ENVISAT Post-Launch Products

MERIS

1. Product Summary

This CD-R contains simulated MERIS sample products corresponding to the reduced resolution and full resolution operating modes of the MERIS instrument.

The CD-R also contains Auxiliary data files used to produce the MERIS products.

Filename on CD-ROM	Product ID	Product Type
MER_RR_2PNPDK20020805_070721_00000270208_00192_02250_3912.N1	MER_RR__2P	Level 2 reduced resolution product acquired in August
MER_RR_2PNPDK20020802_184536_00000270208_00156_02214_3739.N1	MER_RR__2P	Level 2 reduced resolution product acquired in August
MER_RR__1PNPDK20020802_184536_00000270208_00156_02214_3739.N1	MER_RR__1P	Level 1b reduced resolution product acquired in August
MER_RR__1PNPDK20020803_092852_00000270208_00165_02223_3798.N1	MER_RR__1P	Level 1b reduced resolution product acquired in August
MER_FR__1PNETB20020819_093001_00000098208_00394_02452_0090.N1	MER_FR__1P	Level 1b full resolution product
MER_CP1_AXTACR20020115_093756_20020115_093756_20120115_093756	MER_CP1_AX	Level 1b Processor configuration data
MER_INS_AXTACR19991122_134352_19991122_134352_20043112_235959	MER_INS_AX	Instrument characterization data
MER_RAC_AXTACR19991109_112455_19991109_112455_20043112_235959	MER_RAC_AX	Radiometric calibration data
AUX_DEM_AXVCLS19971106_132734_19971106_132734_20101231_235959	AUX_DEM_AX	Digital Elevation Model
MER_DRM_AXVCLS19980330_132734_19980330_132734_20101231_235959	MER_DRM_AX	Digital Roughness Model
MER_LVI_AXTACR19990402_181600_19990402_181600_20043112_235959	MER_LVI_AX	Land vegetation index parameters
MER_WVP_AXTACR20000222_165001_20000222_165001_20043112_235959	MER_WVP_AX	Water Vapour parameters
MER_AER_AXTACR19991118_155349_19991118_155349_20043112_235959	MER_AER_AX	Aerosol climatology
MER_ATP_AXTACR20000114_093215_20000114_093215_20043112_235959	MER_ATP_AX	Atmosphere parameters
MER_OC1_AXTACR19991124_180651_19991124_180651_20043112_235959	MER_OC1_AX	Ocean I parameters
MER_OC2_AXTACR20011010_190736_20011010_190736_20111010_190736	MER_OC2_AX	Ocean II parameters
MER_CMP_AXTACR20000118_100934_20000118_100934_20043112_235959	MER_CMP_AX	Cloud measurement parameters
MER_LAP_AXTACR19991029_160234_19991029_160234_20043112_235959	MER_LAP_AX	Land aerosol parameters
MER_CP2_AXTACR20011009_155131_20011009_1	MER_CP2_AX	Level 2 Processor configuration data

55131_20111009_155131		
MER_OAP_AXTACR19991026_150208_19991026_150208_20043112_235959	MER_OAP_AX	Ocean aerosol parameters
MER_LRC_2PTGMV20000620_104318_00000104X000_00000_00000_0001.N1	MER_LRC_2P	***Simulated*** Extracted Cloud Optical Thickness and Water Vapour content for Meteo users
MER_RRC_2PTGMV20000620_104318_00000104X000_00000_00000_0001.N1	MER_RRC_2P	***Simulated*** Extracted Cloud Optical Thickness and Water Vapour Content
MER_RRV_2PTGMV20000620_104318_00000104X000_00000_00000_0001.N1	MER_RRV_2P	***Simulated*** Product

Note: *MERIS Level 0 and Level 2 full resolution products are **not** included in this CD-R.*

1. 1 Product Summary

MERIS is a medium spatial resolution imaging spectrometer operating in downward viewing push-broom imaging mode. The instrument operates at Full Resolution (FR) or at Reduced Resolution (RR) on a swath width of approximately 1150 km. RR data is acquired on a global basis, whereas FR data is acquired regionally by direct ground reception.

1.1.1 Level 1b Reduced Resolution Product

The RR L1b product provides the Top Of Atmosphere (TOA) radiance of the 15 MERIS spectral bands in the visible and near infrared between 390 nm and 1040 nm with a high degree of spatial and spectral accuracy.
Processing is done systematically from RR Level 0 for complete and full swath width orbital segments (up to 43.5 minutes during daytime operations, i.e. up to 17,500 km).
The data is calibrated with reference to the solar irradiance at the time of measurement. Calibration information used during the product generation process is indicated in the ancillary data included with the product. Surface identification is performed for each pixel in the image and an identification flag is attached to each pixel.
The calibrated TOA Radiance are re-sampled to an evenly spaced fixed grid aligned to the sub-satellite track: lines in the image correspond to the along-track chronological order evenly spaced in time with a quasi even distance on Earth of approximately 1200 m. Each line of data is sub-divided into a number of pixels evenly spaced with a distance of approximately 1200 m.
Image locations, meteorological information provided by ECMWF, and geometrical data are provided in the Auxiliary Data Annotation Data Sets at equally spaced tie points every 16 by 16 pixels.
The product serves as basis for Level 2 RR processing to derive information including ocean color parameters in open waters and coastal waters, characteristics of clouds, the presence and vigor of vegetation, and atmosphere parameters.

Name	Level 1b Reduced Resolution
Identifier	MER_RR__1P
Product Level	1b
Description	TOA radiance for the 15 MERIS bands at reduced resolution, calibrated, geo-located, annotated with Product Confidence Data, classification flags, and environment parameters. The products will be available in scenes of approximately 1150 km by 1150 km. The user will be able to order any number of scenes leading up to the complete MERIS orbit of 17,500 km. Radiometric and geometric continuity is guarantied between adjacent scenes.
File Size	593 lines x 1121 pixels
Pixel Spacing	approximately 1200m x 1200 m (along-track x across-track)
Coverage	Scene = 1150 km x 1150 km, or multiples of scenes up to 17,500 km x 1150 km
Bits / Pixel	16
Unit	10^{-3} W.m^{-2}.sr^{-1}.nm^{-1}
Radiometric Resolution	2.85 x 10^{-2} w/m^2/μm @ 442.5 nm SSP with $\theta_s = 60^o$
Radiometric Accuracy	From 400 to 900 nm < 2% From 900 to 1050 nm < 5%
Format	▪ **MPH:** Main Product Header identifies the product and its main characteristics ▪ **SPH**: Specific Product Header includes Product Confidence Data applying to the whole product, and/or relevant processing parameters ▪ **SQ ADS**: Summary Quality Annotation Data Set contains summarized information useful for the evaluation of the quality of the product ▪ **GADS:** Global Annotation Data Set contains scaling factors and the Sun flux at the time of the measurement ▪ **LADS**: Tie Points Location and Auxiliary Data Annotation Data Set includes information on tie point latitude/longitude and correction due to altitude, sun zenith angle, viewing zenith and azimuth angle, re-sampled meteorological parameters such as wind field components, mean sea level pressure, total column ozone, total column water vapor ▪ **MDS (1-15):** 15 Measurement Data Sets containing calibrated TOA radiance for each pixel ▪ **MDS (16):** The following flags are provided for each pixel in this Measurement Data Set: bright clouds, coastline, land/sea, sun glint risk, suspect pixel, cosmetic pixel, duplicated pixel.

1.1.2 Level 1b Full Resolution Product

The FR L1b product provides the TOA radiance of the 15 MERIS spectral bands in the visible and near infrared between 390 nm and 1040 nm with a high degree of spatial and spectral accuracy.
L1b FR data are processed on request from the acquired Level 0 segments on a floating scene basis. The product serves as the basis for Level 2 FR processing. It is disseminated to the user in floating scene size of approximately 575 km by 575 km or 296 km by 296 km ("imagette").
The data is calibrated with reference to the solar irradiance at the time of measurement. Calibration information used during the product generation process is indicated in the ancillary data included with the product. Surface identification is performed for each pixel in the image and an identification flag is attached to each pixel.
The calibrated TOA Radiance are re-sampled to an evenly spaced fixed grid aligned to the sub-satellite track: lines in the image correspond to the along-track chronological order evenly spaced in time with a quasi even distance on Earth of approximately 300 m. Each line of data is sub-divided into a number of pixels evenly spaced with a distance of approximately 300 m.
Image locations, meteorological data provided by ECMWF, and geometrical annotations are provided in the Auxiliary Data Annotation Data Sets at equally spaced tie points every 64 by 64 pixels.
FR scenes contain 36 x 36 tie points; FR "imagettes" contain 19 x 19 tie points.

Name	Level 1b Full Resolution
Identifier	MER_FR__1P
Product Level	1b
Description	TOA radiance for the 15 MERIS bands at full resolution, calibrated, geo-located, annotated with Product Confidence Data, calibration data, classification flags, and environment parameters. The products will be available in scenes (or imagettes) of approximately 575 km by 575 km (or 296 km by 296 km). The user will be able to order adjacent scenes covering the full MERIS swath and any number of adjacent scenes pairs leading up to the complete MERIS orbit of 17,500 km, depending on the availability of the Full Resolution data. Radiometric and geometric continuity is guarantied between adjacent scenes.
File Size	2241 lines x 2241 pixels (scene)
Pixel Spacing	approximately 300 m x 300 m (along-track x across track)
Coverage	approximately 575 km x 575 km (scene) approximately 296 km x 296 km ("imagette")
Bits / Pixel	16
Unit	10^{-3} W m^{-2} sr^{-1} nm^{-1}
Radiometric Resolution	1.14 x 10^{-1} w/m^2/□m @ 442.5 nm SSP with □$_s$ = 60^o
Radiometric Accuracy	From 400 to 900 nm < 2% From 900 to 1050 nm < 5%
Format	▪ **MPH**: Main Product Header identifies the product and its main characteristics ▪ **SPH**: Specific Product Header includes Product Confidence Data applying to the whole product, and/or relevant processing parameters ▪ **SQ ADS**: Summary Quality Annotation Data Set contains summarized information useful for the evaluation of the quality of the product ▪ **GADS**: Global Annotation Data Set contains scaling factors and the Sun flux at the time of the measurement ▪ **LADS**: Tie Points Location and Auxiliary Data Annotation Data Set includes information on tie point latitude/longitude and correction due to altitude, sun zenith angle, viewing zenith and azimuth angle, re-sampled meteorological parameters such as wind field components, mean sea level pressure, total column ozone, total column water vapor ▪ **MDS (1-15):** 15 Measurement Data Sets containing calibrated TOA radiance for each pixel ▪ **MDS (16):** The following flags are provided for each pixel in this Measurement Data Set: bright clouds, coastline, land/sea, sun glint risk, suspect pixel, cosmetic pixel, duplicated pixel.

1.1.3 Level 2 Reduced Resolution Product

Processing is done systematically from RR Level 1b for complete and full swath width orbital segments (up to 43.5 minutes during daytime operations, i.e. up to 17,500 km).
The geophysical fields are re-sampled to an evenly spaced fixed grid aligned to the sub-satellite track: lines in the image correspond to the along-track chronological order evenly spaced in time with a quasi even distance on Earth of approximately 1200 m. Each line of data is sub-divided into a number of pixels evenly spaced with a distance of approximately 1200 m
The RR L2 product provides geophysical products for three surface types – Ocean, Land and Clouds in a distributed fashion. In the L2 distributed products, the geophysical quantity found in the data sets varies depending on the surface measured.
The open ocean data products consist of chlorophyll concentrations and several atmospheric parameters. In coastal zones more products are produced such as Total Suspended Matter and Yellow Substance Concentration.
The land surface product contains MERIS global Vegetation Index (MGVI) and atmospheric parameters. In addition, surface reflectance will be made available, allowing the user to derive further products.
Three cloud products are foreseen: cloud top height, cloud optical thickness and cloud albedo.
Total column Water Vapour is provided over all three surfaces.
Each of the above candidate level 2 parameters is the subject of continuing scientific research commissioned by ESA. The algorithms for each of the parameters will be subject to examination by ESA to determine whether they should be implemented in the ground segment.
The current status of development is the following:

Normalized water leaving radiance / reflectance
The MERIS Level 2 radiometric unit is atmospherically corrected water leaving reflectance. The atmospheric correction applied assumes that the water is absorbing in the NIR, and includes a correction for those sediment-loaded waters where this assumption fails.
For more information, see ***ATBD 2.7***, and ***ATBD 2.6*** for the bright water correction.

Algal Pigment Index I
The MERIS algal pigment index is a measurement of the concentration in $Log_{10}(mg/m^3)$ of phytoplankton (algae) in the water. The concentration is derived by the direct relationship between the ratio of the blue and green signal leaving the water surface and the concentration of algal pigments. The relationship, based on published data, is valid over clear waters and spans a concentration range from mg/m^3 to tens of g/m^3 .For more information, see ***ATBD 2.9***

Algal Pigment Index II
The second MERIS algal pigment index is also a measurement of the concentration in $Log_{10}(mg/m^3)$ of phytoplankton (algae) in the water but, is part of a suite of oceanic products derived by inverting a model of the optical properties of the ocean by the use of a neural network. The other oceanic products are suspended matter and yellow substance.
For more information, see ***ATBD 2.12***

Suspended matter
The MERIS suspended matter products is a measurement of the suspended sediments concentration in $Log_{10}(g/m^3)$. As described above, it is derived by inverting a model of the optical properties of the ocean by the use of a neural network. The model describe suspended matter as a scattering particle with very little absorption for which a more appropriate name would be "total suspended mineralic matter concentration"
For more information, see ***ATBD 2.12***

Yellow substance
The MERIS yellow substance product is a measurement of the Gelbstoff absorption in m-1. As described above, it is derived by inverting a model of the optical properties of the ocean by the use of a neural network. The model describes yellow substance as non-scattering absorbing matter. Yellow substance or "Gelbstoff" is decayed organic material that has been dissolved in the marine waters and is usually transported into the sea by rivers.
For more information, see ***ATBD 2.12***

Photosynthetically Active Radiation (PAR)
The MERIS PAR product is a measurement the amount of radiation in mEinstein.m^2 available to the Photosynthetically Active oceanic flora. It will be computed from atmospherically corrected irradiances using the method proposed by Calder et al. This product is intended for the study of chlorophyll fluorescence and should be used with the 681.25 nm band selected for this purpose.
For more information, see ***ATBD 2.18***

Aerosol optical thickness
The MERIS aerosol optical thickness is a measurement the opacity of the aerosol layers at 865 nm. It is measured by assuming that the ocean is a black surface in the NIR (see Normalized water leaving radiance / reflectance).
For more information, see ***ATBD 2.7***

The MERIS Aerosol Epsilon Factor
The MERIS aerosol Epsilon Factor is a description of the aerosol assemblage detected over water bodies. It is expressed as the spectral slope of the Aerosol Reflectance in the near InfraRed, Complemented by two flags, which identifies whether they are absorbing or not.
For more information, see ***ATBD 2.7***

Cloud optical thickness
The MERIS cloud optical thickness is a measurement the opacity of the cloud.
For more information, see ***ATBD 2.1***

Cloud albedo
The MERIS cloud albedo is a measurement the amount of radiation reflected by clouds.
For more information, see ***ATBD 2.2***

Cloud top pressure
The MERIS cloud top pressure is a measurement of pressure in hPa based on the absorption of solar radiation by oxygen. It is derived by inverting a model of the optical properties of the atmosphere and clouds by the use of a neural network.
For more information, see ***ATBD 2.3***

Cloud Type
The MERIS cloud type product is determined by using a simple relationship between the cloud properties - optical thickness and height - and its type, as established by the International Satellite Cloud Climatology Project (ISCCP).

Cloud reflectance
The MERIS Level 2 cloud radiometric unit will consist of top of the atmosphere reflectance only.
For more information, see ***ATBD 2.16***

Reflectance
The MERIS Level 2 land radiometric unit will consist of Rayleigh corrected reflectance. The atmospheric corrections over land does not include a correction for the aerosols contribution.
For more information, see ***ATBD 2.15***

Aerosol optical thickness
The MERIS cloud optical thickness is a measurement the opacity of the aerosol layers at 865 nm. It is measured by assuming that Dense Dark Vegetation has a known dependent standard reflectance value in the visible.
For more information, see ***ATBD 2.15***

Aerosol Epsilon Factor
The aerosol epsilon factor is description of the aerosol assemblage detected over dense dark vegetation. It is expressed as the spectral slope of the aerosol reflectance in the Near Infra Red.
For more information, see ***ATBD 2.15***

Meris Global Vegetation Index
The MERIS Global vegetation index is a measurement of the presence of healthy live green vegetation. It has been optimized to be robust to atmospheric conditions and surface reflectance and constrained to provide an estimate of the fraction of absorbed Photosynthetically active radiation.
For more information, see ***ATBD 2.10***

Water Vapour products
The MERIS water vapour product is a measurement of the concentration in $g.m^{-2}$ of water vapour found in the total atmospheric column. This product is of particular interest over land where the signal is high, but it will also be provided over water surfaces and clouds.
For more information, see ***ATBD 2.4***

The MERIS Level 2 products are coded in such a way as to take the full advantage of the storage space allocated to them. As a consequence, in order to convert the data to geophysical units, an offset and gain correction shall be applied.
Image locations, meteorological information provided by ECMWF, and geometrical data are provided in the Auxiliary Data Annotation Data Sets at equally spaced tie points every 16 by 16 pixels.

Name	Level 2 Reduced Resolution
Identifier	MER_RR__2P
Product Level	2
Description	Meris product generated systematically from MERIS L1B , Water leaving radiance (reflectance) and geophysical products
File Size	593 lines x 1121 pixels
Pixel Spacing	approximately 1200m x 1200 m (along-track x across-track)
Coverage	Scene = 1150 km x 1150 km, or multiples of scenes up to 17,500 km x 1150 km
Bits / Pixel	16
Radiometric Resolution	NEDR=1.42 X 10^{-4} at sea level @ 442.5nm
Accuracy	Surface reflectance (ocean) <2 x 10 -4 Surface reflectance (Land) < 5% Chlorophyll retrieval < 15 % Yellow substance < 30 % Suspended matter < 15 % Water vapour < 20% Cloud albedo < 2 % Cloud optical thickness ~ 10% Cloud top pressure ~ 40 hPa MERIS Vegetation Index:-N/A
Format	▪ **MPH:** Main Product Header identifies the product and its main characteristics ▪ **SPH**: Specific Product Header includes Product Confidence Data applying to the whole product, and/or relevant processing parameters ▪ **SQ ADS**: Summary Quality Annotation Data Set contains summarized information useful for the evaluation of the quality of the product ▪ **GADS:** Global Annotation Data Set contains scaling factors and the Sun flux at the time of the measurement ▪ **LADS**: Tie Points Location and Auxiliary Data Annotation Data Set includes information on tie point latitude/longitude and correction due to altitude, sun zenith angle, viewing zenith and azimuth angle, re-sampled meteorological parameters such as wind field components, mean sea level pressure, total column ozone, total column water vapor ▪ **MDS (1-19):** Measurement Data Sets containing geophysical data for each pixel ▪ **MDS (20):** The following flags are provided for each pixel in this Measurement Data Set: Surface Classification: land product available, cloud product available, water product available. Product Confidence: validity for MDS 1 to 13, validity for MDS 14, validity for MDS 15, validity for MDS 16, validity for MDS 17, validity for MDS 18, validity for MDS 19. Scientific: Coastline: From Level 1b, Cosmetic: From Level 1b, Suspect: From Level 1b, Continental absorbing aerosol, Dust-Line absorbing aerosol, Turbid water, Anomalous scattering water, Yellow substance loaded water, Ice or high aerosol load, Corrected for glint, Contaminated by glint, Dense dark vegetation, Cloud Top Pressure and Surface pressure do not match, Pressure product Lower than ECMWF pressure.

1.1.4 Level 2 Extracted Cloud thickness and Water Product

This RR Level 2 product contains selected fields extracted from the MERIS Reduced Resolution Geophysical product. The geophysical parameters are cloud optical thickness and total column water vapour content (see section 1.1.3 for details). This product is available in near real time, 3 hours after data acquisition. It is primarily intended for meteorological applications.

Name	**Extracted Cloud Optical Thickness and Water Vapour Content**
Identifier	MER_RRC__2P
Product Level	2
Description	Meris product generated systematically from MERIS L1B , Water leaving radiance (reflectance) and geophysical products
File Size	1536 lines x 1121 pixels
Pixel Spacing	approximately 1200m x 1200 m (along-track x across-track)
Coverage	Scene = 1150 km x 1150 km, or multiples of scenes up to 17,500 km x 1150 km
Bits / Pixel	16
Radiometric Resolution	N/A
Accuracy	Water vapour < 20% Cloud optical thickness ~ 10%
Format	▪ **MPH:** Main Product Header identifies the product and its main characteristics ▪ **SPH**: Specific Product Header includes Product Confidence Data applying to the whole product, and/or relevant processing parameters ▪ **SQ ADS**: Summary Quality Annotation Data Set contains summarized information useful for the evaluation of the quality of the product ▪ **GADS:** Global Annotation Data Set contains scaling factors and the Sun flux at the time of the measurement ▪ **LADS**: Tie Points Location and Auxiliary Data Annotation Data Set includes information on tie point latitude/longitude and correction due to altitude, sun zenith angle, viewing zenith and azimuth angle, re-sampled meteorological parameters such as wind field components, mean sea level pressure, total column ozone, total column water vapor ▪ **MDS (1-2):** Measurement Data Sets containing geophysical data for each pixel ▪ **MDS (3):** The following flags are provided for each pixel in this Measurement Data Set: Surface Classification: land product available, cloud product available, water product available. Product Confidence: validity for MDS 1 to 13, validity for MDS 14, validity for MDS 15, validity for MDS 16, validity for MDS 17, validity for MDS 18, validity for MDS 19. Scientific: Coastline: From Level 1b, Cosmetic: From Level 1b, Suspect: From Level 1b, Continental absorbing aerosol, Dust-Line absorbing aerosol, Turbid water, Anomalous scattering water, Yellow substance loaded water, Ice or high aerosol load, Corrected for glint, Contaminated by glint, Dense dark vegetation, Cloud Top Pressure and Surface pressure do not match, Pressure product Lower than ECMWF pressure.

1.1.5 Level 2 Extracted Cloud thickness and Water Product for Meteo Users

This RR Level 2 product contains selected fields extracted from the MERIS Reduced Resolution Geophysical product. The geophysical parameters are identical to those of MER_RRC_2P apart for the resolution which is reduced to 4160 m across track at nadir by 4640 m along track through an averaging process. This product is available in near real time only, 3 hours after data acquisition. It is intended only for meteorological applications, and may be converted to BUFR format outside the PDS for GTS

Name	**Extracted Cloud Thickness and Water Vapour for Meteo Users**
Identifier	MER_LRC__2P
Product Level	2
Description	Meris product generated systematically from MERIS L1B , Water leaving radiance (reflectance) and geophysical products
File Size	384 lines x 281 pixels
Pixel Spacing	approximately 4800m x 4800 m (along-track x across-track)
Coverage	Scene = 1150 km x 1150 km, or multiples of scenes up to 17,500 km x 1150 km
Bits / Pixel	16
Radiometric Resolution	N/A
Accuracy	Water vapour < 20% Cloud optical thickness ~ 10%
Format	▪ **MPH:** Main Product Header identifies the product and its main characteristics ▪ **SPH**: Specific Product Header includes Product Confidence Data applying to the whole product, and/or relevant processing parameters ▪ **SQ ADS**: Summary Quality Annotation Data Set contains summarized information useful for the evaluation of the quality of the product ▪ **GADS:** Global Annotation Data Set contains scaling factors and the Sun flux at the time of the measurement ▪ **LADS**: Tie Points Location and Auxiliary Data Annotation Data Set includes information on tie point latitude/longitude and correction due to altitude, sun zenith angle, viewing zenith and azimuth angle, re-sampled meteorological parameters such as wind field components, mean sea level pressure, total column ozone, total column water vapor ▪ **MDS (1-2):** Measurement Data Sets containing geophysical data for each pixel ▪ **MDS (3):** The following flags are provided for each pixel in this Measurement Data Set: Surface Classification: land product available, cloud product available, water product available. Product Confidence: validity for MDS 1 to 13, validity for MDS 14, validity for MDS 15, validity for MDS 16, validity for MDS 17, validity for MDS 18, validity for MDS 19. Scientific: Coastline: From Level 1b, Cosmetic: From Level 1b, Suspect: From Level 1b, Continental absorbing aerosol, Dust-Line absorbing aerosol, Turbid water, Anomalous scattering water, Yellow substance loaded water, Ice or high aerosol load, Corrected for glint, Contaminated by glint, Dense dark vegetation, Cloud Top Pressure and Surface pressure do not match, Pressure product Lower than ECMWF pressure.

1.1.6 Level 2 Full Resolution Product

The FR L2 product provides the same geophysical data products as those of the RR L2 product. (See Level 2 Reduced Resolution Product for details of the geophysical fields provided)

L2 FR data are processed on request from the Level 1b segments on a floating scene basis. It is disseminated to the user in floating scene size of approximately 575 km by 575 km or 296 km by 296 km ("imagette")

The are re-sampled to an evenly spaced fixed grid aligned to the sub-satellite track: lines in the image correspond to the along-track chronological order evenly spaced in time with a quasi even distance on Earth of approximately 300 m. Each line of data is sub-divided into a number of pixels evenly spaced with a distance of approximately 300 m.

Image locations, meteorological data provided by ECMWF, and geometrical annotations are provided in the Auxiliary Data Annotation Data Sets at equally spaced tie points every 64 by 64 pixels.

FR scenes contain 36 x 36 tie points; FR "imagettes" contain 19 x 19 tie points.

NOTE this CD does not include an example L2 Full Resolution product. (See Simulated Products v.4 CD for an example).

Name	Level 2 Full Resolution
Identifier	MER_FR__2P
Product Level	1b
Description	Meris product generated systematically from MERIS L1b, Water leaving radiance (reflectance) and geophysical products. The products will be available in scenes (or imagettes) of approximately 575 km by 575 km (or 296 km by 296 km). The user will be able to order adjacent scenes covering the full MERIS swath and any number of adjacent scenes pairs leading up to the complete MERIS orbit of 17,500 km, depending on the availability of the Full Resolution data. Radiometric and geometric continuity is guarantied between adjacent scenes.
File Size	2241 lines x 2241 pixels (scene) 1153 lines x 1153 pixels ("imagette")
Pixel Spacing	approximately 300 m x 300 m (along-track x across track)
Coverage	approximately 575 km x 575 km (scene) approximately 296 km x 296 km ("imagette")
Bits / Pixel	16
Radiometric Resolution	NEDR=1.42 X 10^{-4} at sea level @ 442.5nm
Accuracy	Surface reflectance (ocean) <2 x 10 -4 Surface reflectance (Land) < 5% Chlorophyll retrieval < 15 % Yellow substance < 30 % Suspended matter < 15 % Water vapour < 20% Cloud albedo < 2 % Cloud optical thickness ~ 10% Cloud top pressure ~ 40 hPa MERIS Vegetation Index:-N/A
Format	▪ **MPH**: Main Product Header identifies the product and its main characteristics ▪ **SPH**: Specific Product Header includes Product Confidence Data applying to the whole product, and/or relevant processing parameters ▪ **SQ ADS**: Summary Quality Annotation Data Set contains summarized information useful for the evaluation of the quality of the product ▪ **GADS**: Global Annotation Data Set contains scaling factors and the Sun flux at the time of the measurement ▪ **LADS**: Tie Points Location and Auxiliary Data Annotation Data Set includes information on tie point latitude/longitude and correction due to altitude, sun zenith angle, viewing zenith and azimuth angle, re-sampled meteorological parameters such as wind field components, mean sea level pressure, total column ozone, total column water vapor ▪ **MDS (1-19):** Measurement Data Sets containing geophysical data for each pixel ▪ **MDS (20):** The following flags are provided for each pixel in this Measurement Data Set: Surface Classification: land product available, cloud product available, water product available. Product Confidence: validity for MDS 1 to 13, validity for MDS 14, validity for MDS 15, validity for MDS 16, validity for MDS 17, validity for MDS 18, validity for MDS 19. Scientific: Coastline: From Level 1b, Cosmetic: From Level 1b, Suspect: From Level 1b, Continental absorbing aerosol, Dust-Line absorbing aerosol, Turbid water, Anomalous scattering water, Yellow substance loaded water, Ice or high aerosol load, Corrected for glint, Contaminated by glint, Dense dark vegetation, Cloud Top Pressure and Surface pressure do not match, Pressure product Lower than ECMWF pressure.

1.1.7 Browse Product

MERIS Browse product contains 3 false colour bands (red, blue and green) derived from sub-sampled Level 1B product. This product is systematically produced and archived and is available 3 hours after data acquisition. The Browse product is intended to supply prospective users with a visual indication of the quality of the full image products and is intended to support queries made to the MERIS archive.

Name	Browse
Identifier	MER_RR__BP
Product Level	Browse
Description	Meris product generated systematically from MERIS L1B , The browse will be a 3 band colour product derived from level 1b data where three of the MERIS bands will be chosen for the best visualization of the land, sea, ice, cloud features. MERIS product generated systematically for all MERIS RR L0 acquired
File Size	384 lines x 281 pixels
Pixel Spacing	approximately 4800m x 4800 m (along-track x across-track)
Coverage	approximately 17,500 km x 1150 km
Bits / Pixel	24 (RGB)
Radiometric Resolution	N/A
Accuracy	N/A
Format	▪ **MPH:** Main Product Header identifies the product and its main characteristics ▪ **SPH**: Specific Product Header includes Product Confidence Data applying to the whole product, and/or relevant processing parameters ▪ **SQ ADS**: Summary Quality Annotation Data Set contains summarized information useful for the evaluation of the quality of the product ▪ **LADS**: Tie Points Location and Auxiliary Data Annotation Data Set includes information on tie point latitude/longitude and correction due to altitude, sun zenith angle, viewing zenith and azimuth angle, re-sampled meteorological parameters such as wind field components, mean sea level pressure, total column ozone, total column water vapor ▪ **MDS (1):** Measurement Data Sets containing false colour (RGB) for each pixel

1.1.8 Auxiliary Data Files

Auxiliary data files are all other data files used to produce a product other than the direct measurements of the instrument. The structure of these files follows the standard structure of all ENVISAT auxiliary data. Three sample auxiliary data files are provided on this CD-R:

- **MER_CP1_AX: Level 1B Processor Configuration Data**:
  This file contains processing parameters used during the generation of Level 1b products. It includes solar spectral fluxes in the 15 MERIS spectral bands, Earth radius, pixel spacing, and thresholds for pixel classification and radiometric corrections, look-up tables for atmospheric corrections.

- **MER_INS_AX: Instrument Characterization data:**
  This data file contains all the parameters needed for processing MERIS data. It includes point spread function characterization data, across track pointing data, along track frame offsets, pixel instantaneous filed of view characterization, other instrumental parameters.

- **MER_RAC_AX: Radiometric Calibration Data:**
  This data file contains all the control parameters needed for the radiometric calibration of MERIS L1b products. It includes spectral bandwidths and positions, radiometric gain coefficients, dark signal characterization data, smear correction coefficients, look-up tables for non-linearity correction

- **AUX_LSM_AX: Land/Sea Mask :**
  This data file contains the Land / Sea mask generated by RAL using the CIA vector shoreline as input.

- **AUX_DEM_AX: Digital Elevation Model:**
  This data file contains the Digital Elevation Model " Terrain Base " from NOAA

- **MER_DRM_AX: Digital Roughness Model:**
  This data file contains the standard deviation of GTOP-030 within the cells of Terrain Base. It is intended for use as a confidence indicator in areas of fast varying topography.

- **MER_LVT_AX: Land vegetation index parameters:**
  This file contains processing parameters used during the generation of the MERIS Global Vegetation Index (MGVI).

- **MER_WVP_AX: Water Vapour parameters:**
  This file contains processing parameters used during the generation of the MERIS Water Vapour products.

- **MER_AER_AX: Aerosol Climatology:**
  This file contains the following aerosol climatology: Over land, Volcanic (Used in the event of a large volcanic eruption), over oceans – this climatology is intended for use by the atmospheric processing over the ocean, and excludes some aerosol types from processing over zones (i.e. urban aerosols in the middle of the Pacific.

- **MER_ATP_AX: Atmosphere parameters:**
  This file contains various atmosphere related processing parameters such as: Rayleigh phase function, Pressure retrieval, PAR.

- **MER_OC1_AX: Ocean I parameters:**
  This file contains processing parameters used during the generation of Ocean Case I parameters.

- **MER_OC2_AX: Ocean II parameters:**
  This file contains processing parameters used during the generation of Ocean Case II parameters

- **MER_CMP_AX: Cloud measurement parameters:**
  This file contains processing parameters used during the generation of cloud parameters.

- **MER_LAP_AX: Land aerosol parameters:**
  This file contains processing parameters used for the atmospheric correction over land

- **MER_CP2_AX: Level 2 Processor configuration data:**
  This file contains processing parameters used during the generation of Level 2 products.

- **MER_OAP_AX: Ocean aerosol parameters:**
  This file contains processing parameters used for the atmospheric correction over the ocean.

1.1.9 Available documentation

- MERIS Level 1b algorithm description
- MERIS Level 2 Algorithm Theoretical Basis Documents (ATBDs 1- 21)

1.2 Sources of the Simulated Products

The MERIS level 1b reduced and full resolution simulated products have been generated using the MERIS prototype processor developed by ACRI (F). The input was created by ACRI using an image simulator. The image was then converted to instrument source packets (scientific telemetry data) by ACRI with the use of the MERIS instrument system simulator. Finally, the instrument source packets were converted to a MERIS Level 0 product prior to being processed by the prototype processor.

Two real Level 1b and two Level 2 products computed with data acquired in August 2002 have been included.

1.3 Limitation of the scientific content

The scientific content of the products available on the CD-ROM is limited to the science included in the generation of the simulated data, in particular with respect to the geographical distribution and to limited number of surface types (see 1.2)

The level 1b data acquired in August has been properly calibrated, however, the straylight and non-linearity correction was not applied.

The level 2 data acquired in August has been processed with the initial processing parameters i.e. no tuning performed to date. The clear camera boundaries seen are due to the instrument smile - up to 1nm spectral shift at camera edges. This effect will be corrected in the near future.