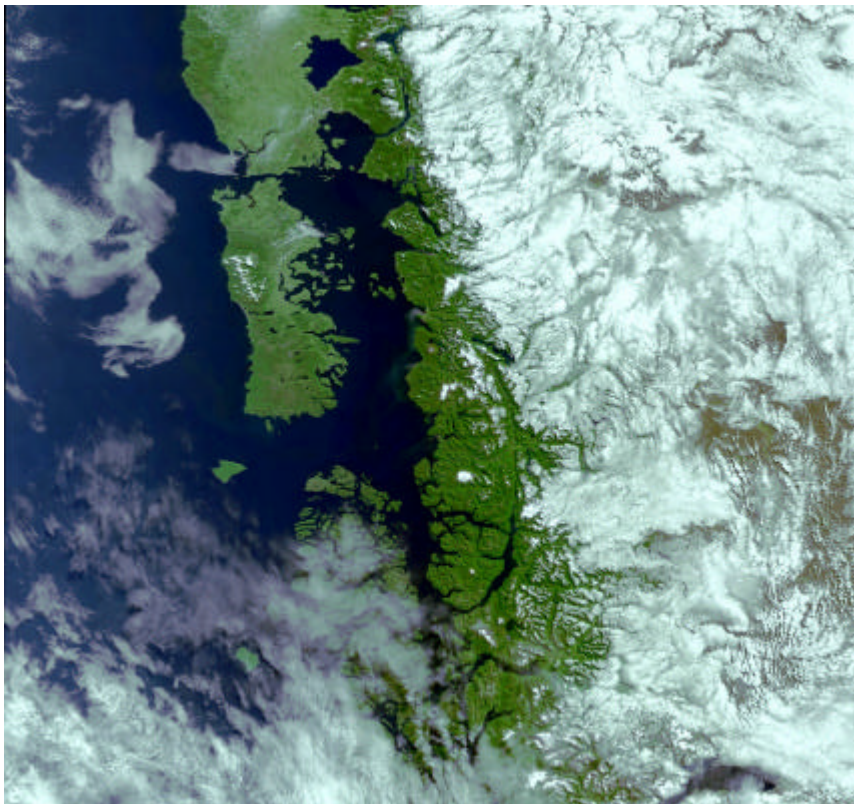


MERIS CYCLIC REPORT 45TH

06TH FEBRUARY 2006– 13TH MARCH 2006



23 February 2006 – MERIS Full Resolution scene showing the Chiloe Island in the south of Chile.

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1 INTRODUCTION

The MERIS Cyclic Report is distributed by ESRIN-PCF (Product Control Facility) to keep the MERIS Community informed of any modification regarding the processor, updates of auxiliary products, anomalies of the instrument behavior, 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 (Julian)
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 #45 starts on the 06th of February 2006 and stops on the 13th of March 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 unavailability have occurred during the reporting period.

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

Cycle number	45
Start time	06 February 2006, 21:59:29
Stop time	13 March 2006, 21:59:29
Start orbit	20596
Stop orbit	21096

Table 1 – Cycle characteristics

3 PROCESSOR VERSION AND PROCESSING CONFIGURATION

3.1 MERIS Processor Release

IPF version 4.10 is the operational processor at the MERIS processing centers (stations and PACs). The reference documents for the operational processor are listed below:

- | | | |
|---|---------------------|-------------------|
| 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 |

Issues 6.1a consist in issue 6.1 augmented/corrected by change pages issued as 6.1a

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 Vapor Parameters	MER_WVP	No changes

Table 2 – Auxiliary Data files in use for the cycle #45

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 #45.

- Level 1 ADF configuration:

Product name	Start Validity
MER_INS_AXVIEC20030620_120000_20020321_193100_20121008_190821	21/03/02
MER_CP1_AXVIEC20030620_120000_20020429_040000_20120920_173421	29/04/02
MER_RAC_AXVIEC20030620_120000_20021224_121445_20121224_121445	24/12/03
MER_DRM_AXVIEC20020122_083343_20020101_000000_20200101_000000	01/03/02
AUX_DEM_AXVIEC20031201_000000_20031201_000000_20200101_000000	01/12/03
AUX_LSM_AXVIEC20020123_141228_20020101_000000_20200101_000000	01/03/02
AUX_ATT_AXVIEC20020924_131534_20020703_120000_20781231_235959	03/07/02

Table 3 – MERIS Level 1 Auxiliary Data files

- Level 2 ADF configuration:

Product name	Start Validity
MER_AER_AXVIEC20030620_120000_20020321_193100_20200101_000000	21/03/02
MER_ATP_AXVIEC20030620_120000_20021224_121445_20121224_121445	24/12/02
MER_CMP_AXVIEC20030620_120000_20021224_121445_20120321_193100	24/12/02
MER_CP2_AXVIEC20031120_104149_20021224_121445_20121224_121445	24/12/02
MER_LAP_AXVIEC20030715_151450_20020321_193100_20120321_193100	21/03/02
MER_LVI_AXVIEC20030620_120000_20020321_193100_20130224_164916	21/03/02
MER_OAP_AXVIEC20030620_120001_20020321_193100_20120321_193100	21/03/02
MER_OC1_AXVIEC20030620_120000_20020321_193100_20120321_193100	21/03/02
MER_OC2_AXVIEC20030620_120000_20020321_193100_20120624_174339	21/03/02
MER_WVP_AXVIEC20030620_120000_20020321_193100_20120321_193100	21/03/02

Table 4 – MERIS Level 2 Auxiliary Data files

3.4 Configuration Table Interface (CTI)

No new CTI disseminated during cycle #45.

3.5 Level 1/ Level 2 RR or FR products

During cycle #45 no format changes or algorithm modifications regarding MERIS RR and FR products were implemented into the operational processor.

A new product type has been introduced with IPF version 4.10: the Full Swath product (4481 pixels per line). The Full Swath format includes new FR Level 1b, Level 2 and Browse products; however the ordering is not yet possible since the Full Swath operations are not yet defined.

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.

4.1 MERIS Level 0 products availability

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

Week	MER_RR_OP %	
	Inventoried	Missing
From 02/01 to 09/01	99.05	1.03
From 09/01 to 16/01	100	0.00
From 06/01 to 23/01	100	0.01
From 23/01 to 30/01	100	0.99
From 30/01 to 06/02	100	0.00

Table 5 –Reduced Resolution Level 0 products availability

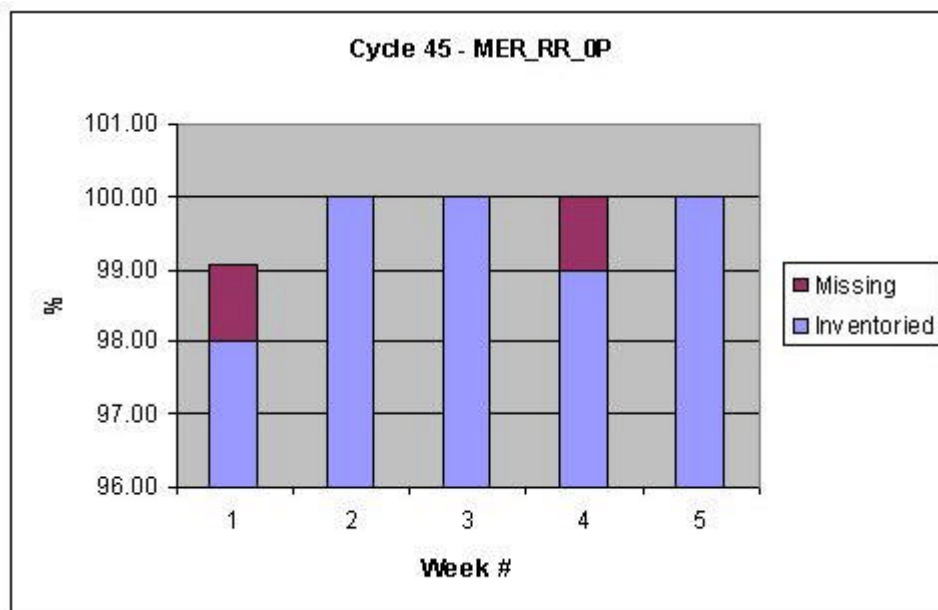


Figure 1 - MER_RR_OP generated/missing by the ground segment during cycle #45

The number of RR Level 0 products acquired during the cycle is about 99.40 % of the planned ones.

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

Week	MER_FR_OP %	
	Inventoried	Missing
From 02/01 to 09/01	99.67	3.95
From 09/01 to 16/01	100	0.06
From 06/01 to 23/01	100	0.82
From 23/01 to 30/01	100	1.65
From 30/01 to 06/02	100	5.77

Table 5 –Full Resolution Level 0 products availability

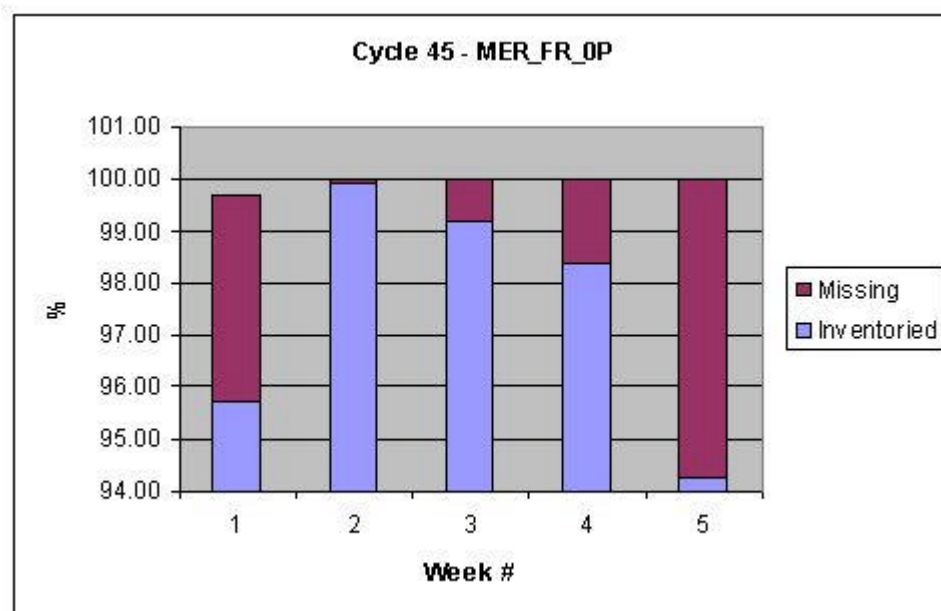


Figure 2 - MER_FR_OP generated/missing by the ground segment during cycle #45

The number of FR Level 0 products generated during the cycle is about 97.48 % 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. Due to technical issues, the last weeks pictures are not available.

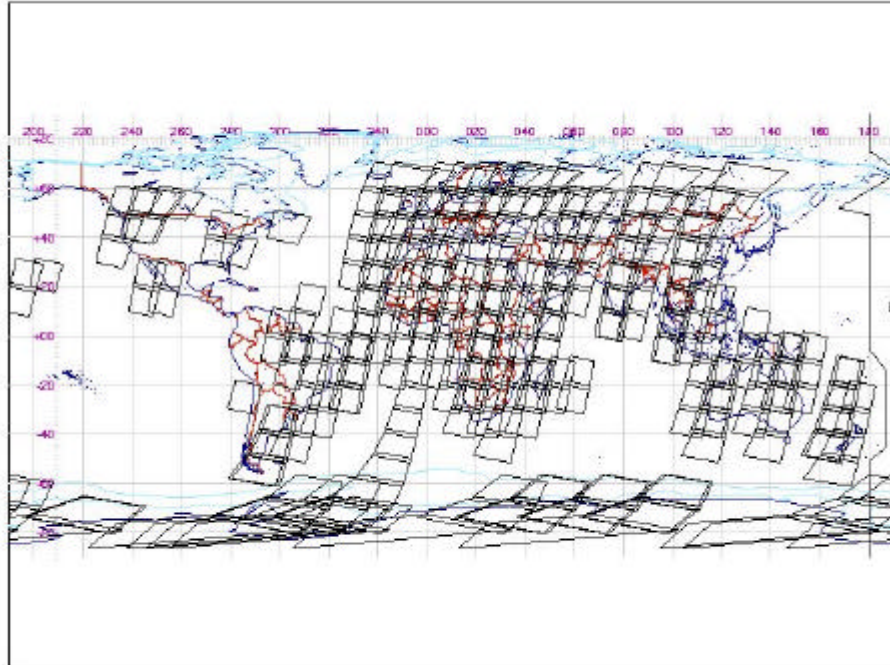


Figure 3 - MERIS full resolution Level 0 acquisitions – Part #1 – 07/02/2006 – 11/02/2006

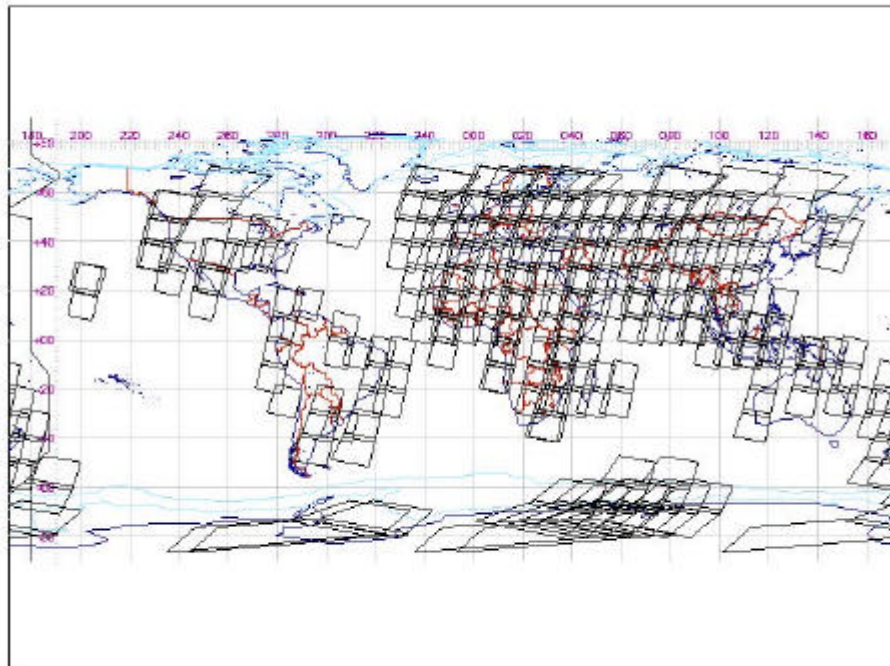


Figure 4 - MERIS full resolution Level 0 acquisitions – Part #2 – 12/02/2006 – 16/02/2006

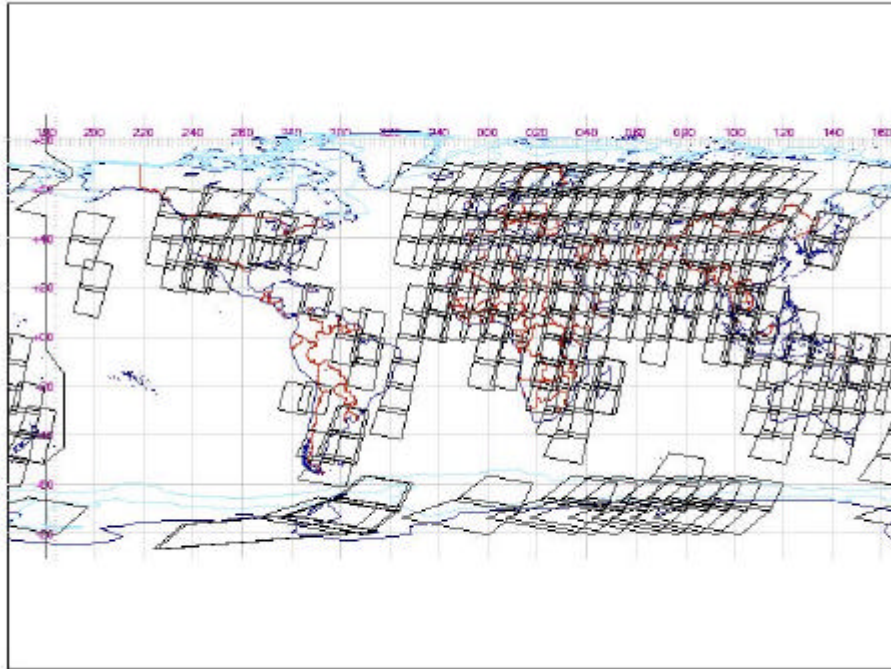


Figure 5 - MERIS full resolution Level 0 acquisitions – Part #3 – 17/02/2006 – 21/02/2006

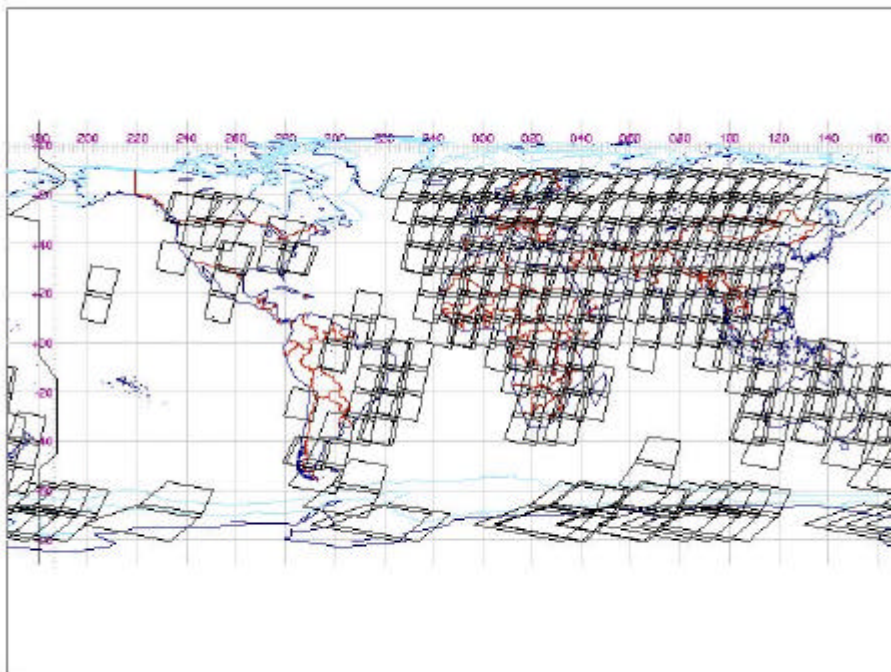


Figure 6 - MERIS full resolution Level 0 acquisitions – Part #4 – 22/02/2006 – 26/02/2006

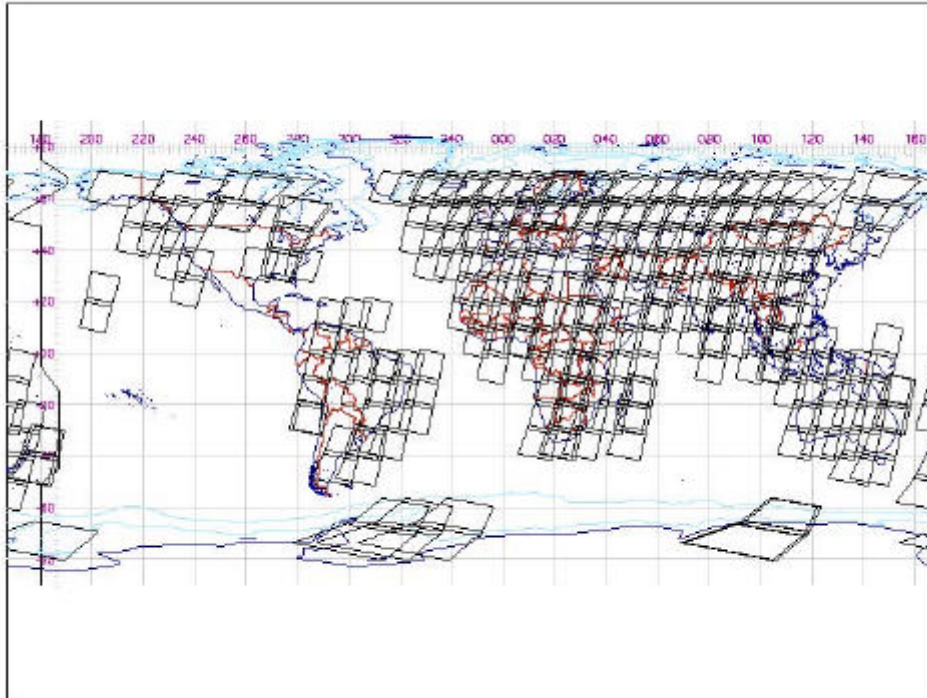


Figure 7 - MERIS full resolution Level 0 acquisitions - Part #5 - 27/02/2006 - 03/03/2006

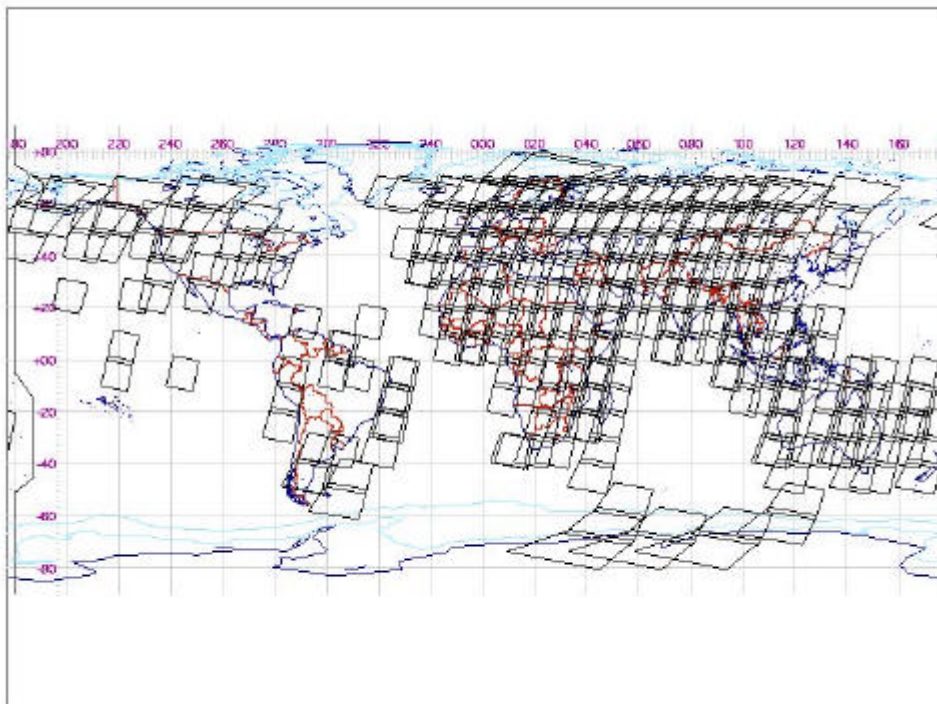


Figure 8 - MERIS full resolution Level 0 acquisitions - Part #6 - 04/03/2006 - 08/03/2006

4.3 MER_CA__0P Products

During Cycle #45 three RGC radiometric gain routine calibrations have been planned during one orbit each. All the calibrations were successfully executed on the 25th of January, 11th and 25th of February, in orbits respectively 20660, 20860, 21060.

The list of calibration files is reported below:

MER_CA__0PNPDK20060225_095215_000001792045_00265_20860_0024.N1	RGC
MER_CA__0PNPDK20060311_091015_000001792045_00465_21060_0000.N1	RGC
MER_CA__0PNPDK20060325_082815_000001792046_00164_21260_0003.N1	RGC

5 INSTRUMENT/DATA UNAVAILABILITY

5.1 Instrument Unavailability

No instrument unavailability to be communicated for cycle #45.
In the reporting period, 58 EDAC-corrected SEU occurred.

5.2 Data Unavailability

There were two periods of data unavailability reported during cycle #45.

- Due to 1/2 OBT Wrap Around DOY 2006.055 at 03.39.49z (24 February 2006), MERIS stopped its acquisition 32 seconds before the end scheduled.
- MERIS SDPSS switched unexpectedly into PAUSE on DOY 062 (3rd of March) from 11.07.55z back to acquisition (thanks to extra commanding in DIR&AVG mode !) at 11.26.03z

6 CALIBRATION AND INSTRUMENT CHARACTERIZATION

6.1 Calibration

6.1.1 Radiometric calibration

During Cycle #45 three radiometric calibrations (RGC type) were successfully executed on the 25th of January, 11th and 25th of February. For more details see section 4.3.

6.1.2 Spectral calibration

No Erbium calibration has been planned during Cycle #45.

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 on the order of ± 135 m along-track and ± 207 meters across-track. The RMS absolute geolocation error stays within the range of **251.24 ± 81** m.
- (II) The 2003 period is characterized by a degradation of the absolute geolocation accuracy where error is around ± 209 meters along-track and ± 295 meters 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 (centered results), for 2004 period the RMS absolute geolocation error stays within the range of **166 ± 18** m. Products collection 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 stabilize 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 $-10^{\circ}/+50^{\circ}$ in order to meet the image quality requirements. The VEU temperature should be maximum $\pm 10^{\circ}\text{C}$ different from the last radiometric calibration for optimum performance.

During cycle #45 the VEU temperature does not show any anomalous behavior, being into the nominal operating temperature range.

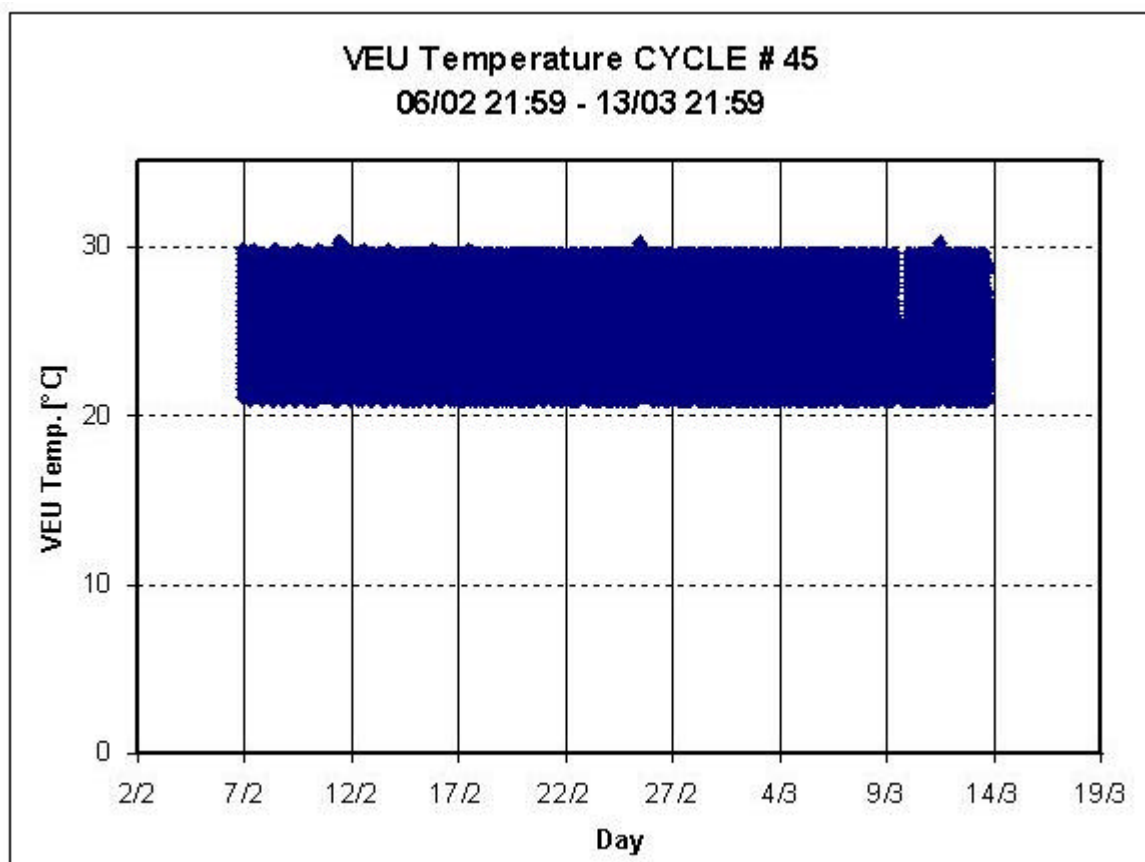


Figure 9 - VEU Temperature during cycle #45

6.1.5 Vicarious calibration results

For absolute calibration of MERIS by vicarious methods, METRIC2.0 tools is 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 where are stored 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:

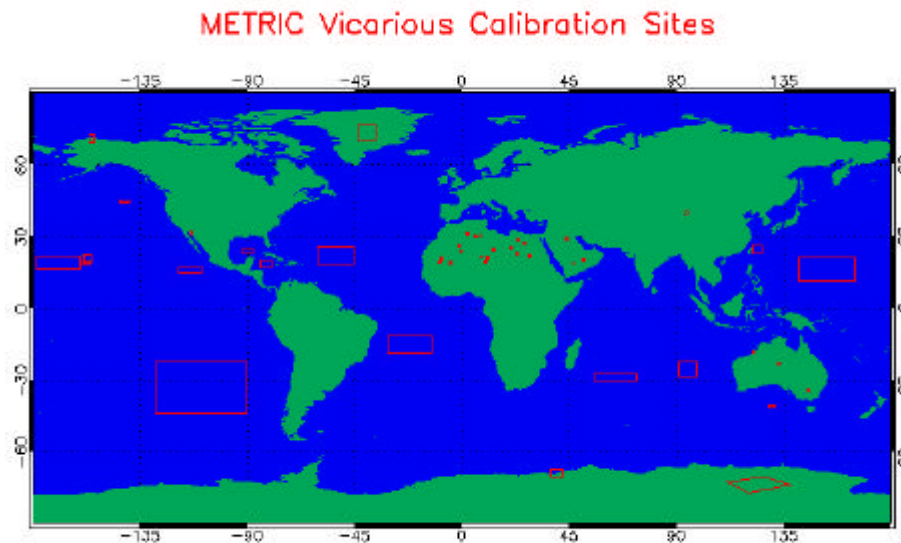


Figure 10 - METRIC calibration site map

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

This reprocessing has started in the current of December 2005 in ACRI premises, and will concern the data starting from the ENVISAT launch to present. The METRIC v2.0 tool has been delivered to ESRIN where it will be used in operational mode after the IPF upgrade to the last version of the processing chains (MERISv5.1)

6.2 Instrument Characterization

6.2.1 Instrument degradation

Using the on-board diffuser, the gain evolution is monitored through the MERIS life.

From the beginning of the mission until present a degradation of the instrument response of up to about 3% is observed. The degradation is wavelength dependant, from a maximum in the blue to negligible in the infra-red, and camera dependant, cameras 2 and 5 being the most affected. Instrument degradation presented here is corrected for the Diffuser Ageing (see next section).

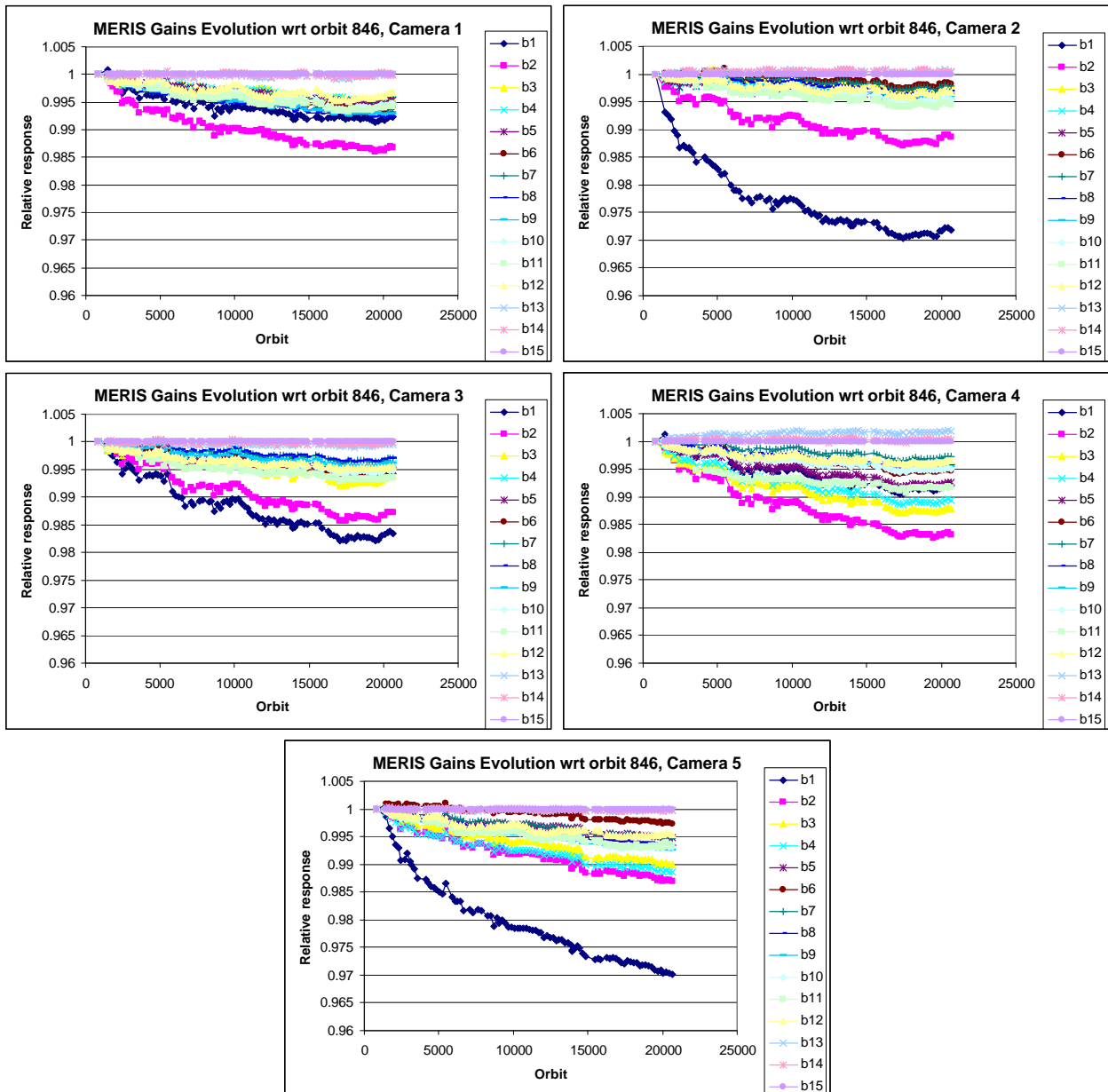


Figure 11 – Degradation of the instrument response from the beginning of MERIS life, per band for each camera

6.2.2 Diffuser ageing

A second on-board diffuser, infrequently used, allows to monitor the ageing of the nominal one. This reference diffuser is used only every 3 months while the nominal one is used every 2 weeks. The Diffuser Ageing measurement consist in radiometric calibrations using the two diffusers on successive orbits, that is in almost identical illumination conditions. The Ageing is then estimated as the evolution of the ratio of the two diffusers response and is expressed relative to a reference orbit. It allows to distinguish between response loss due to ageing of the Sun diffuser from ageing of the instrument itself. The diffuser degradation, or loss of reflectivity, decreases with increasing wavelength. After four years of exposure to space environment, the MERIS diffuser has lost from about 0.8% of reflectivity in the blue to virtually nothing in the infrared. The following figures show the evolution of the reflectivity

ratios, average over each camera and over the whole field of view with respect to orbit 1859 for five orbits up to present (4 years after launch, one year being approximately 5000 orbits), as a function of band index.

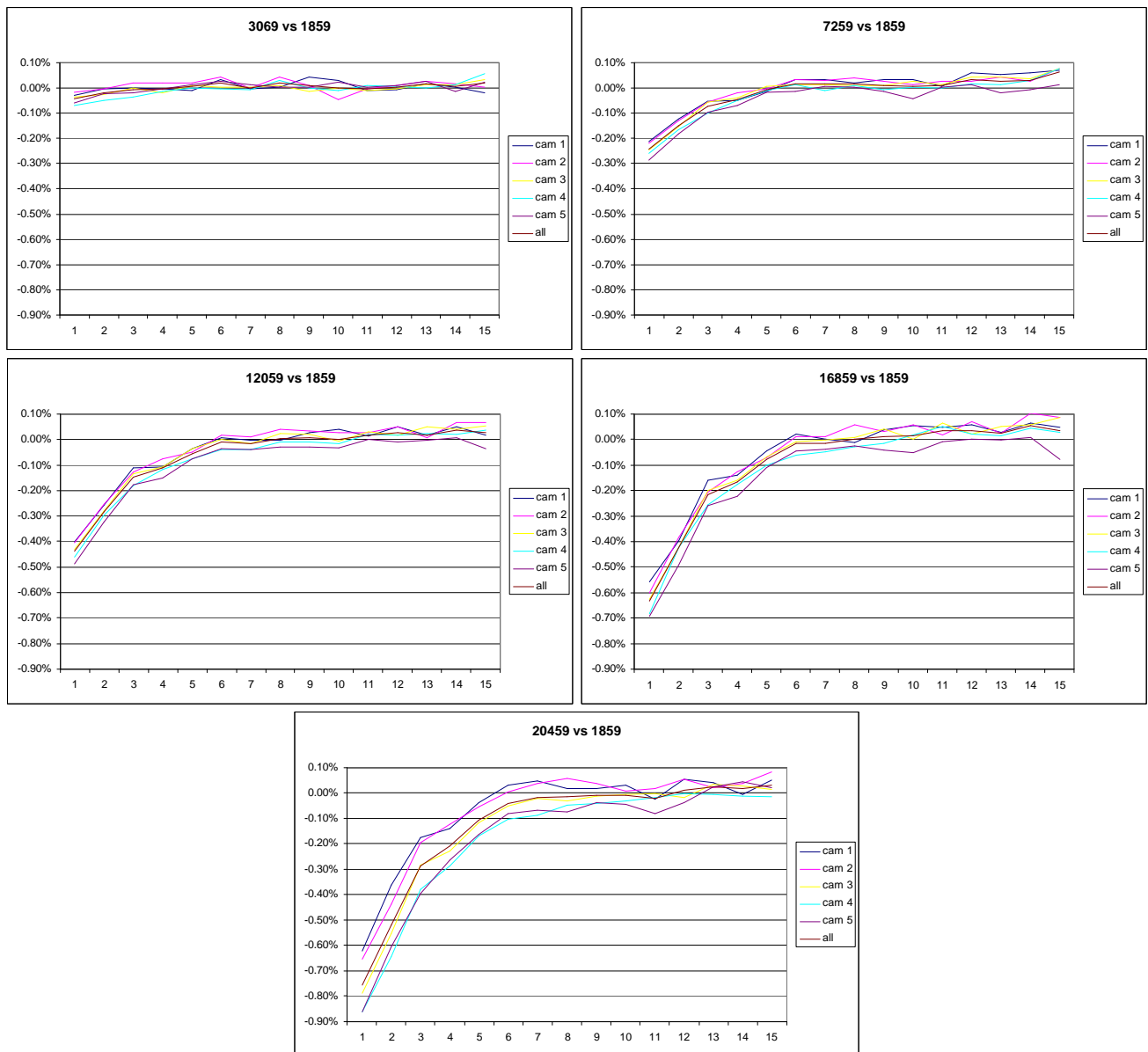


Figure 12 - Variation observed comparing Diffuser 2 vs. Diffuser 1 reflectances spectra per camera. Evolution with time (expressed in orbit number)

Analysis of the data presented above shows that the diffuser ageing process is fairly linear with time, as shown on the next figure.

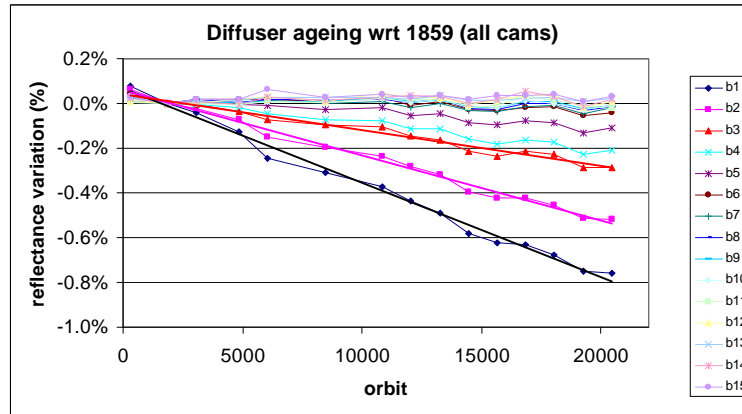


Figure 13 - Variation observed comparing Diffuser 2 to Diffuser 1 reflectances per MERIS spectral bands

It can thus be modeled and expressed as a reflectivity loss per year, as on the figure below, as a function of band index.

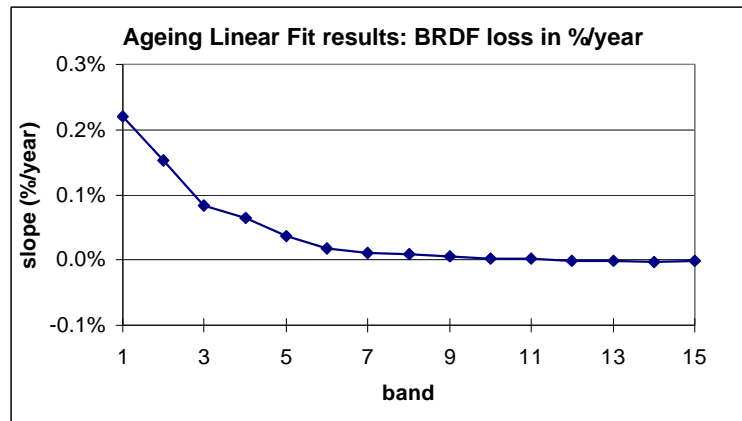


Figure 14 - Reflectivity loss per year as a function of band index

6.2.3 Smile Effect

No new results to be shown for cycle #45. 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 #45. Please refer to Cyclic Report #23 that can be found on the above-mentioned MERIS webpage.

7 DATA QUALITY CONTROL

7.1 MERIS products quality status

IPF version 4.10 did not have any impact on the MERIS products quality but on the Level 2 processing time; moreover some minor bugs related to the FR production and specifically to the water vapor product have been fixed (for details see Par. #6.2 of Cyclic Report #32).

7.2 Anomalies and Software Problem Reporting (SPR)

1. Blank records have been identified in some MERIS FR products rejected by visual inspections using the AMALFI system. An Anomaly Report has been opened and the problem is still under investigation.

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 of the MERIS processing resulted in the version 7.4 of the off-line processor MEGS. It is currently being used for a complete re-processing 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

No new results to be presented. Please refer to the previous cyclic reports for further information on the Validation activities.

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 has organized 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 the ESA's official page:
http://envisat.esa.int/workshops/meris_aatsr2005/
2. Next Data Quality Working Group (QWG) meeting will take place on 13-14th of March 2006 in the ACRI-ST premises - Sophia Antipolis, France.
3. MERIS and AATSR Calibration and Geophysical Validation (MAVT-2006), 20-24 March 2006
The European Space Agency is organizing a second working meeting on MERIS and AATSR Calibration and Geophysical Validation (MAVT-2006). The working meeting will be held in ESRIN (near Rome) from 20 to 24 March 2006. This meeting is primarily intended for the participants of the MERIS and AATSR Validation Program. During the MAVT-2006 scientists and other users will present the latest results from their ongoing validation activities. The presentations at the working meeting will be given by invited speakers. During an open poster session participants can present their individual validation results.
All information about the objectives of the workshop as well as the participants presentations can be found on the ESA's official page:

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