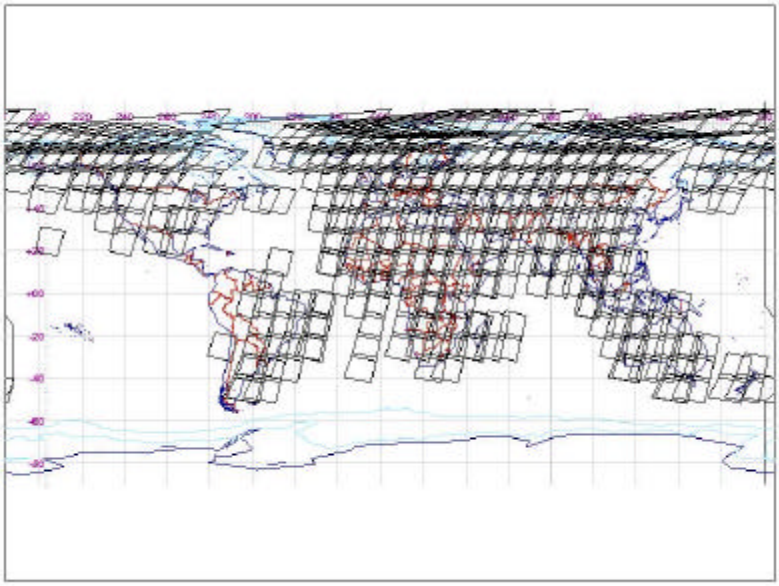

Figure 3 - MERIS Full Resolution Level 0 acquisitions - Part #1 – 22/05/2006 – 26/05/2006

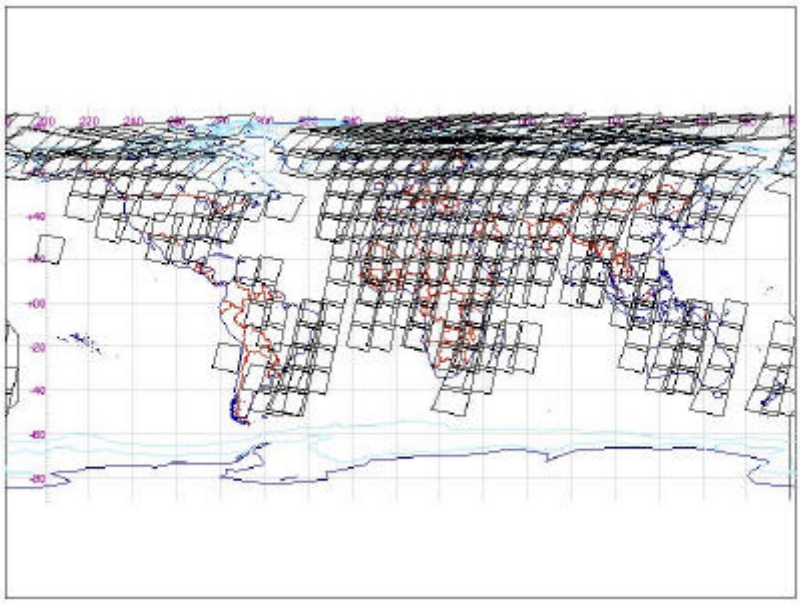

Figure 4 - MERIS Full Resolution Level 0 acquisitions - Part #2 – 27/05/2006 – 31/05/2006

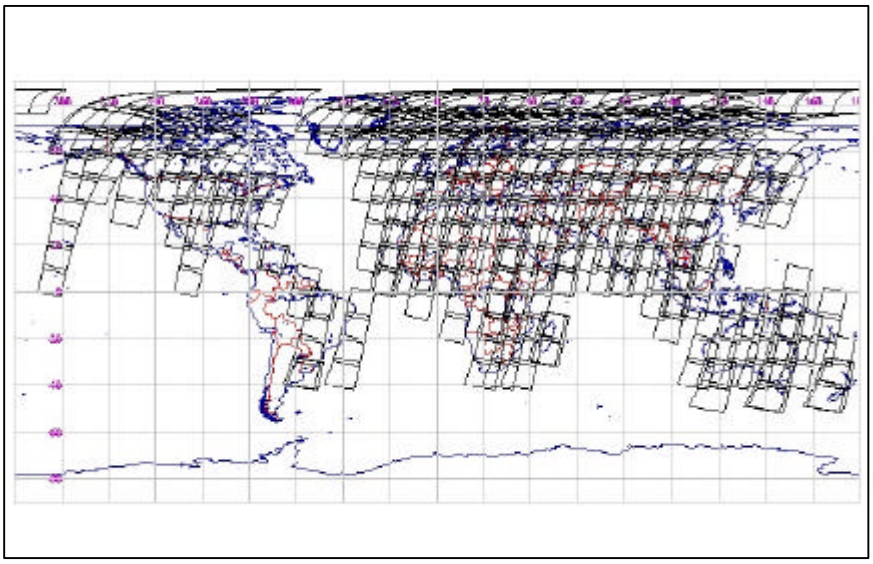

Figure 5 - MERIS Full Resolution Level 0 acquisitions - Part #3 – 01/06/2006 – 04/06/2006

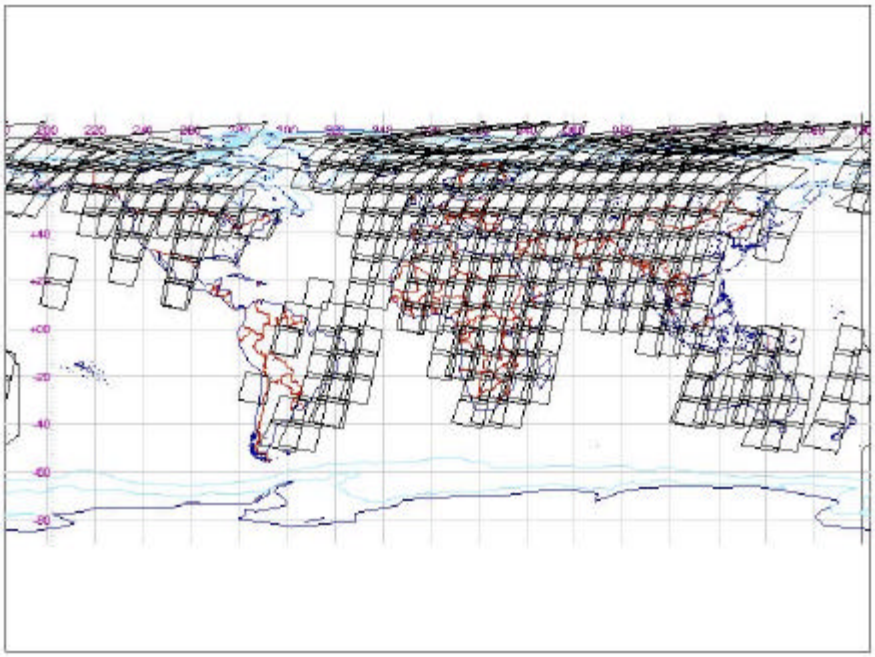

Figure 6 - MERIS Full Resolution Level 0 acquisitions - Part #4 – 05/06/2006 – 09/06/2006

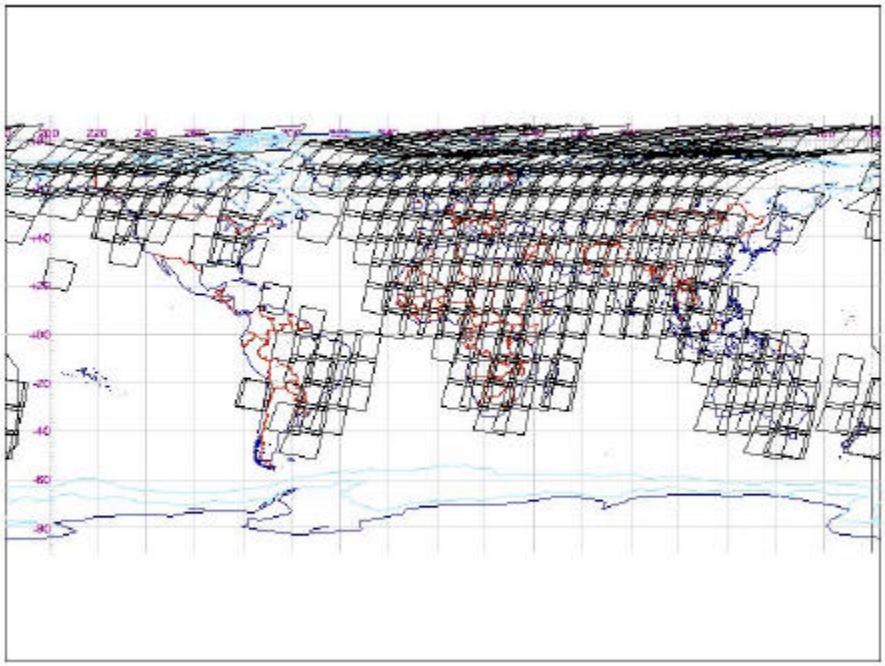

Figure 7 - MERIS Full Resolution Level 0 acquisitions - Part #5 – 10/06/2006 – 14/06/2006

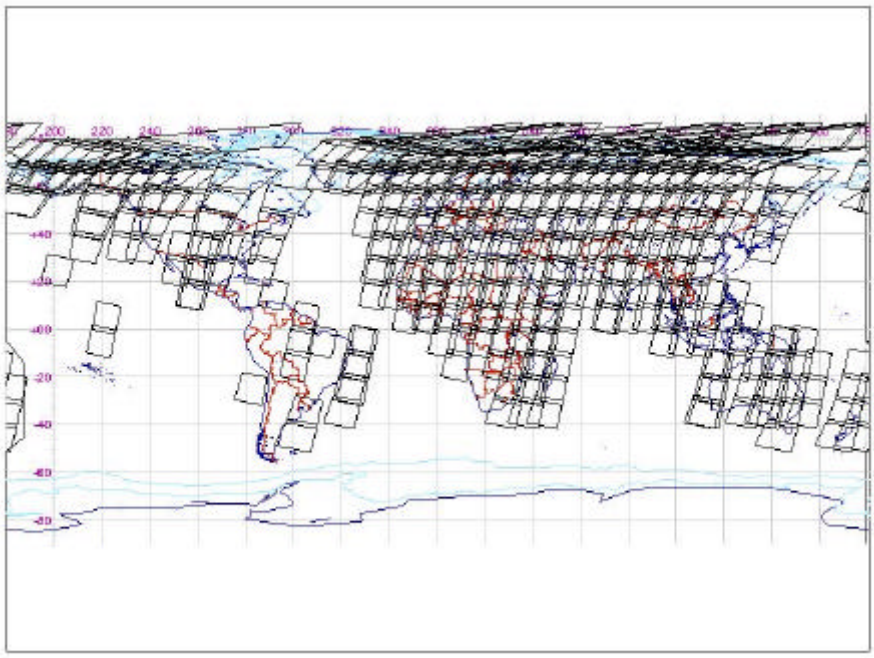

Figure 8 - MERIS Full Resolution Level 0 acquisitions - Part #6 – 15/06/2006 – 19/06/2006

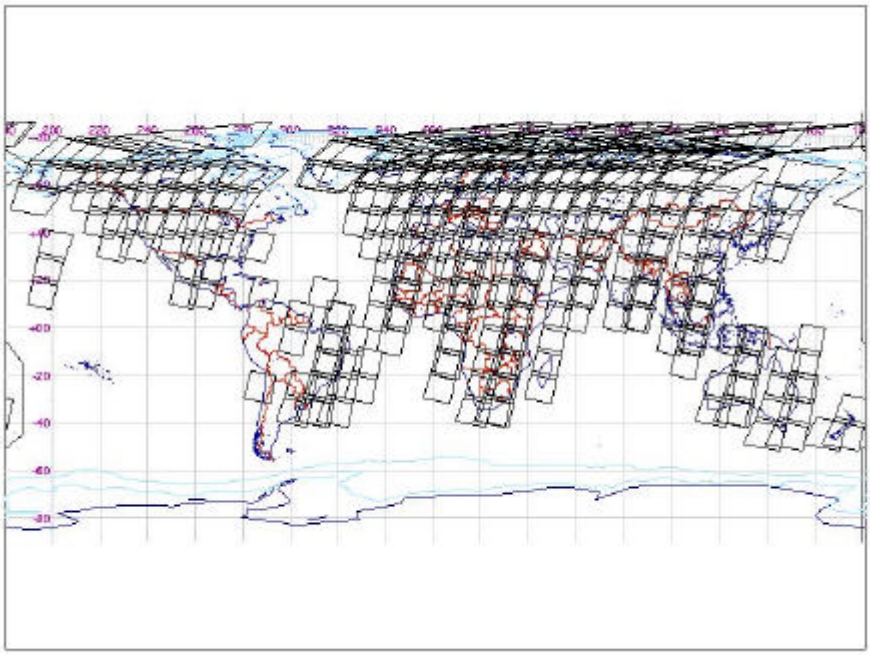

Figure 9 - MERIS Full Resolution Level 0 acquisitions - Part #7 – 20/06/2006 – 25/06/2006

4.3 MER_CA__0P Products

During Cycle #48, two RGC radiometric gain routine calibrations have been planned during one orbit each, on the 03rd of June in orbit 22268 and on the 17th of June in orbits 22468 respectively.

All the calibrations were successfully executed - The list of calibration files is reported below:

MER_CA__0PNPDK20060603_182554_000001782048_00170_22268_0039.N1	RGC
MER_CA__0PNPDK20060617_174521_000001782048_00370_22468_0044.N1	RGC

5 INSTRUMENT/DATA UNAVAILABILITY

5.1 Instrument Unavailability

No instrument unavailability has been reported during cycle #48.

In the reporting period, 53 EDAC-corrected SEU occurred. The dates, times and geolocation of these events are given in the table below:

Date/Time year.day.hr.mn.sc	Lon.	Lat.
2006.142.14.36.37	75.04° W	34.59° S
2006.142.23.35.27	21.21° W	16.99° S
2006.143.02.55.40	70.69° W	20.47° S
2006.143.12.21.21	39.09° W	23.80° S
2006.143.14.02.17	64.54° W	24.99° S
2006.145.19.10.47	79.76° W	79.98° N
2006.146.12.23.21	37.39° W	10.48° S
2006.147.02.28.31	63.09° W	25.04° S
2006.147.02.30.41	64.96° W	17.36° S
2006.148.01.57.48	55.98° W	21.86° S
2006.148.01.57.54	56.07° W	21.50° S
2006.148.14.40.38	71.34° W	8.04° S
2006.149.01.27.30	49.22° W	16.90° S
2006.150.00.54.47	40.39° W	20.83° S
2006.150.09.55.31	19.43° E	64.51° N
2006.152.01.30.16	48.05° W	27.55° S
2006.152.12.39.19	44.07° W	26.54° S
2006.152.14.20.34	69.82° W	28.84° S
2006.152.14.22.19	71.55° W	35.01° S
2006.153.12.09.26	37.81° W	32.64° S
2006.154.00.29.30	34.40° W	18.85° S
2006.154.02.09.27	59.00° W	21.15° S
2006.154.11.31.54	24.70° W	11.66° S
2006.154.15.06.27	90.71° W	58.53° S
2006.157.02.17.34	62.40° W	12.79° S
2006.159.10.33.25	9.52° W	8.04° S
2006.160.11.41.43	26.23° W	5.60° S
2006.160.11.42.20	26.71° W	7.80° S
2006.160.18.58.42	55.70° E	50.20° S
2006.161.01.49.53	54.43° W	19.28° S
2006.161.11.16.06	23.33° W	26.90° S
2006.162.01.15.14	43.81° W	30.02° S
2006.162.10.41.30	12.84° W	16.32° S
2006.163.00.44.50	37.03° W	25.72° S
2006.163.13.32.08	56.12° W	20.05° S
2006.163.22.35.03	6.08° W	17.10° S
2006.165.12.28.13	39.74° W	17.63° S
2006.167.11.26.22	25.11° W	22.55° S
2006.167.23.52.24	26.89° W	7.77° S
2006.169.01.00.11	43.18° W	12.02° S
2006.169.08.51.26	5.39° E	53.79° S
2006.169.21.38.25	131.93° W	77.55° N
2006.170.23.58.59	28.99° W	4.76° S
2006.172.12.08.09	34.76° W	17.88° S
2006.172.12.09.41	36.08° W	23.32° S
2006.174.05.20.25	118.53° W	44.55° N
2006.174.07.18.58	63.21° E	69.00° N
2006.174.11.07.03	20.81° W	25.48° S
2006.174.14.29.59	72.74° W	31.62° S

2006.175.13.58.07	64.60° W	30.76° S
2006.175.14.10.12	90.17° W	72.14° S
2006.176.13.19.18	50.57° W	5.24° S

Table 8 – EDAC corrected Single Event Upsets

5.2 Data Unavailability

One data unavailability has been reported during cycle #48:

- Due to an incorrect command configuration of the CH4 switch on Artemis, MERIS data downlinked via Artemis between 23rd of July 2006 10.00 and 24th of July 200611.36 were lost.

6 CALIBRATION AND INSTRUMENT CHARACTERIZATION

6.1 Calibration

6.1.1 Radiometric calibration

During Cycle #48, two radiometric calibrations (RGC type) were successfully executed on the 03rd and 17th of June. For more details see section 4.3.

6.1.2 Spectral calibration

During Cycle #48, no erbium calibration (WV1/2 type) was planned.

6.1.3 Geolocation

The accuracy specification for MERIS geolocation is 2000 m, with an operational goal of 150 m.
The 290 m (nadir) bands 2, 5, 8 are used to estimate the absolute geolocation accuracy.
This analysis shows significant improvements since launch, with one major upgrade, which occurred in 2003 DOY (Day of Year) 343. The update of the star tracker has been performed to reduce the systematic offset and improve orientation parameters. Global absolute geolocation error (North and South hemispheres) for the three consecutive periods can be summarized as follow:

(I) Initially, after the launch, according to results related to the 2002 period, the geolocation accuracy is in the order of ±135 metres along-track and ±207 metres across-track. The RMS absolute geolocation error stays within the range of **251.24 ± 81** m.

(II) The 2003 period is characterised by a degradation of the absolute geolocation accuracy where error is around ±209 metres along-track and ±295 metres across-track. For this period, the RMS absolute geolocation error stays within the range of 368.39 ± 67 m.

(III) After the update, 2004 period, MERIS geolocation is achieving the goal of 300 m with accuracy of ± 132 m along-track and ± 165 m across-track. The RMS absolute geolocation error remains within the range of **212 ± 22** m.

When correcting products from the systematic offset (centred results), for 2004 period the RMS absolute geolocation error stays within the range of **166 ± 18** m. The amount of products located on northern hemisphere is much larger than the one from the Southern hemisphere. Comparison between

the two sets of results is not trivial. For the 2004 period, this study demonstrated the temporal stability of the absolute geolocation. More results are now needed to confirm this trend.
For more details, refer to the Gael Consultant (Fr) report available on the ESA website:
http://earth.esa.int/pcs/envisat/meris/reports/

6.1.4 VEU Temperature Analysis

During one of the operation modes of MERIS, Stabilization mode, a thermal regulation of VEU (Video Electronic Unit) unit is performed in order to stabilise its temperature to reach full performances and insure a safe transition towards Observation and Calibration modes.
During observation, the VEU Temperature has to remain in the operational acceptance temperature range -10°/+50° in order to meet the image quality requirements. The VEU temperature should be maximum +/- 10°C different from the last radiometric calibration for optimum performance.
During cycle #48 the VEU temperature does not show any anomalous behaviour, being in the nominal operating temperature range over all its nominal functioning.

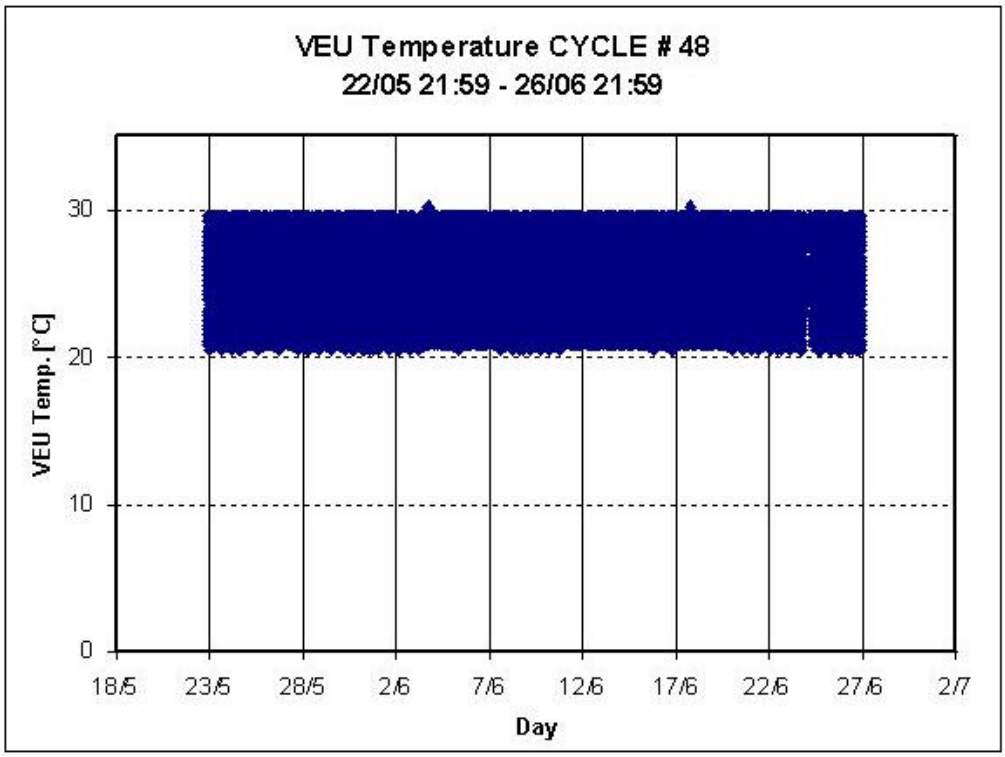

Figure 10 - VEU Temperature during cycle #48

6.1.5 Vicarious calibration results

For absolute calibration of MERIS by vicarious methods, METRIC2.0 tools are used to perform data extraction and spatial compression from MERIS Level1b products over specified sites following site type specific radiometric and geographic criteria. The child L1b products are ordered systematically on the basis of sites definition and mission analysis. Because the list of sites can be over-dimensioned and vary with season, it has a validity period of 3 months. Each L1b child product is submitted to METRIC

with the correct version of auxiliary files MER_INS_AX and MER_CP1_AX used during its generation, and a dedicated resource file which stores all parameters necessary for data filtering (cloud and aerosol screening, distance from coast…). Metric generates one file for each selected site pertaining to the following categories, according to the potential use of the data in the calibration processing: Rayleigh, Glitter, Desert, Snow, and Buoy. Output files have HDF format.
During cycle #24 new overpass tables have been regenerated for all sites of interest updating the relative orbits inside the cycle. The site map is shown in the following picture:

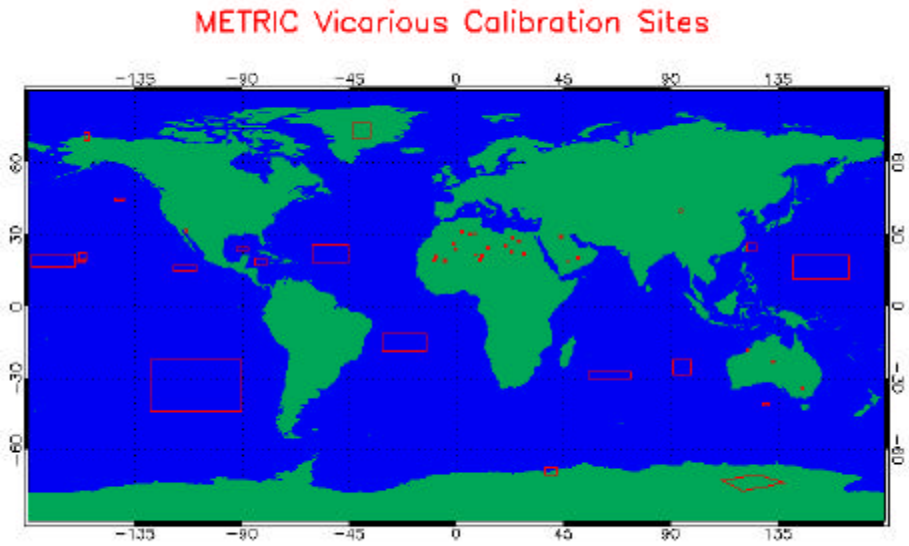

Figure 11 - METRIC calibration site map

Based on the second reprocessing dataset (see section 9), the entire METRIC sites Child products have been generated with the last version of the METRIC tool (2.0).

This reprocessing started in December 2005 in ACRI premises, and has involved data from ENVISAT launch to present. The number of Level 1B products extracted over METRIC sites is given in the chart below:

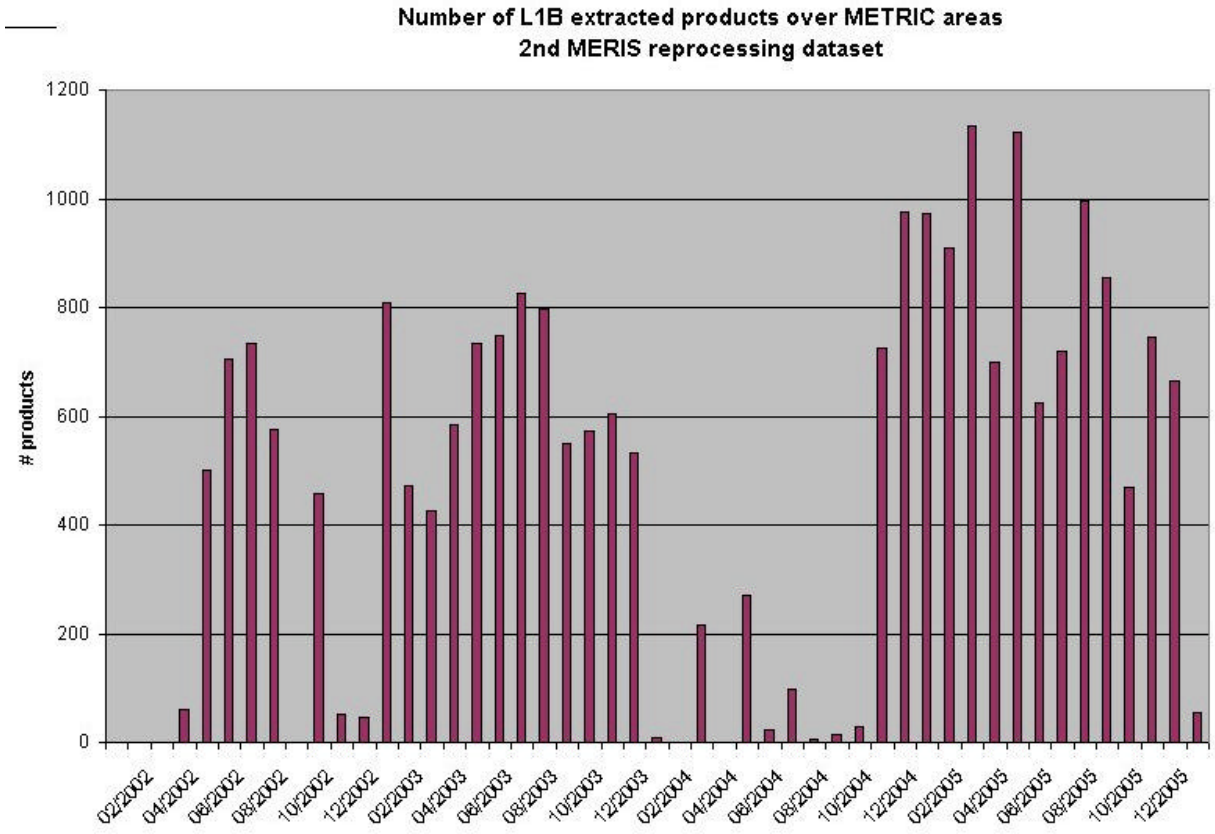

Figure 12 – Number of L1B extracted products over METRIC sites

The lack of data extracted for the 2004 year will be filled accordingly to the availability of the L1B child products. The METRIC v2.0 tool has been delivered to ESRIN where it will be used in operational mode in parallel to the new version of the processing chains (MERISv5.02)

6.2 Instrument Characterization

6.2.1 Instrument degradation

No new results to be shown for cycle #48. For the last updates, refer to Cyclic Report #45 that can be found on the above-mentioned MERIS website (see Section 6.1.3).

6.2.2 Diffuser ageing

No new results to be shown for cycle #48. For the last updates, refer to Cyclic Report #45 that can be found on the above-mentioned MERIS website.

6.2.3 Smile Effect

No new results to be shown for cycle #48. For the last updates, refer to Cyclic Report #23 that can be found on the above-mentioned MERIS website.

6.2.4 Spectral evolution from erbium measurements

No new results to be shown for cycle #48. Please refer to Cyclic Report #23 that can be found on the above-mentioned MERIS website.

7 DATA QUALITY CONTROL

7.1 MERIS products quality status

IPF version 5.02 did not have any impact on the MERIS products quality; an increase of the Level 2 processing time has been reported – it is linked to the increase of the number of pixels taken into account for the retrieval of aerosols over land , and the more detailed aerosols Look Up Table.

7.2 Anomalies and Software Problem Reporting (SPR)

Blank records have been identified in some MERIS products rejected by visual inspections using the AMALFI system. These black lines crossing the track are a nominal behavior of the processor which replaces missing or corrupted Instrument Source Packets (ISPs) with blank data to preserve the geographical consistency of the scene.

8 FIRST 2003 MERIS ARCHIVE REPROCESSING

Information concerning the 1st reprocessing of the 2003 MERIS data archive done spring 2004 can be found on the MERIS website:

http://earth.esa.int/pcs/envisat/meris/documentation/First_2003_MERIS_Reprocessing.pdf

The document explains also how to get the reprocessed data.

9 SECOND 2005 MERIS ARCHIVE REPROCESSING

Following the recommendations of the Data Quality Working Group and the Science Advisory Group, improvements to MERIS processing resulted in version 7.4 of the off-line processor MEGS. It is currently being used for a complete reprocessing of the MERIS Reduced Resolution data archive. The corresponding time period extends from June 2002 to June 2005. 2003 and 2004 data will be made available through the MERCI (MERIS Catalogue and Inventory) service by the end of year 2005. For further information see:

http://envisat.esa.int/services/catalogues.html

10 MERIS PROCESSOR EVOLUTION

A detailed description of the MERIS IPF evolution since March 2002 until present, in terms of data format changes and algorithm modifications, can be found on the MERIS website:

http://earth.esa.int/pcs/envisat/meris/documentation/MERIS_IPF_evolution.pdf.

11 VALIDATION ACTIVITIES AND RESULTS

The presentations given at the MAVT-2006 yield at ESRIN premises, Frascati, Italy, from 20 to 24 March 2006 are now available at the following address:

http://envisat.esa.int/workshops/mavt_2006/

12 WATER VAPOUR AND BROWSE MAPS

Water Vapour data, retrieved from MER_LRC_2P products, have been used to generate global coverage maps for each day of the cycle. Maps are available on the ESA website:

http://earth.esa.int/pcs/envisat/meris/maps/watervapour/

MERIS tracks for each day of the cycle have been plotted using Browse products. Maps are available on the ESA website:

http://earth.esa.int/pcs/envisat/meris/maps/browse/

13 HOW TO GET MERIS DATA

Information concerning the different ways to access the MERIS data can be found on the MERIS website:

http://earth.esa.int/pcs/envisat/meris/documentation/Access_to_MERIS_data.pdf

14 GENERAL INFORMATION

1. The European Space Agency organised a joint MERIS and (A)ATSR workshop, held at ESRIN, Frascati, Italy, on 26-30 September 2005. All information about the objectives of the workshop as well as the participants' presentations can be found on ESA's official page:

   http://envisat.esa.int/workshops/meris_aatsr2005/

2. The European Space Agency organised the second working meeting on MERIS and AATSR Calibration and Geophysical Validation (MAVT-2006) in ESRIN, Frascati, Italy, from 20 to 24 March 2006. All information about the objectives of the workshop as well as the participants' presentations can be found on ESA's official pages:

   http://www.congrex.nl/06M07