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MERIS RR
4th REPROCESSING
QUALITY ASSESSMENT

Technical Note

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Title	Reference	ID
S&T spread sheet report on RR processing	MERIS_RR_processing_report_2018_10_19.xlsx	[RD-01]

1 Introduction

Since September 2018, the bulk processing of MERIS RRG L1 and L2 data and ingestion into MERCI for quality analysis is finished. The complete MERIS Full Resolution Full Swath L1b and L2 data archive of the Envisat mission is spanning from May 17th 2002 through April 8th 2012.

The main goal of this activity was to make a quality assessment (QA) of MERIS RRG L1b data in SEN3 like format, to ensure a good quality of the reprocessed data. The quality assessment is based on three steps:

1. Evaluation of processing reports provided by the processing facility.
2. Evaluation of the MERCI quality tests.
3. Random check of products already segregated during 3rd reprocessing.

L0 data have been analysed and consolidated before processing.

The following two images show the yearly coverage of MERIS FR and RR.
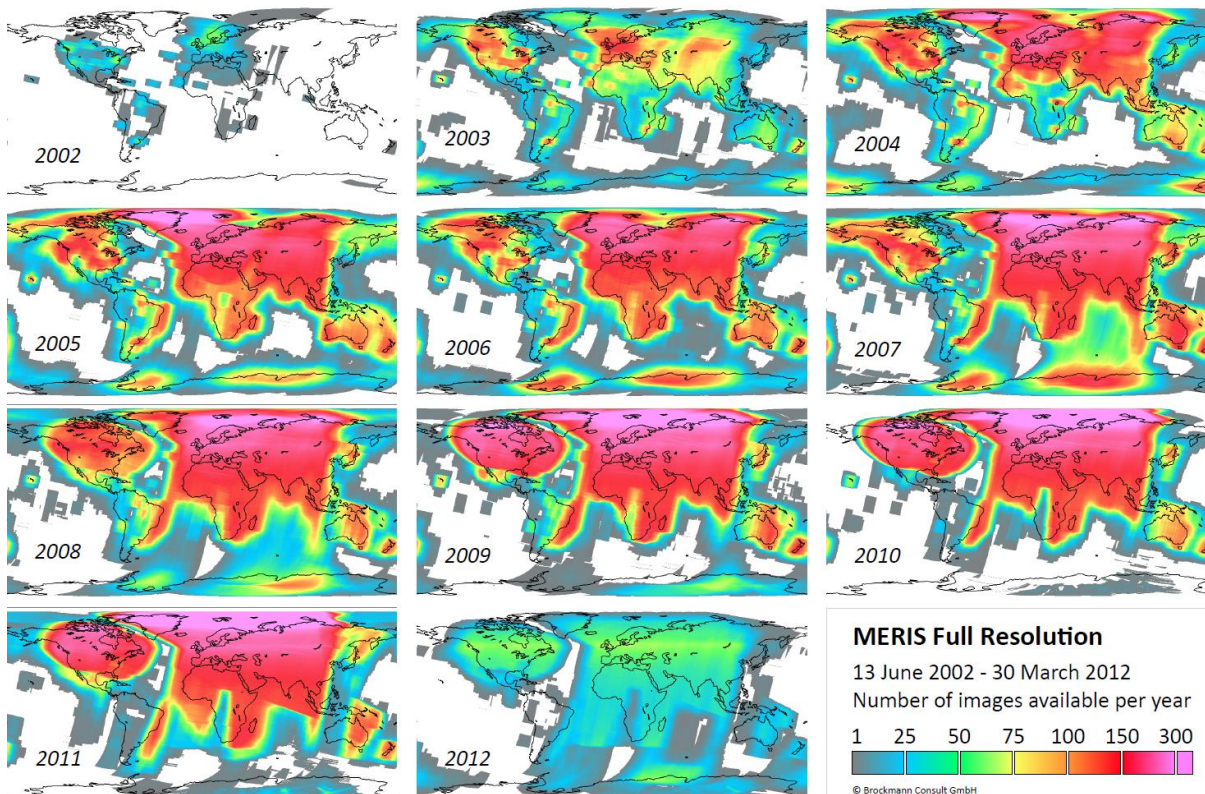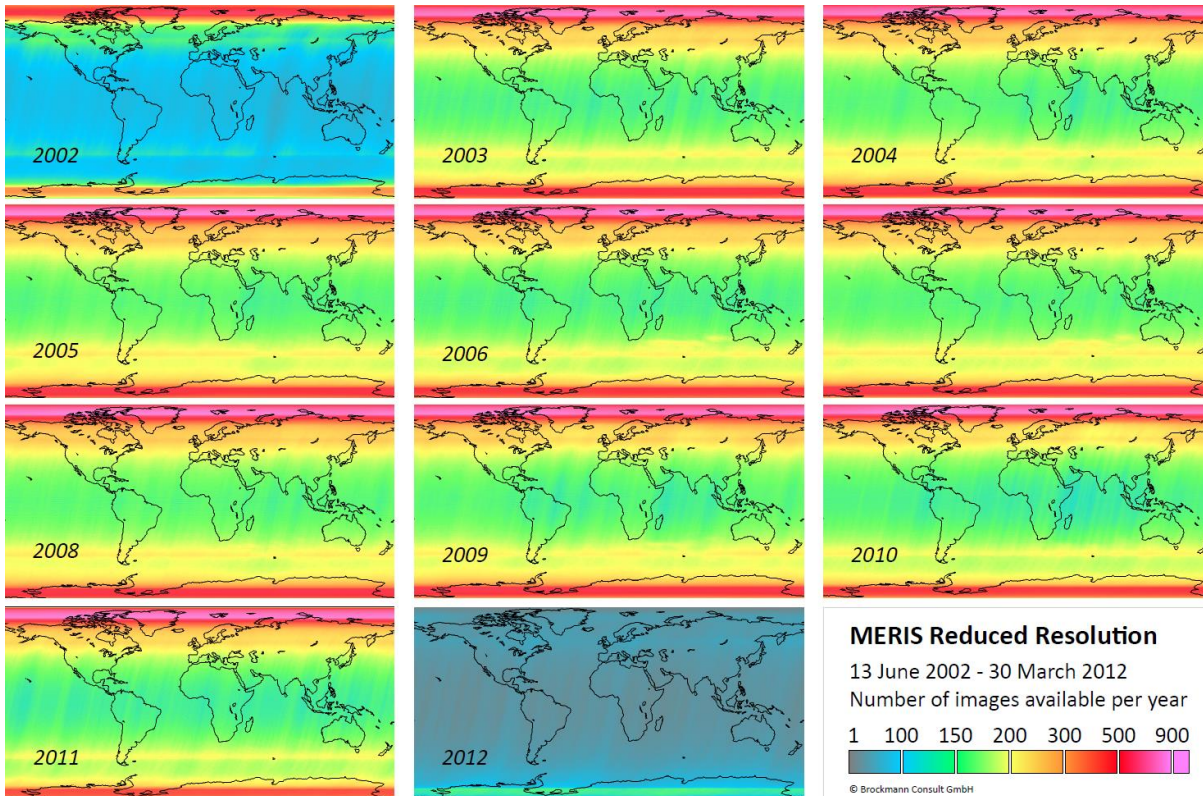
This document summarizes the methods and results of the QA on L1b MERIS RR v2018 data.

2 Methodology

As described in the previous chapter the quality assessment was done in three steps:

1. Evaluation of processing reports provided by the processing facility
2. Evaluation of the MERCI quality tests
3. Random check of products already segregated during 3rd reprocessing

For this first step the reprocessing (RP) S&T spread sheet report on RR processing [RD-01] was analysed. This information was utilized to better understand the L0 products used for L1b processing and to get insight into any issues of the processing that could have affected the L1b quality.

In a second step, the processed L1b products have been ingested into MERCI after processing was finished. MERCI is able to make quality checks based on raster and flag statistics. Five unique tests have been conducted on the L1b products with MERCI:

1. L1b SUSPECT: L1b dubious flag less than 20 percent of all pixels
2. L1b DUPLICATED: L1b DUPLIACTED flag less than 20 percent of all pixels
3. L1b COSMETIC: L1b COSMETIC flag less than 1 percent of all pixels
4. L1b INVALID: Less than 5 percent of all pixels INVALID
5. Blank lines Mxx_radiance: No blank lines which are not flagged as invalid

Those test flags indicate good product quality. Therefore, a flag is raised (value set to 1) if a test is passed. If a test is not passed the value 0 is returned. Products that have failed the test and therefore no flag was raised, have been analysed.

In a third step the segregated products from the 3rd RP have been taken as reference for another quality analysis. The L1b names of the segregated product list have been looked up in a crosswalking table (linking 3rd RP L0 and L1b names) to identify the related L0 product. These L0 names from the 3rd RP have been used to identify L0 products of the 4th RP. By using a crosswalking table, linking 4th RP L0 and L1b names, the related L1b products have been identified. A random sample of these products have been taken and analysed, to see if the issues found in the 3rd RP L1b products are still present in the 4th RP L1B products.

3 Processing Report Analysis

3.1 L0 data

The following analysis of L0 products is based on S&T spread sheet report on RR processing [RD-01]. No writen report was available at this stage.

The entire MERIS RR L0 dataset is comprised by 50586 files. These data were previously analysed in order to generate a master dataset devoid of corrupt and duplicate files, aligned to the same naming convention and file format.

Note: During comparison planned comparison between 4th and 3rd reprocessing (RP) data, it was identified that all L0 products that were identified as segregated during 3rd RP have not been processed during 4th RP (see chapter 5).

3.2 L1b data

The following table shows the status of the L1b Processing (source [RD-01]).

Table 3-1: MERIS FR L1B Figures per Processing Status, Provenance and Year

YEAR	MERIS RR L1B Processing Status	
	SUCESS	FAILED
2002	2760	207
2003	4903	143
2004	5000	150
2005	5050	100
2006	4786	327
2007	4732	342
2008	5080	86
2009	5072	80
2010	4846	253
2011	5087	172
2012	1385	25
	48701	**1885**

50586 MERIS RR L0 files have been reprocessed. 48701 products have successfully been processed to L1b while 1885 products failed during production due to multiple reasons.

4 MERCI Level 1b Analysis

4.1 Description

The QA of MERIS RRG L1b data has taken been conducted with MERCI. Five unique tests have been performed:

1. L1b SUSPECT: L1b dubious flag less than 20 percent of all pixels
2. L1b DUPLICATED: L1b DUPLIACTED flag less than 20 percent of all pixels
3. L1b COSMETIC: L1b COSMETIC flag less than 1 percent of all pixels
4. L1b INVALID: Less than 5 percent of all pixels INVALID
5. Blank lines Mxx_radiance: No blank lines which are not flagged as invalid

The following table shows how many products failed the single tests, as well as how many of those are part of the WAITING products, described in the previous chapter.

Table 4-1: MERCI tests and numbers of affected products

Test	Number of affected products
L1b SUSPECT	0
L1b DUPLICATED	0
L1b COSMETIC	0
L1b INVALID	0
Blank lines M01_radiance	0
Blank lines M02_radiance	0
Blank lines M03_radiance	0
Blank lines M04_radiance	0
Blank lines M05_radiance	0
Blank lines M06_radiance	0
Blank lines M07_radiance	0
Blank lines M08_radiance	0
Blank lines M09_radiance	0
Blank lines M10_radiance	0
Blank lines M11_radiance	0
Blank lines M12_radiance	0
Blank lines M13_radiance	0
Blank lines M14_radiance	0
Blank lines M15_radiance	0

As the table shows, no product has been identified by MERCI to have failed any of the tests. This means all products passed the MERCI QC tests.

5 Third Reprocessing Segregation List Analysis

5.1 Description

The segregated products from the 3rd RP have been taken as reference for a final quality check. The methodology is described in chapter 2. When linking the 3rd and 4th crosswalk tables based on L0 names no matches were found. A closer analysis had revealed that 55 products seemed to be missing. After consultation with DSI it was stated that these products have not yet been processed. A further analysis that some of these products have been NRT products which will not be generated for this reprocessing campaign. This left a set of 37 products that could be processed. The processing of 9 of these 37 products products failed leaving only 28 remaining products. After L0 consolidation 5 of these products shared the same L0 product and therefore ended in the exact same L1 product. Therefore the final product list was down to 23. One fo these products (ENV_ME_1_RRG____20021003T090850_20021003T090904_____0014_010_036_____DSI_R_NT_____.SEN3) could not be found on the FTP Server and was therefore not analysed. This left 22 products to check for quality issues.

The products have been checked visually for anomalies and artefacts. 20 products did not show any issues while two products had geolocation issues.

The following list shows all product names and status of the quality:

Product name	Status
ENV_ME_1_RRG____20020925T095931_20020925T104021_____2450_009_423_____DSI_R_NT____	Gelocation issue: land flag completely wrong (Europe over Africa)
ENV_ME_1_RRG____20060303T105853_20060303T112422_____1529_045_352_____DSI_R_NT____	Severe geolocation issue
ENV_ME_1_RRG____20060706T152246_20060706T160648_____2641_049_140_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20060711T092339_20060711T100740_____2641_049_208_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20060726T195648_20060726T204043_____2636_049_429_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20060825T105322_20060825T113712_____2630_050_352_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20060830T063513_20060830T071903_____2630_050_421_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20060916T174700_20060916T183050_____2630_051_170_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20060929T062843_20060929T063939_____0656_051_349_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20061001T070506_20061001T071718_____0732_051_378_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20061018T074137_20061018T082529_____2633_052_121_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20061203T184349_20061203T192739_____2630_053_285_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20061207T131559_20061207T140008_____2650_053_339_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20061207T113523_20061207T121932_____2650_053_338_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20061208T092312_20061208T100721_____2650_053_351_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20061229T014101_20061229T022440_____2619_054_146_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20070319T025947_20070319T034323_____2616_056_290_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20070319T230652_20070319T235028_____2616_056_302_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20091105T191602_20091105T195957_____2636_084_042_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20100305T111837_20100305T120204_____2607_087_252_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20101008T224238_20101008T232631_____2633_093_359_____DSI_R_NT____	No issue found
ENV_ME_1_RRG____20101017T075527_20101017T083922_____2636_093_479_____DSI_R_NT____	No issue found

5.2 Examples

ENV_ME_1_RRG____20020925T095931_20020925T104021_____2450_009_423_____DSI_R_NT____

Geolocation issue: Left image shows land mask (green) on product. Right image shows subset reprojected and draped over basemap
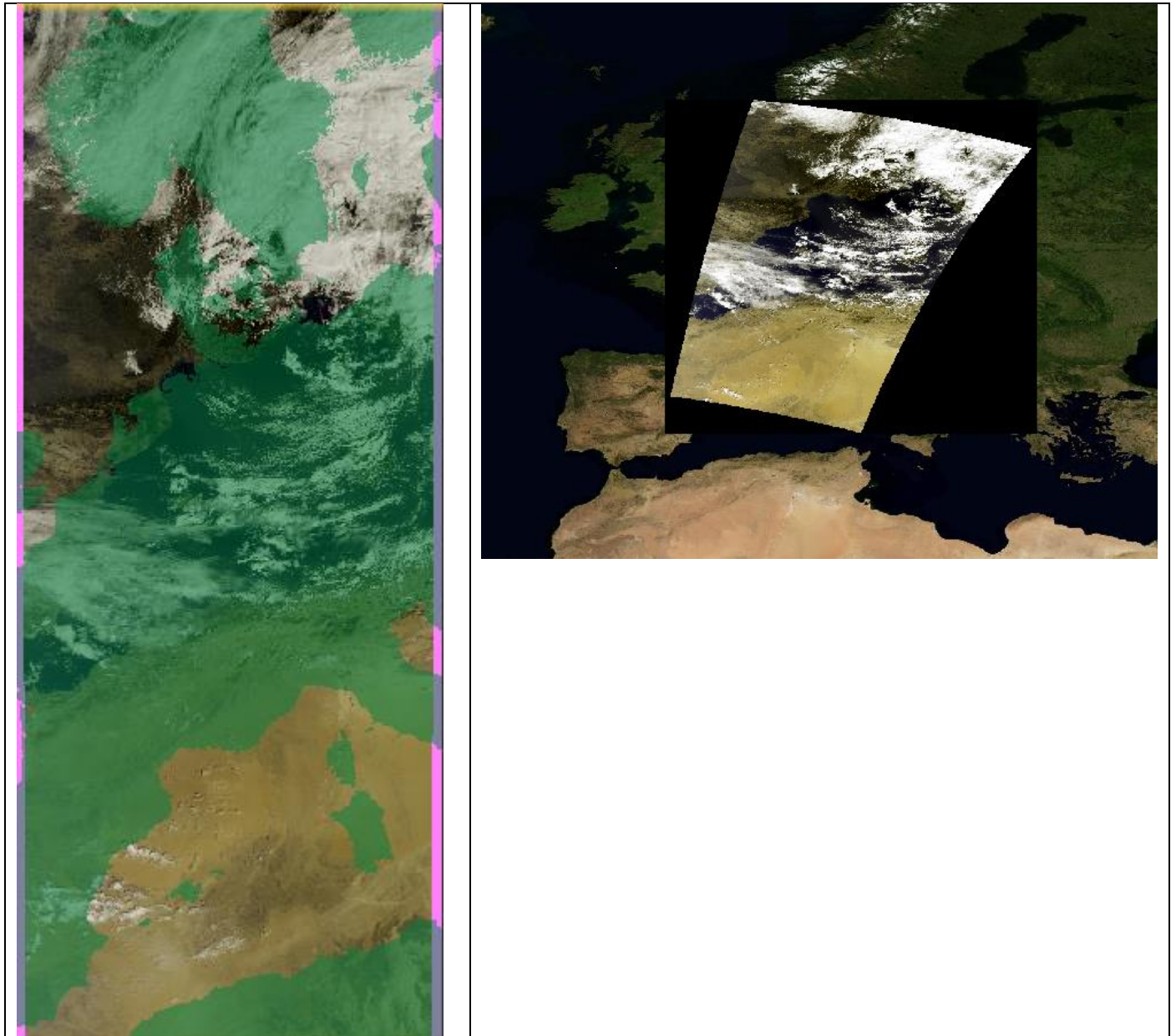
ENV_ME_1_RRG____20060303T105853_20060303T112422_____1529_045_352_____DSI_R_NT____

Severe geolocation issue: Image shows land mask (green) on product.

ENV_ME_1_RRG____20101017T075527_20101017T083922_____2636_093_479_____DSI_R_NT____.SEN3
No issues found

6 L2 Analysis

Level 2 products have not been part of this quality assessment. We recommend treading all corresponding L2 products like the respective L1b products since the detected quality issues with the L1b products will be passed to the L2 product.

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7 Conclusion and Recommendation

The three steps quality analysis has shown that the overall quality of the products seems to be good. No products could be found that showed any quality constraints. Nervertheless a around 3% of all L0 products have failed production to subsequent levels. It is recommended to analysis these errors and try to fix them if possible.

The quality controll of the 22 products segregated during 3rd reprocessing has shown that 20 out of 22 products had shown no anomalies. Therefore we recommend to make these 20 products available to the users and just segerate these two identified products.