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TITLE: ENVISAT-1 PRODUCTS SPECIFICATIONS

VOLUME 10: GOMOS PRODUCTS SPECIFICATIONS

Abstract : This document contains the GOMOS Product Specifications.

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AMENDMENT POLICY

This document shall be amended by releasing a new edition of the document in its entirety. The Amendment Record Sheet below records the history and issue status of this document.

AMENDMENT RECORD SHEET

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
1	A	12/01/96	Issue 1	
1	B	16/02/96	SCR #16, CR #16 Issue 1, Revision B Reason for Change: Updated to reflect information in PO-TN-ESA-GS-0381 and to address RIDs of Feb. 2/96 pertaining to the Level 0 structure. MPH, SPH, DSD, and DSR structures modified. Table added showing generalized Level 0 product structure. RIDs Addressed: ESA/0001: FEP header defined ESA/0002: PF-Host time stamp clarified ESA/0004: Processing PCD added ESA/0006: AF PCD ADS and DSD added ESA/0007: page A-3 updated ESA/0008: page B-3 updated ESA/0009: Table 8.1.1 modified ESA/0011: TBD changed to Range/ Doppler ESA/0013: FEP header defined ESA/0014: Table 8.4.7.4-2 corrected CSF/1: filename in MPH corrected CSF/2: page A-3 updated CSF/3: MPH PCD information updated	

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
			CSF/5: DSD added to Level 0 SPH CSF/6: Section on AATSR updated and re-issued CSF/8: AATSR_O Summary Sheet updated	
1	C	04/04/96	SCR #38, CR #38 Issue 1, Revision C Reason for Change: Updated Sections 1-6, 17 and Annex A to reflect changes discussed at the Products Review Meeting #1, March 5-8, 1996, as per action item "AI MDA 6 April 96" from PO-MN-ESA-00416, Pg. 35.	Products Review Meeting #1
2	A	20/05/96	SCR #71, CR #71 Issue 2 Separate volume created. Updated with new product information from Document A-3.	
2	B	23/09/96	SCR #102, CR #102 Issue 2, Revision B Reason for Change: Added Level 1B products, Level 2 products, and Auxiliary Data file definitions	Products Review Meeting #2
3	A	10/02/97	SCR #133, CR #133 Issue 3 Reason for Change: Updated in response to ESA RIDs received 06/01/97. Based on changes to IODD (Version 3.2) document received 09/01/97. Further updates as per fax DPD/JMJ/ ENV, 0280/97.	ESA RIDs
3	B	20/03/98	SCR #169, CR #169 Issue 3, Revision B Reason for Change: Updated as per SPRs. SPR-42000-0022-CSF to SPR-42000-0041-CSF, and SPR-42000-0082-CSF to SPR-42000-0084-CSF.	Updated as per SPRs

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
3	C	13/11/98	SCR #218, CR #218 Issue 3, Revision C Reason for Change: Updated as per SPRs SPR-42000-0181-CSF to '0189-CSF, SPR-42000-0196-CSF, SPR-42000-0212-CSF, SPR-42000-0237-CSF to '0245-CSF.	Updated as per SPRs
3	D	15/5/00	Reason for Change: Updated as per GOMOS IODD 5.1 and SPR-42000-0285-CSF, SPR-100N0-0412-ESA, PF-SPR-SSF-GS-231, PF-SPR-SSF-GS-242	PDS V3
3	E	7/11/00	Reason for Change: SPR-46N00-1309-CSF : The first field of dimension 1 of the table 10.6.2.1.5-1 corrected to dimension 4. PF-SPR-SSF-GS-132 ; PF-SPR-SSF-GS-190 ; PF-SPR-SSF-GS-225 ; PF-SPR-SSF-GS-242 ; PF-SPR-SSF-GS-245.	
3	F	31/8/2001	SPR-100N0-0966-ESA: fields 20 and 31 of GOM_CAT_AX page 10-121	
3	G	15/5/2002	Added second ECMWF file reference for level1b products. Change according to CCN 212	
3	H	7/04/2003	Reason for change: Alignment to the documentation baseline and corrections according to users/ developer comments. All changes described in "List of changes", tables affected: 10.4.1.7.1-1 field #5,#14,#16,#19 10.4.1.7.2-1 Fields #9 to #15 10.4.1.7.6-1 Fields #5, #11 10.4.1.7.8-1 Field#8, flags modifications. 10.4.2.7.5-1 Fields #8 to #13 10.6.6.1.2-1 Fields #35, #42, #43 to #51, #54 to #59 10.6.6.1.8-1 Added comments 10.6.6.1.9-1 Added comments.	Baseline applied**: IODD: PO-RS-ACR-0003. Issue 5 Rev.1** (Nov 30, 1999) DPM Level 1b Issue 5.4 **PO-RS-ACR-GS-0001** 20/11/ 2002 DPM Level 2 Issue 5.4, **PO-RS-ACR-GS-0002** 20/11/ 2002

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
3	I	01/02/05	Modified items: list of products reported in Table 10.2.3-1 Table 10.4.1.7.1-1 rows #11- 16, 2330, total size and footnotes Table 10.4.1.7.2-1 rows #5-21, total size and footnotes Table 10.4.1.7.3-1 row #1 Chapter 10.4.1.7.4 text Table 10.4.1.7.4-1 rows #1,3 and total size and footnotes Table 10.4.1.7.5-1 Total size Table.10.4.1.7.6-1 rows #11,12 and total size Table 10.4.1.7.7-1 rows #3-6, total size and footnotes Table 10.4.1.7.8-1 rows #3,6 and total size Chapter 10.4.1.7.9 text Table 10.4.1.7.9-1 rows #28,31 and total size Table 10.4.2.7.2-1 all rows, size and footnote Table 10.4.2.7.4-1 row# 3 and total size Table 10.4.2.7.5-1 rows #14-17 and total size Table 10.5.1.6-1 rows# 21-35 Table 10.5.1.6-2 new DSD name Table 10.5.1.7.1-1 rows #1-41, 45-58, 59, 61-66, total size and footnotes. Table 10.5.1.7.2-1 rows #5-24 and total size Chapter 10.5.1.7.5 renamed Table 10.5.1.7.5-1 rows #4-7, total size and footnotes Table 10.5.1.7.6-1 rows #12-24 and total size	New Baseline: **IODD 6.1 PO-RS-ACR-GS-0003** of February 6, 2004 L1 DPM: **PO-RS-ACR-GS-0001 V6.1** of 28 November 2003 L2 DPM: **P0-RS-ACR-GS-0002 V 6.0** of February 6, 2004
3	I	01/02/05	...follows Table 10.5.2.6-1 SPH of product, rows # 10, 24 Table 10.5.2.7.3-1 rows #1,6 and total size Table 10.5.2.7.4-1 rows # 14,15 and total size Chapter 10.5.3.4 Product structure table Table 10.5.3.6 SPH of product, rows #3-6 and total size Table 10.5.3.6-2 DS_NAME strings Chapter 10.5.3.7.3 added. Table 10.6.1.1.1-1 rows #10-19 and total size Chapter 10.6.2.1 Table describing list of DSDs, one modified. Table 10.6.2.1.1-1 rows # 20-40, 45-68 and total size Table 10.6.2.1.3-1 rows #1-4,6-11 and total size Table 10.6.2.1.4-1 rows # 9-17 and total size Table 10.6.2.1.5-1 rows #3-10 and total size Table 10.6.2.1.7-1 rows #9-11 and total size Table 10.6.3.1.1-1 rows #2, 6, 9, 27 ,35 , 37-41, 46, 50-56 Table 10.6.3.1.2-1 rows #6, 8 and total size Table 10.6.4.1.2-1 rows # 5, 6 Table 10.6.4.1.3-1 rows # 65,66 Chapter 10.6.5.1 Table describing product structure Chapters 10.6.5.1.1, 10.6.5.1.2, 10.6.5.3, 10.6.5.4 re-arranged with all table contents	see above

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
3	I	01/02/05	...follows Table 10.6.6.1.1-1 rows # 2, 8-13 Table 10.6.6.1.2-1 rows # 1-8, 13, 1519, 21, 22, 26, 28, 30, 36, 38, 39, 43-69 and total size Table 10.6.6.1.3 rows # 1-6 Table 10.6.6.1.4-1 rows # 4-12	see above
3	J	10/08/2007	"DSD for Attitude file used added to both L1b and Limb products SPH. …also integrating comments from EOP-GQ and GOMOS_DPQC	**IODD 6.2 PO-RS-ACR-GS-0003** of July 18, 2007
3	J	22/08/2007	…also integrating comments from EOP-GQ and GOMOS_DPQC	See above
3	K	15/10/2012	Template porting ➔ Please refer to the Register of Changes (C1)	Serco
		15/10/2012	Typo corrections ➔ Please refer to the Register of Changes (C2)	Serco
		15/10/2012	Reason for change: Alignment to the documentation baseline and corrections according to users/ developer comments. Automatic dark charge bias correction (SCR #33) New reflectivity parameter storage (SCR #34) New coding of the error bars of the local and line densities (SCR #37) Specification of the intra-pixel PRNU correction (SCR #26) ➔ Please refer to the Register of Changes (C3)	New Baseline: **IODD 7 PO-RS-ACR-GS-0003** of September 30, 2009

REGISTER OF CHANGES

Section	Change	ID
All	Porting to IDEAS template from DPQC template	C1
All	Renumbering of Table captions (Updating table references accordingly)	C1
Section 10.5.1.6	Editorial Typo correction	C2
Section 10.5.2.6	Editorial Typo correction	C2
Section 10.5.3.6	Editorial Typo correction	C2
Section 10.6.2.1.1	Editorial Typo correction	C2
Section 10.6.3.1	Editorial Typo correction	C2
Section 10.6.4.1	Editorial Typo correction	C2
Section 10.6.6.1.9	Editorial Typo correction	C2
Section 10.5.2.7.2	Editorial Typo correction	C2
Section 10.2.1	Editorial Typo correction	C2
Section 10.4.1.3	Editorial Typo correction	C2
Table 10.4-2	Editorial Typo correction	C2
Table 10.4-4	Editorial Typo correction	C2
Section 10.4.1.7.3	Editorial Typo correction	C2
Section 10.4.1.7.4	Editorial Typo correction	C2
Table 10.4-9	Editorial Typo correction	C2
Section 10.4.1.7.5	Editorial Typo correction	C2
Section 10.4.1.7.6	Editorial Typo correction	C2
Section 10.4.2.7.4	Editorial Typo correction	C2
Section 10.5.1	Editorial Typo correction	C2
Section 10.5.1.6	Editorial Typo correction	C2
Section 10.5.1.7.5	Editorial Typo correction	C2
Table 10.5-9	Editorial Typo correction	C2
Table 10.6-6	Editorial Typo correction	C2
Table 10.6-12	Editorial Typo correction	C2
Section 10.6.4.1	Editorial Typo correction	C2
Table 10.6-21	Editorial Typo correction	C2
Table 10.6-30	Editorial Typo correction	C2
Table 10.6-31	Editorial Typo correction	C2
Section 10.7	Editorial Typo correction	C2
Table 10.6-19	Inserted missing caption	C2
Table 10.6-33	Inserted missing caption	C2
Table 10.6-44	Inserted missing caption	C2
Table 10.4-4	New PCD flag for the dark charge bias correction	C3
Table 10.1-1	Change of the standard deviation Unit for the local species density	C3
Table 10.5-5	Added note about unit of the standard deviation of the local species density	C3
Table 10.1-6	Change of the standard deviation Unit for the tangent species density	C3
Table 10.5-6	Added note about unit of the standard deviation of the tangent species density	C3
Table 10.6-6	Added note about the reflectivity LUT	C3
Table 10.6-10	Added note about spectrometer non uniformity maps width	C3
Table 10.6-14	Added note about intra pixel non uniformity map	C3
Section 10.6.2	Update of the Calibration dataset size	C3
Section 10.6.6	Update of the Level 2 processing configuration size	C3
Section 10.6.7	Update of the Cross Section size	C3

10. GOMOS PRODUCTS SPECIFICATIONS

10.1 INSTRUMENT OVERVIEW

The accurate mapping of the ozone layer with Global Ozone Monitoring by Occultation of Stars (GOMOS) intends to search for daily and long term trends in the ozone distribution in the Earth's atmosphere through measurements with a precise self calibrating instrument. GOMOS measures tangential atmospheric ultraviolet, visual, and infrared light as a function of wavelength and altitude. Measurements are made by observation of stars through the atmosphere using a steerable Ritchey Chretien telescope and two spectrometers. Fast Photometers monitor the stellar scintillation.

GOMOS performs multi-spectral observation of a selected set of star occultations of the Earth's limb caused as a result of satellite motion. In addition to monitoring ozone, GOMOS monitors other atmospheric trace gases (H_2O, NO_2, NO_3, and OClO), temperature, and aerosols.

The GOMOS telescope acquires and tracks the light from a predetermined number (about 25 per orbit) of stars, and passes the collected light to spectrometers and photometers. The ultraviolet, visible, and infrared spectrometers monitor selected spectral regions to deduce (in later ground processing) the amount and height distribution of the trace gases in the Earth's atmosphere. For each of the two spectrometers a two-dimensional image is recorded 2 times a second, yielding spectral information in one CCD dimension and spatial information in the other CCD dimension. The central region records light from a star plus light scattered in the atmosphere. The upper and lower CCD detector rows collect only scattered light which is used to correct the central region data.

The Fast Photometers monitor stellar scintillation on two wavelength bands to correct for this atmospheric effect which would otherwise distort the spectrometer measurements.

GOMOS operates in five modes:

- Occultation mode, to monitor multispectral stellar absorption through the limb.
- Linearity Monitoring Mode, to check periodically (nominally once a week) GOMOS response linearity. Spectrometer A and B central band spectra data are provided with variable integration times, and Spectrometer A and B upper and lower background band spectra are acquired simultaneously with the target spectra. This data enables the generation of look-up tables for ground processing correction for non-linear pixel response.
- Uniformity Monitoring Mode, to check (nominally once a week) pixel-to-pixel response uniformity while observing an extended source. Spectrometer A and B pixel by pixel data of 33 successive lines is provided with integration times within the range 0.25 to 10 sec, and Fast Photometer 1 and 2 data on a pixel-by-pixel basis is provided with an integration time of 1 msec. This data enables the

generation of look-up tables to correct, during ground processing, the response non-uniformity of the CCD image.

- Spatial Spread Monitoring Mode, to periodically check (nominally once a month) the pixel-to-pixel spectral image spreading response by tracking selected stars. Spectrometer A and B pixel by pixel data of 33 successive lines is provided with integration times within the range 0.25 to 10 sec, and Fast Photometer 1 and 2 data on a pixel-by-pixel basis is provided with an integration time of 1 msec. This determines which CCD pixels of the star image to utilize for the Occultation Mode measurements.
- Pause Mode, reached between any of the previous operating modes.

Table 10.1-1 GOMOS Instrument Characteristics

GEOMETRIC:	• Occultation mode; telescope acquires and tracks a star as it sets on the horizon at an elevation of +62^{o} to 68^{o}, and at an azimuth of -10^{o} to +90^{o} (or anti-flight direction). GOMOS has a 1.7 km maximum vertical height sampling resolution. Spectra are separately sampled as Target (central region of the CCD) and Background (upper and lower CCD detector rows) spectra.
	• Vertical accuracy of +/-50 m for stellar occultation method. • observes about 25 stars brighter than Mv 2 each orbit
SPECTRAL:	SPECTROMETER CHARACTERISTICS: Spectrometer A: • 250 - 675 nm (@0.312 nm sampling interval, 1.2 nm resolution) • Relative spectral accuracy: 1.5 nm • applications: O_3, trace gases, aerosols Spectrometer B: • IR1: 756 - 773 nm (@0.044 nm sampling interval, 0.2 nm resolution) • IR2: 926 - 952 nm (@0.054 nm sampling interval, 0.2 nm resolution) • Relative spectral accuracy: 0.3 nm • applications: O_2, H_2O, temperature, and aerosols Spectral response linearity < 1% for A and B PHOTOMETER CHARACTERISTICS: • Fast Photometer 1: 470 - 520 nm integrated (applications: detection of scintillation and turbulence characterisation) • Fast Photometer 2: 650 - 700 nm integrated (applications: detection of scintillation and turbulence characterisation).

10.2 PRODUCTS OVERVIEW

The GOMOS Product Tree is shown in Figure 10.2-1 and listed in Table 10.2-1.

Table 10.2-1 GOMOS Products

Instrument / mode	Product ID	Description
GOMOS	GOM_NL__0P	GOMOS Nominal Mode Level 0
	GOM_MM__0P	GOMOS Monitoring Modes (either Linearity, Uniform, or Spatial Spread data)
	GOM_TRA_1P	Geolocated and Calibrated Transmission Spectra and Fast Photometer Fluxes
	GOM_LIM_1P	Geolocated and Calibrated Background Spectra
	GOM_NL__2P	Temperature and Atmospheric Constituent profiles
	GOM_EXT_2P	Residual Extinction Product
	GOM_RR__2P	Extracted Profiles for Meteo Users contains extracted profiles at reduced spatial resolution for NRT dissemination to Meteo users

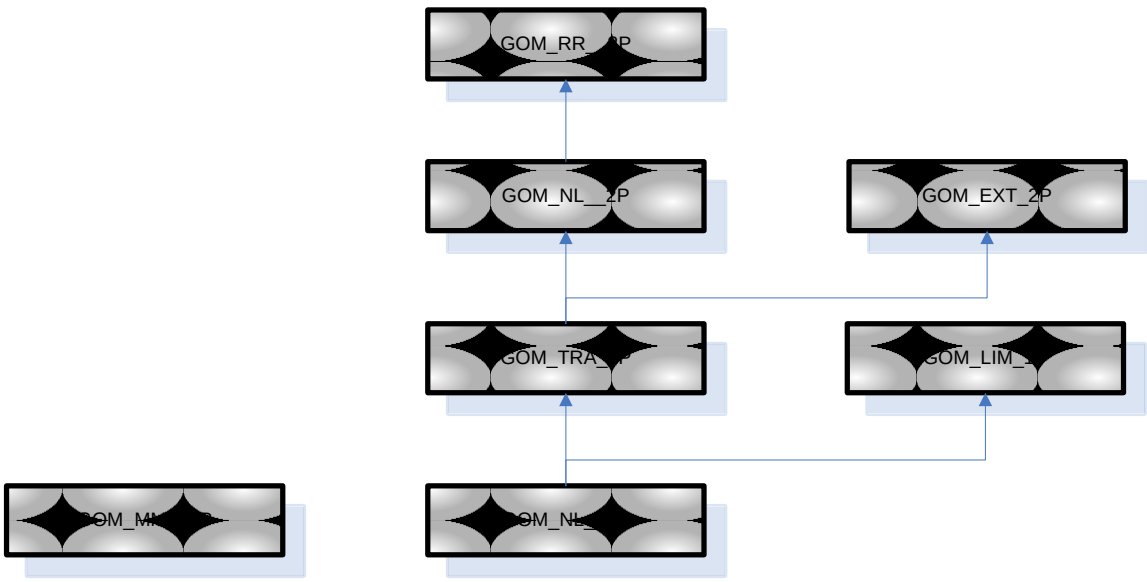

Figure 1 GOMOS Product Tree

10.2.1 Product Specific Units

General units used in the description of products are given in Annex A. Units specific to the GOMOS products include:

ADU	ADC output unit e number of electrons
jd	Julian date
DU	Dobson Unit (10^{-2} atm.cm)
sf	Stellar Flux (photon/s/cm^2/nm)
lf	Limb Flux (photon/s/cm^2/nm/nanosteradian)

10.2.2 Product Specific Notations

The following notations may be used when describing fields in the GOMOS products:

Table 10.2-2 Indices and Notations for Level 1B

Symbol	Description
SP	spectrometer (SPA = Spectrometer A, SPB = Spectrometer B)
FP	fast Photometer (FP1 = Fast Photometer 1, FP2 = Fast Photometer 2)
f_{size}	number of spectrometer measurements during the occultation (variable)
f	index of the spectrometer measurement in the occultation (1..f_{size})
k_{size}	spectra size (nominal is 2336). k_{size} is the sum of the number of useful columns of SPA CCD1 and 2 and SPB CCD1 and 2.
k	column index of the spectrometers (1..k_{size}).
c_{size}	number of spectrometer CCD arrays (nominal is 4)
c	index of the spectrometer CCD (1..c_{size})
b_{size}	effective number of spatial bands (nominal is 3) for the spectrometers
b	index of the spatial band (1..b_{size}). The spatial bands may also be called L (for lower), C (for central), and U (for upper)
n_{size}	number of spectrometers CCD lines (nominal is 143)
n	CCD line index (1..n_{size})
f_{SFA}	number of SFA output data per spectrometer measurement (nominal is 5)
i	index of the SFA outputs during one spectrometer measurement
f_{SATU}	number of SATU data during one spectrometer measurement (nominal is 50)
s	index of SATU output during one spectrometer measurement
fc_{size}	number of photometers (nominal is 2)
fc	photometer index: FP1 or FP2
fp_{size}	number of photometer outputs during one spectrometer measurement (nominal is 500)
fp	index of the photometer output during one spectrometer measurement

Table 10.2-3 Indices and Notations for Level 2

Symbol	Description
i	index of the species: 0=air, 1=aerosols, 2=ozone, 3=NO_2, 4=NO_3, 5=O_2, 6=H_2O, 7=OClO
j	index of the acquisition in the occultation (1...Nsp)
i_species	number of species
i_species_a	number of species (spectrometer A)
i_species_b	number of species (spectrometer B)
j_acquisitions	number of acquisitions (= N_{sp} from level 1b products)
j2_acquisitions	2*j_acquisitions+1
k_wl_samples	number of wavelength samples (=k_{size} from level 1b)
k_wl_samples_a	number of wavelength samples (spectrometer A= $k_{len}(1)$ + $k_{len}(2)$)
k_wl_samples_b	number of wavelength samples (spectrometer B= $k_{len}(3)$ + $k_{len}(4)$)

10.2.3 Product Size Estimates

The table below gives the estimated size of the main GOMOS products for several occultation durations (30, 50, 75, and 250 seconds). The sizes are expressed in MBytes.

More precise values and hypothesis used for size estimation are provided in chapters 10.4.1.8, 10.4.2.8 for GOMOS Level-1B products, and in chapters 10.5.1.8, GOMOS Level-2 products.

Table 10.2-4 Estimated Product Sizes (MBytes)

Product	30 s duration	50 s duration	75 s duration	250 s duration
GOM_NL__0P [1]	0.7	1.2	1.8	6.2
GOM_MM__0P	TBD	TBD	TBD	TBD
GOM_TRA_1P	2.7	4.5	6.7	22.8
GOM_LIM_1P	1.7	2.8	4.3	14.4
GOM_EXT_2P	1.8	3.1	4.6	15.5
GOM_NL__2P	0.08	0.13	0.19	0.63
GOM_RR__2P	<1	<1	<1	<1

[1] *Assumes 50 occultations per product. Each product contains all occultations for 1 orbit.*

10.3 LEVEL 0 PRODUCTS

There are two GOMOS Level 0 products. One for when the sensor is in nominal occultation measurement mode, and one for when the sensor is in calibration monitoring modes such as Linearity, Uniformity, or Spatial Spread monitoring. Both products contain data corresponding to a full orbit.

10.3.1 GOMOS Nominal Level 0

The GOMOS Nominal Level 0 Product is a file containing time ordered AISPs which record the occultation measurements of the GOMOS instrument. It is archived and is the basis for all further GOMOS processing. The GOMOS Nominal Level 0 is formed systematically when the instrument is in occultation mode and the NRT version is available from the PDHS after 3 hours from data acquisition. The OFL (fully consolidated) version is available 2 weeks after acquisition from the LRAC.

10.3.2 GOMOS Monitoring Modes Level 0

The GOMOS Monitoring Modes Level 0 Product contains time ordered AISPs which hold data acquired while the instrument is in self-calibration monitoring modes.

There are three modes in which GOMOS is not acquiring stellar occultation data, but is acquiring data which is used to establish operating parameters, and to set up look-up tables which are used in subsequent GOMOS data processing. These modes are:

- Linearity Monitoring Mode,
- Uniformity Monitoring Mode, and
- Spatial Spread Monitoring Mode.

The Linearity Monitoring Mode of GOMOS acquires data with varying integration times while pointing at and tracking preselected stars, with the result that the LUT is subsequently used to correct occultation data for non-linear radiometric response in the CCDs and the measurement train.

The Uniformity Monitoring Mode of GOMOS acquires data while observing a uniformly illuminated source, and the data is used to generate look-up tables to correct occultation data for pixel-to-pixel spatial non-uniform response.

Finally, GOMOS Spatial Spread Monitoring Mode of operating acquires data which is used for selecting the spectrometer band pixel locations to utilize during occultation data acquisition.

The GOMOS Monitoring Modes Level 0 is produced systematically and the NRT version is available 3 hours after data acquisition from the PDHS. The OFL (fully consolidated) version is available 2 weeks after acquisition from the LRAC. No further products are created from this product.

10.3.3 Input Data

Annotated ISPs as received from the Front End Processor (FEP) plus auxiliary data.

10.3.4 Auxiliary Data Used

The Level 0 product requires the following auxiliary information (refer to Volume 6):

- Phase, cycle and orbit number data,
- ID of the systems and subsystem that collect and process the data,
- ENVISAT orbital state vectors,
- Processor Configuration file, which includes PCD error codes and threshold values, and
- SBT to UTC conversion data.

10.3.5 Processing Performed

The determination of the satellite position and conversion of Satellite Binary Time (SBT) to Universal Time Co-ordinates (UTC) is accomplished using ESA software. These are the only algorithms applied when forming the Level 0 product.

10.3.6 Product Structure

As defined in Volume 6. The detailed description of the Instrument Source Packets is contained in Document A-1.

10.4 LEVEL 1B PRODUCTS

There are two GOMOS Level 1B products: the Geolocated Calibrated Transmission Spectra Product, and the Geolocated Calibrated Background Spectra Product (Limb Product).

10.4.1 Geolocated Calibrated Transmission Spectra Product

This is the engineering foundation product for the GOMOS sensor. It contains the calibrated data, a copy or a reference to the auxiliary data, the datation of the measurements and of the processing, and the product confidence indicators at product and at data level. It also includes auxiliary data needed for higher level processing. The product is processed systematically and consists of data corresponding to a single occultation. The NRT version of the product is available from the PDHS 3 hours after the data acquisition. The OFL (fully consolidated) version is available from the LRAC 2 weeks after the acquisition.

10.4.1.1 Input Data

Level 0 product plus auxiliary data.

10.4.1.2 Auxiliary Data Used

The auxiliary data files needed to produce the Level 1B product includes:

Table 10.4-1 Auxiliary Data Files for GOMOS Level 1B Processing

Description	Auxiliary File ID
Stellar Spectra	GOM_STS_AX
Calibration database	GOM_CAL_AX
Star catalogue	GOM_CAT_AX
Instrument physical characteristics data	GOM_INS_AX
Level 1B processing configuration database	GOM_PR1_AX
Orbit state vectors (one file of five)	AUX_FRO_AX AUX_FPO_AX DOR_NAV_0P DOR_POR_AX DOR_VOR_AX
ECMWF Forecast or ECMWF Analysis data file ATTITUDE file	AUX_ECF_AX AUX_ECA_AX AUX_ATT_AX

10.4.1.3 Processing Performed

This document is not the applicable document regarding GOMOS

algorithms. The information below is intended only as a summary of the major processing steps:

- GOMOS source packet data extraction - extracts the operation mode specific data from the data packets.
- Star catalogue extraction.
- Datation processing: assignment of the correct Julian date to each spectrometer measurement.
- Wavelength assignment processing: computation of the nominal wavelength assignment of the spectra.
- Geolocation processing: geolocation of the satellite position and the measurement data tangent position.
- GOMOS samples processing: geometric and radiometric correction and calibration of the data samples.

10.4.1.4 Product Structure

The high-level breakdown of the product is described here below:

MPH
Level 1b - SPH (includes DSDs)
Level 1b - Summary Quality GADS (SQ GADS)
Level 1b - Occultation data GADS
Level 1b - Nominal wavelength assignment GADS
Level 1b - Reference Star Spectrum GADS
Level 1b - Reference Atmospheric Density Profile GADS
Level 1b - Transmission MDS (one MDSR per measurement)
Level 1b - SATU data and SFA angles MDS (one MDSR per measurement)
Level 1b - Auxiliary data ADS (one ADSR per measurement)
Level 1b - Geolocation ADS (one ADSR per measurement)

10.4.1.5 Main Product Header

The GOMOS MPH is of the same structural format as that given in Section 5.2.

10.4.1.6 Specific Product Header

The GOMOS Level 1B product SPH is described below. The SPH is in ASCII format (as described in Volume 5) and provides information relevant to the entire product which may be used for identification and evaluation of the product data.

Table 10.4-2 Layout of the GOMOS Level 1b Product SPH

N	Description	Units	Byte Length	Data Type	Dim.
1	**SPH_DESCRIPTOR=**	keyword	15	uc	15
	quotation mark (“)	-	1	uc	1
	SPH descriptor is an ascii description of the product	-	28	uc	28
	quotation mark (“)	-	1	uc	1
	newline character	terminator	1	uc	1
	Product Location Information				
2	**START_TIME=**	keyword	11	uc	11
	quotation mark (“)	-	1	uc	1
	Start time of the occultation UTC time format	utc	27	uc	27
	quotation mark (“)	-	1	uc	1
	newline character	terminator	1	uc	1
3	**STOP_TIME=**	keyword	10	uc	10
	quotation mark (“)	-	1	uc	1
	Time of the end of the occultation UTC time format	utc	27	uc	27
	quotation mark (“)	-	1	uc	1
	newline character	terminator	1	uc	1
4	**START_TANGENT_LAT=**	keyword	18	uc	18
	Latitude of the tangent point at the START_TIME WGS84 latitude, positive = North	(1e-6) deg	11	AI	1
	<10-6degN>	units	10	uc	10
	newline character	terminator	1	uc	1
5	**START_TANGENT_LONG=**	keyword	19	uc	19
	Longitude of the tangent point at the START_TIME WGS84 longitude, positive = East, 0 = Greenwich	(1e-6) deg	11	AI	1
	<10-6degE>	units	10	uc	10
	newline character	terminator	1	uc	1
	STOP_TANGENT_LAT=	keyword	17	uc	17

N	Description	Units	Byte Length	Data Type	Dim.
6	**Latitude of the tangent point at the STOP_TIME** WGS84 latitude, positive = North	(1e-6) deg	11	Al	1
	<10-6degN>	units	10	uc	10
	newline character	terminator	1	uc	1
7	**STOP_TANGENT_LONG=**	keyword	18	uc	18
	Longitude of the tangent point at the STOP_TIME WGS84 longitude, positive = East, 0 = Greenwich	(1e-6) deg	11	Al	1
	<10-6degE>	units	10	uc	10
	newline character	terminator	1	uc	1
8	**Spare**	-	50	uc	50
	newline character	terminator	1	uc	1
	General Product Information				
9	**OCC_DURATION=**	keyword	13	uc	13
	Occultation duration [Δt_{occ}]	(1.e-2) s	6	As	1
	<10-2s>	units	7	uc	7
	newline character	terminator	1	uc	1
10	**SAMP_DURATION=**	keyword	14	uc	14
	Sampling duration [Δt_{sp}]	(1.e-3) s	6	As	1
	<10-3s>	units	7	uc	7
	newline character	terminator	1	uc	1
11	**NUM_MEASURE=**	keyword	12	uc	12
	Number of measurements [f_{size}]	-	6	As	1
	newline character	terminator	1	uc	1
12	**INS_STATUS=**	keyword	11	uc	11
	Status of the instrument [INS_{stat}] redundancy definition vector + instrument configuration. The value is 0 if the instrument is in nominal extended mode. This is the case if: 1) bit 12 of the redundancy definition vector is set to 1 and bit 13 is set to 0, 2) and bits 14 and 15 of the instrument configuration are set to 1 and bits 4 and 5 are set to zero. For all other cases the value will be 1.	-	1	uc	1
	newline character	terminator	1	uc	1

N	Description	Units	Byte Length	Data Type	Dim.
13	**OCC_NUM=**	keyword	8	uc	8
	Occultation number in the orbit [N_{occ}] First occultation = 1	-	4	Ac	1
	newline character	terminator	1	uc	1
14	**STAR=**	keyword	5	uc	5
	Star name [N_{star}] (left-justified, unused characters are set to ASCII blank space characters)	-	13	uc	13
	newline character	terminator	1	uc	1
15	**STAR_ID=**	keyword	8	uc	8
	Star identifier in the star catalogue [ID_{star}]	-	6	As	1
	newline character	terminator	1	uc	1
16	**STAR_MAG=**	keyword	9	uc	9
	Star apparent magnitude [mv_{star}]	(1.e-3)	6	As	1
	<10-3>	units	6	uc	6
	newline character	terminator	1	uc	1
17	**STAR_TEMP=**	keyword	10	uc	10
	Star temperature [T_{star}]	(1.e-1) K	11	Al	1
	<10-1K>	units	7	uc	7
	newline character	terminator	1	uc	1
18	**STAR_DIRECT1=**	keyword	13	uc	13
	Star direction in the heliocentric JD2000 frame Two float values, the right ascension of the occulted star [α_{star}], and the declination of the occultated star [δ_{star}].	deg	30	Afl	2
	<deg>	units	5	uc	5
	newline character	terminator	1	uc	1
19	**STAR_DIRECT2=**	keyword	13	uc	13
	Star direction in the quasi-true of date frame (cartesian) Three float values.	-	45	Afl	3
	newline character	terminator	1	uc	1
20	**BRIGHT_LIMB=**	keyword	12	uc	12
	Dark/bright limb flag [$FLAG_{DB}$] Set to 1 for bright limb, 0 for dark limb.	-	1	uc	1

N	Description	Units	Byte Length	Data Type	Dim.
	newline character	terminator	1	uc	1
21	**Spare**	-	50	uc	50
	newline character	terminator	1	uc	1
	DSDs for attached data sets				
22	*DSD for the SQ GADS (G)*	-	280	dsd	1
23	*DSD for the occultation data (G)*	-	280	dsd	1
24	*DSD for the nominal wavelength assignment (G)*	-	280	dsd	1
25	*DSD for the reference star spectrum (G)*	-	280	dsd	1
26	*DSD for the reference atmospheric density profile (G)*	-	280	dsd	1
27	*DSD for the Transmission MDS (M)*	-	280	dsd	1
28	*DSD for the SATU data and SFA angles MDS (M)*	-	280	dsd	1
29	*DSD for the Level 1b Auxiliary data ADS (A)*	-	280	dsd	1
30	*DSD for the Geolocation ADS (A)*	-	280	dsd	1
	DSDs for reference files				
31	*DSD for the Level 0 product (R)*	-	280	dsd	1
32	*DSD for the Instrument Physical Charact. Database (R)*	-	280	dsd	1
33	*DSD for the Calibration Database (R)*	-	280	dsd	1
34	*DSD for the Level 1b Processing Config. Database (R)*	-	280	dsd	1
35	*DSD for the Star Catalogue (R)*	-	280	dsd	1
36	*DSD for the Stellar Spectra Databank (R)*	-	280	dsd	1
37	*DSD for the ECMWF file (R)*[a]	-	280	dsd	1
38	*DSD for the optional ECMWF file (R)*[a]	-	280	dsd	1
39	*DSD for the Orbit Data file used (R)*	-	280	dsd	1
40	*DSD for the Attitude File used (R)*	-	280	dsd	1
TOTAL (in bytes)			**6016**	**-**	

Note:

a. When the FILENAME of this DSD is reported as MISSING, it means either 1) no AUX_ECA_AX or AUX_ECF_AX file was used by the processor or 2) a GRIB encoded file was used locally. The distinction between 1) and 2) can be made by examining field 13 of the SQADS where a value > 200 will indicate case 2).

The following strings will be used in the field DS_NAME for the DSDs listed in the SPH above.

Table 10.4-3 DS_NAME Strings

DSD	DS_NAME String
DSDs for included Data Sets	
DSD (G) - SQ GADS	TRA_SUMMARY_QUALITY
DSD (G) - Occultation data	TRA_OCCULTATION_DATA
DSD (G) - Nominal wavelength assignment	TRA_NOM_WAV_ASSIGNMENT
DSD (G) - Reference star spectrum	TRA_REF_STAR_SPECTRUM
DSD (G) - Reference atmospheric density profile	TRA_REF_ATM_DENS_PROFILE
DSD (M) - Transmission MDS	TRA_TRANSMISSION
DSD (M) - SATU data and SFA angles MDS	TRA_SATU_AND_SFA_DATA
DSD (A) - Level 1b Auxiliary data ADS	TRA_AUXILIARY_DATA
DSD (A) - Geolocation ADS	TRA_GEOLOCATION
DSDs for referenced files	
DSD (R) - Level 0 product	LEVEL_0_PRODUCT
DSD (R) - Instrument Physical Charact. Database	INST_PHYS_CHARACTERISTICS
DSD (R) - Calibration Database	CALIBRATION_DATABASE
DSD (R) - Level 1b Processing Config. Database	LEVEL-1B_PROC_CONFIG
DSD (R) - Star Catalogue	STAR_CATALOGUE
DSD (R) - Stellar Spectra Databank	STELLAR_SPECTRA_DATABANK
DSD (R) - ECMWF file	ECMWF_FILE
DSD (R) - Optional ECMWF file	OPTIONAL_ECMWF_FILE
DSD (R) - Orbit Data file used	ORBIT_DATA_FILE
DSD (R) – Attitude file used	ATTITUDE_FILE

10.4.1.7 Data Sets

The following sub-sections describe the individual data sets which together form the Level 1B product. Data sets are in mixed-binary format. ASCII strings may be included within the data sets, but the string is not surrounded by quotation marks as for the MPH/SPH structures.

10.4.1.7.1 Summary Quality GADS

The Summary Quality (SQ) GADS provides a summary of various quality measurements for the product.

Table 10.4-4 GOMOS Level 1b Product - Layout of the SQ GADS

N	Description	Units	Byte Length	Data Type	Dim.
	Flags				
1	**No valid data flag [PCD$_{fvalid}$]** 0 = valid data was found in the Level 0 product 1 = no valid packets in the Level 0 product.	flag	1	uc	1
2	**Internal straylight correction was not performed flag [PCD$_{ist}$]** 0 = internal straylight correction was performed 1 = internal straylight correction was not performed	flag	1	uc	1
3	**External earth straylight correction was not performed flag [PCD$_{earth}$]** 0 = otherwise 1 = external earth straylight correction was not performed	flag	1	uc	1
4	**External sun straylight correction was not performed flag [PCD$_{sun}$]** 0 = otherwise 1 = external sun straylight correction was not performed	flag	1	uc	1
5	**Slit transmission correction was not performed flag [PCD$_{slit}$]** 0 = otherwise 1 = slit transmission correction was not performed	flag	1	uc	1
6	**PCD Flag for reference star spectrum computation [PCD$_{ref}$]** 0 = no problem; 1 = the reference star spectrum was computed with a small number of measurements 2= no valid measurements in the occultation to compute the reference star spectrum (see PCD$_{sdb}$ and PCD$_{fatal}$);	flag	1	uc	1
7	**PCD Flag indicating if the star spectrum has been read from the Stellar Spectra Database [PCD$_{sdb}$]** 0 = the reference spectrum is computed from the measurements 1 = the reference spectrum is read in the stellar spectra data base 2= the reference spectrum was not found in the stellar spectra data base (see PCD$_{fatal}$)	flag	1	uc	1
8	**PCD Flag indicating the reference star spectrum has not been computed [PCD$_{fatal}$]** 0 = the reference star spectrum was computed 1 = the reference star spectrum has not been computed	flag	1	uc	1
9	**PCD Flag indicating that the automatic dark charge**	flag	1	uc	1

N	Description	Units	Byte Length	Data Type	Dim.
	bias correction has been applied [PCDadc] bit 0: automatic dark charge bias correction activated (1) or not (0) for SPA1 bit 1: automatic dark charge bias correction activated (1) or not (0) for SPA2 bit 2: automatic dark charge bias correction activated (1) or not (0) for SPB1 bit 3: automatic dark charge bias correction activated (1) or not (0) for SPB2				
10	**PCD Flag for dark charge correction for the photometers [PCDFP dc]** 1 = DC correction performed 0 = no DC correction performed	flag	1	uc	1
	Other Quality Information [a]				
11	**Number of source packets containing errors** This value will equal the number of Transmission MDSRs with their quality flag set to -1.	-	4	ul	1
12	**Level 0 PCD [PCDlv0]** 0 = Standard occultation 1 = first part of a tangent occultation 2 = last part of a tangent occultation	-	1	uc	1
13	**Type of atmosphere file used [PCDatm]** 54 = One ECMWF file used. Time record is included in the occultation period. 102 = One ECMWF file used. Time record before the beginning of the occultation (Delta t <= 24h) 103 = One ECMWF file used. Time record after the beginning of the occultation (Delta t <= 24h) 106 = One ECMWF file used. Only one time record in the validity interval.(Delta t <= 24h) 155 = Two ECMWF files used. 201 = No ECMW file available. Use MSIS model alone 202 = Only old ECMWF files (Delta t >=24h). Use MSIS model alone 203 = Only future ECMWF files (Delta t >=24h). Use MSIS model alone. 206 = No ECMWF file available in the validity interval (Delta t >=24h). Use MSIS model alone.	-	1	uc	1
14	**Dark Charge correction information [PCDdc]** 0 = dark charge map used 1 = first measurements used 2 = no dark charge correction applied 11 = first measurements not available -DC corrections with DC maps 12 = first measurements not available and missing first packet - DC correction with DC maps without	-	1	uc	1

N	Description	Units	Byte Length	Data Type	Dim.
	temperature dependence 21 = dark charge map computed from DSA observation has been used				
15	**Dark/Bright Limb conditions [PCD$_{DB}$]** 0 = dark limb 1 = bright limb	-	1	uc	1
16b	**Observation illumination condition [PCD$_{illum}$]** 0 = full dark limb condition 1 = bright limb condition 2 = pure twilight condition 3 = straylight condition 4 = twilight+straylight condition	-	1	uc	1
17	**SDP extraction processing [PCD$_{DV}$]** Number of invalid measurements during the occultation This value will equal the number of Transmission MDSRs with their quality flag set to -1 plus the number of missing source packets which were found.	-	4	ul	1
18	**Datation errors [PCD$_{time}$]** Number of measurements where flags were raised to indicate a datation problem occurred	-	4	ul	1
19	**Ray Tracing errors [PCD$_{rt}$]** Number of measurements with a non-converged ray path A value = 1000 indicates that geolocation/raytracing is completely outside the atmosphere	-	4	ul	1
20	**Geolocation errors [PCD$_{gl}$]** Number of measurements performed outside the atmosphere, set to 1000 if completely performed outside the atmosphere	-	4	ul	1
21	**Saturation errors [PCD$_{sat}$]** Number of measurements containing saturated samples	-	4	ul	1
22	**Cosmic Ray errors [PCD$_{cr}$]** Number of measurements where cosmic rays have been detected	-	4	ul	1
23	**Modulation correction errors [PCD$_{mod}$]** Number of measurements where a modulation correction error has been detected	-	4	ul	1
24	**Vignetting correction [PCD$_{inv}$]** Number of measurements where the vignetting correction was applied	-	4	ul	1
25	**Central Background [PCD$_{bg}$]** Number of measurements where FLAG$_{bg}$(f) has been raised	-	4	ul	1
26	**Flat field correction [PCD$_{out}$]**	-	4	ul	1

N	Description	Units	Byte Length	Data Type	Dim.
	Number of measurements where the star falls outside the central band				
27	**Full transmission errors [PCD$_{ft}$]** Number of measurements where a problem has been detected during the full transmission computation	-	4	ul	1
28	**Bad Pixels [PCD$_{bad}$]** Number of bad pixels per measurement	-	4	ul	1
29	**Photometer Saturation [PCD$_{FP\ sat}$(fc)]** Number of photometers saturated samples. First number is for photometer 1 second is for photometer 2	-	8	ul	2
30[c]	**Background corrections switch OK$_{back}$** 0 = no background correction 1 = background correction applied (linear interpolation) 2 = background correction applied (exponential interpolation) 3 = background correction applied (general method)	-	1	uc	1
TOTAL (in bytes)		**-**	**76**	**-**	

Note:

a. *The use of the term PCD for some of these values is not strictly correct within the context of the PDS definition of PCD. However, the notation has been kept here to allow cross reference between this document and Document R-22.*

b. *This flag is not dependant of the dark/bright limb flag that is read in the level 0 product and which is related to the GOMOS instrument programming (also related to the gain setting) and may not fully reflect the actual observation conditions. Bright limb conditions: sza_tgp<97° for TGP altitudes lower than 50 km. Twilight/straylight conditions: not in bright conditions AND (sza_tgp<110° for TGP altitudes lower than 100 km (twilight condition) OR sza_sat<120° (straylight condition)). Dark limb conditions: not in bright nor in twilight conditions where sza_tgp is the Sun Zenith Angle at the tangent point and sza_sat is the Sun Zenith Angle at the satellite (see the Geolocation ADS).*

c. *Background correction switch: this field indicates which correction has been effectively applied to the samples. In case of full dark limb condition, whatever the value of OK_back switch read from the Level 1b processing configuration, its value is forced to 0 during the processing and no correction is performed.*

10.4.1.7.2 Occultation Data GADS

The occultation GADS provides general information describing the full product.

Table 10.4-5 GOMOS Level 1b Product - Layout of the Occultation Data GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Number of points of the spectra [$k_{len}(c)$]**	-	8	us	4
2	**Number of photometer output data per measurement [fp_{size}]**	-	2	us	1
3	**Number of SATU output data per measurement [f_{SATU}]**	-	2	us	1
4	**Photometers central wavelength [$\lambda_{FP\ mid}(fc)$]** first for photometer 1 second for photometer 2	(1.e-1) nm	4	us	2
5	**Spectrometer effective sampling time**	s	4	fl	1
6	**Effective time shift for ray tracing/geolocation**	s	4	fl	1
7	**Ref. wavelength for the ray tracing [$\lambda_{rt\ ref}$]**	(1.e-1) nm	2	us	1
8	**Size of the radiometric sensitivity curve (background)**	-	1	uc	1
9	**Abscissae of the radiometric sensitivity curve (background)**	(1.e-3) nm	512	ul	128
10	**Radiometric sensitivity curve (background)**	lf per e	512	fl	128
11	**Size of the Radiometric sensitivity curve (star)**	-	1	uc	1
12	**Abscissae of the radiometric sensitivity curve (star)**	(1.e-3) nm	512	ul	128
13	**Radiometric sensitivity curve (star)**	sf per e	512	fl	128
14	**Thermistor temperature (SP)**	(1.e-2)K	8	us	4
15	**Thermistor temperature (FP)**	(1.e-2)K	4	us	2
16	**Dark charge used for the spectrometer dark charge correction**	e	14016	us	3*2336
17	**Mean spectrometer dark charge (3 bands)**	e	48	fl	4*3
18	**Mean photometer dark charge**	e	8	fl	2
19	**Offset between thermistor and CCD arrays temperature**	(1.e-2)K	12	us	6
20	**Sun coordinates in the geocentric equatorial inertial system**	-	12	fl	3
21	*Spare*	-	16	uc	16
TOTAL (in bytes)		**-**	**16200**		

Note:

The SATU and SFA conversion factors are not anymore included in the Level 1b product as the SATU and SFA data are provided decoded (directly expressed as angles, see the SATU data and SFA angles MDS).

Fields #8 to #13: radiometric sensitivity curves (star and background): these curves are the

LUT to be used for the conversion of the star limb spectra provided in number of electrons into physical units.

The physical unit is obtained by multiplying the flux (expressed in electrons) by the conversion factor (obtained by linear interpolation from the conversion LUT).

Field #16: The dark charge used for the spectrometer dark charge correction: These spectra are provided (one for each band in the order: upperband, target band, lower band).

Field #17: the order of mean spectrometer dark charge is the following: SPA1 upper, target and lower bands, SPA2 upper, target and lower bands, then SPB1 and finally SPB2.

Field #18: the order is FP1, FP2

10.4.1.7.3 Nominal Wavelength Assignment GADS

This GADS is used to identify the wavelength assignment for each measurement.

Table 10.4-6 GOMOS Level 1b Product - Layout of the Nominal Wavelength Assignment GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Nominal wavelength assignment of the star spectra [$\lambda_{ref\ k}$]** (The coding allows values from 0 nm up to 4294 nm)	(1.e-6) nm	9344	ul	2336
2	*Spare*	-	64	uc	64
TOTAL (in bytes)		**-**	**9408**	**-**	

Order by CCD columns: - overall order CCD arrays (SPA CCD1, SPA CCD2, SPB CCD1, SPB CCD2); - suborder CCD columns in wavelength ascending order.

10.4.1.7.4 Reference Star Spectrum GADS

This GADS provides the reference star spectrum measurement corresponding to the actual measurements from the instrument.

Table 10.4-7 GOMOS Level 1b Product - Layout of the Reference Star Spectrum GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Number of star spectra used for the computation of the reference star spectrum**	-	4	uc	4
2	**Reference star spectrum [N^{ref}_{k}]** (The coding allows values from 0 up to 42.9e+06 electrons)	(1.e-2) e	9344	sl	2336
3a	**Flags for the reference star spectrum**	-	2336	uc	2336
TOTAL (in bytes)		**-**	**11684**	**-**	

Note:

a. Field #3 flag values:

0: no problem for this column

1: saturation of one band of the column, or bad pixel in the column, or cosmic ray detection in the column (background correction applied) or in the central band (background correction not applied).

2: level of the sample below a minimal validity threshold

3: both cases 1 and 2

When one problem occurs in one column, the closest columns are also flagged.

10.4.1.7.5 Reference Atmospheric Density Profile GADS

This GADS provides the reference atmospheric density profile created during Level 1B processing.

Table 10.4-8 GOMOS Level 1b Product - Layout of the Reference Atmospheric Density Profile GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Size of the reference atmospheric profile[Nn_ρ]**	-	1	uc	1
2	**First altitude of the profile [$hn_{\rho min}$]**	(1.e-1) m	4	ul	1
3	**Altitude discretisation [δhn_ρ]**	(1.e-1) m	4	ul	1
4	**Reference atmospheric density profile [n_{ref}]**	cm^{-3}	404	fl	101
TOTAL (in bytes)		**-**	**413**	-	

10.4.1.7.6 Transmission MDS

This MDS contains the primary measurement data of the instrument. The MDS is made of several MDS records (one MDSR for each measurement time of 0.5 s). The layout of each MDSR is described below:

Table 10.4-9 GOMOS Level 1b Product - Layout of the Transmission MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the Data Set Record*	-	12	mjd	1
2	*Data quality indicator (-1 if MDSR is empty, 0 otherwise)*	-	1	sc	1
3	**Full transmission spectra [$T_k(f)$]** (coding in 32-bits floating point corresponds to a relative accuracy of about 1.0e-7)	-	9344	fl	2336
4	**Covariance function of the full transmission [$C_k(f)$]** (coding in 32-bits floating point corresponds to a relative accuracy of about 1.0e-7)	-	9344	fl	2336
5	**Scaled Estimated central background [$N'_{B\,k}(f)$]** (See Note below)	-	4672	us	2336

N	Description	Units	Byte Length	Data Type	Dim.
6	**Error bar for the estimated central background [$err_{Bk}(f)$]** (Relative percentage of error for each estimated central value)	(1.e-1) %	4672	us	2336
7	**Photometers engineering data (FP1) [$N_{engFP}(1,f,fp)$]** (coding in 32-bits floating point corresponds to a relative accuracy of about 1.0e-7)	e	2000	fl	500
8	**Photometers engineering data (FP2) [$N_{engFP}(2,f,fp)$]** (coding in 32-bits floating point corresponds to a relative accuracy of about 1.0e-7)	e	2000	fl	500
9	**Error bar for the photometers eng. data (FP1) [$\delta N_{engFP}(1,f,fp)$]**	(1.e-1) %	100	us	50
10	**Error bar for the photometers eng. data (FP2) [$\delta N_{engFP}(2,f,fp)$]**	(1.e-1) %	100	us	50
11	**PCD at sample level (SP) [$FL_{sum}(k,f)$]** PCD at sample level for the Spectrometers. Each unsigned short integer is composed of the following bit flags. bit 0: $FL_{sat}(k,L,f)$ -saturation flag for the lower band 0 = no saturation 1 = saturated bit 1: $FL_{sat}(k,C,f)$ - saturation flag for the central band 0 = no saturation 1 = saturated bit 2: $FL_{sat}(k,U,f)$ - saturation flag for the upper band 0 = no saturation 1 = saturated	-	4672	us	2336
	bit 3: $FL_{bad}(k,L)$ - bad pixel flag for the lower band 0 = no bad pixel in the sample 1 = at least one bad pixel bit 4: $FL_{bad}(k,C)$ - bad pixel flag for the central band 0 = no bad pixel in the sample 1 = at least one bad pixel bit 5: $FL_{bad}(k,U)$ - bad pixel flag for the upper band 0 = no bad pixel in the sample 1 = at least one bad pixel				

N	Description	Units	Byte Length	Data Type	Dim.
	bit 6: $FL_{cr}(k,L,f)$ - cosmic ray detection for lower band 0 = no cosmic ray detected in the sample 1 = one cosmic ray in the sample bit 7: $FL_{cr}(k,C,f)$ - cosmic ray detection for central band 0 = no cosmic ray detected in the sample 1 = one cosmic ray in the sample bit 8: $FL_{cr}(k,U,f)$ - cosmic ray detection for upper band 0 = no cosmic ray detected in the sample 1 = one cosmic ray in the sample bit 9-10: $FL_{bg}(k,f)$ - background data flag 0 = central background computed with no flagged samples 1 = less than 25% flagged samples 2 = less than 50% flagged samples 3 = more than 50% flagged samples bit 11-12: $FL_{ft}(k,f)$ - full transmission computation 0 = no problems identified 1 = reference star spectrum value is zero 2 = one of the spatial band is flagged for saturation bit 13: $FL_{off}(k)$ - pixel is in an invalid spectral range 0 = pixel is in a valid spectral range 1 = pixel is in an invalid spectral range				
	bit 14: $FL_{rsp}(k,f)$ - pixel has been computed with flagged data during resampling process 0 = no problem 1 = current data computed with flagged data bit 15: Not used anymore				
12	**PCD at sample level (FP) [$FL_{FP\ sum}(fc,f)$]** PCD at sample level for the Fast Photometers. The first integer refers to photometer 1 the second to photometer 2. Each unsigned short integer contains the following information: bit 0: $FL_{FP\ sat}(fc,f,fp)$ - photometers saturation flag 0 = no saturation 1 = saturated sample bit 1-15: not used	-	4	us	2
TOTAL (in bytes)			**36921**		

Due to the high variations of these central background spectra with the altitude, the coding is dynamic and uses an offset and a gain for each MDSR. Offset and gain are stored in the Auxiliary data ADS. For each MDSR, the offset and the gain are tuned to code all the values of the spectrum into the range 0...65535. The accuracy in number of electrons is the following for several ranges of background spectra:

Range (in electrons) ==> Accuracy (LSB)

100 ==> <0.1 e^-

1000 ==> <0.1 e^-

10000 ==> 0.2 e^-

30000 ==> 0.5 e^-

100000 ==> 1.5 e^-

300000 ==> 4.6 e^-

500000 ==> 7.6 e^-

1000000 ==> 15.0 e^-

In bright limb conditions, the electronic chain gain is close to 280 electrons/ADU for spectrometer A and close to 28 electrons/ADU for spectrometer B (high background signals are expected to reach the saturation here, at low altitudes). In dark limb conditions, this gain varies from 34 up to 68 for spectrometer A and from 7 up to 9 for spectrometer B (in this case, low background signal is expected).

10.4.1.7.7 SATU Data and SFA Angles MDS

This MDS contains data from the Star Acquisition and Tracking Unit (SATU) and the Steering Front Assembly (SFA). The MDS is made of several MDS records (one MDSR for each measurement time of 0.5 s). The layout of each MDSR is described below:

Table 10.4-10 GOMOS Level 1b Product - Layout of the SATU Data and SFA Angles MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the Data Set Record*	-	12	mjd	1
2	*Data quality indicator (-1 if MDSR is empty, 0 otherwise)*	-	1	sc	1
3	**SATU mispointing angle (X direction)**	µrad	200	fl	50
4	**SATU mispointing angle (Y direction)**	µrad	200	fl	50
5	**SFA azimuth angle**	deg	20	fl	5
6	**SFA elevation angle**	deg	20	fl	5
TOTAL (in bytes)		**-**	**453**	**-**	

Note:

SATU output data are converted to residual mispointing angles during the level 1b processing.

SFA angles: the frequency of the SFA is 10 Hz i.e. there are 5 measurements during one spectrometer measurement.

10.4.1.7.8 Auxiliary Data ADS

This ADS contains auxiliary information created or used during the level 1B processing. The ADS is made of several ADS records (one ADSR for each measurement time of 0.5 s). The layout of each ADSR is described below:

Table 10.4-11 GOMOS Level 1b Product - Layout of the Auxiliary Data ADSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the measurement*	-	12	mjd	1
2	*Attachment flag (set to 1 if there are no Transmission MDSRs or SATU MDSRs corresponding to this ADSR, set to zero otherwise)*	-	1	uc	1
3	**Spectral shift of the star spectra [$\delta\lambda_k(f)$]** (See Note below)	(1.e-4) nm	4672	ss	2336
4	**Offset for the estimated background coding [$O_{back}(f)$]**	e	4	fl	1
5	**Gain for the estimated background coding [$G_{back}(f)$]**	-	4	fl	1
6	**PCD at measurement level** The following values are reported. Despite the notation as a “Flag” each value is in fact an integer value:	-	32	us	16
	1. $FLAG_{DV}(f)$ -data valid 0 = anomaly 1 = time out 3 = fully successful 9 = missing packet Not used anymore 3. $FLAG_{time}(f)$ - datation 0 = no datation problem 1 = problem during the datation processing 2 = invalid measurement ($FLAG_{DV}(f)$ = 0 or 1) 9= missing packet 4. $FLAG_{rt}(f)$ - ray-tracing 0 = no problem				

N	Description	Units	Byte Length	Data Type	Dim.
	1 = wrong pointing (not in direction of the atmosphere) 2 = ray path across the Earth 5. $FLAG_{gl}$(f) -geolocation 0 = no problem 1 = geolocation problem 6. $FLAG_{sat}$(f) - number of saturated samples per measurement 7. $FLAG_{cr}$(f) - number of cosmic rays detected per measurement 8. $FLAG_{irv}$(f) -vignetting correction flag 0 = no vignetting 1 = vignetting occurred during the measurement 9. $FLAG_{bg}$(f) - number of background flagged data per measurement 10. $FLAG_{out}$(f) - star spectrum out of band 0 = star spectrum inside central band 1 = centre line of star spectrum image is outside the central band 11. $FLAG_{ft}$(f) - number of samples per measurement for which full transmission flag FL_{ft}(k,f) has been raised 12. $FLAG_{FP\ sat}$(1,f) - number of photometer 1 saturations 13. $FLAG_{FP\ sat}$(2,f) -number of photometer 2 saturations 14. FLAG - stability flag: 0 = no measurement skipped n = first measurement used to compute the reference star spectrum is number n (index starting at 0) 15.FLAG mod(f) - Demodulation correction flag 0: No problem +1: problem of structure for SPA1 upper band.				

N	Description	Units	Byte Length	Data Type	Dim.
	+2: problem of structure for SPA1 lower band. +4: inconsistent upper and lower band structures for SPA1 +10: problem of structure for SPA2 upper band. +20: problem of structure for SPA2 lower band +40: inconsistent upper and lower band structures for SPA2 Note that flag values between SPA1 and SPA2 may be mixed: i.e. flag values like 11, 21, 32, 23, 41, and 24 can exist. 16. FLAG $_{uc}$(f) ratio between the averaged upper band signal and the averaged star signal over the SPA2 spectral range n < 65535 = computed ration expressed in % 65535 = star signal is equal to 0				
TOTAL (in bytes)		**-**	**4725**	**-**	

Note (about Wavelength assignment of the spectra):

In order to store the information on 16 bits, the value written is really the difference between the current wavelength assignment and the nominal wavelength assignment for the same CCD column.

A coding on 16 bits with an accuracy of 1.0e-4 nm allows a shift of +/- 3.2767nm:

- *with a pixel spectral width close to 0.312 nm, this coding allows a current spectral shift of +/-10.5 pixels and an accuracy better than 1/3000 pixel;*
- *with a pixel spectral width close to 0.054 nm, this coding allows a current spectral shift of +/-60.7 pixels and an accuracy better than 1/540 pixel;*
- *with a pixel spectral width close to 0.044 nm, this coding allows a current spectral shift of +/-74.4 pixels and an accuracy better than 1/440 pixel;*

10.4.1.7.9 Geolocation ADS

This ADS contains information which geolocates the measurement data. The ADS is made of several ADS records (one ADSR for each measurement time of 0.5 s plus one ADSR corresponding to the end of the last measurement [used in the level 2 processing]).

The layout of each ADSR is described below:

Table 10.4-12 GOMOS Level 1b Product - Layout of the Geolocation ADSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the DSR*	-	12	mjd	1
2	*Attachment flag (set to 1 if there are no Transmission MDSRs or SATU MDSRs corresponding to this ADSR, set to zero otherwise)*	-	1	uc	1

N	Description	Units	Byte Length	Data Type	Dim.
3	**Latitude of the spacecraft** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	(1.e-6) deg	8	sl	2
4	**Longitude of the spacecraft** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	(1.e-6) deg	8	sl	2
5	**Altitude of the spacecraft** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	(1.e-2) m	8	ul	2
6	**Latitude of the tangent point [$lat_0(\lambda_{ref},t)$]** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	(1.e-6) deg	8	sl	2
7	**Longitude of the tangent point [$lon_0(\lambda_{ref},t)$]** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	(1.e-6) deg	8	sl	2
8	**Altitude of the tangent point [$h_0(\lambda_{ref},t)$]** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	(1.e-2) m	8	ul	2
9	**Error on the latitude of the tangent point [$E_{lat0}(\lambda_{ref},t)$]** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	(1.e-7) deg	8	sl	2
10	**Error on the longitude of the tangent point [$E_{lon0}(\lambda_{ref},t)$]** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	(1.e-7) deg	8	sl	2
11	**Error on the altitude of the tangent point [$E_{h0}(\lambda_{ref},t)$]** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	(1.e-3) m	8	ul	2
12	**Distance spacecraft - tangent point [L(t)]** 2 values provided at the beginning and during the	(1.e-1) m	8	ul	2

N	Description	Units	Byte Length	Data Type	Dim.
	measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS				
13	**Instrument pointing direction (azimuth) [$\delta_i(t)$]** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	(1.e-6) deg	4	sl	1
14	**Instrument pointing direction (elevation)** [$\alpha_i(t)$] provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	(1.e-6) deg	4	sl	1
15	**Virtual star direction in the quasi-true of date frame[$S_{star}(t)$]**	-	24	fl	2*3
16	**Number of nodes of the ray tracing [$r_{size}(f)$]** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	-	2	us	1
17	**Index of the tangent point in the list of the ray tracing nodes [$i_0(f)$]** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	-	2	us	1
18	**Interpolation factor P for the law delta(lambda) [$p_d(t)$]** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	deg	8	fl	2
19	**Interpolation factor Q for the law delta(lambda) [$q_d(t)$]** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	deg	8	fl	2
20	**Interpolation factors P for the law h0(lambda) [$p_h(t)$]** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	m	8	fl	2
21	**Interpolation factors Q for the law h0(lambda) [$q_h(t)$]** 2 values provided at the beginning and during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS	m	8	fl	2
22	**Latitude of the ray tracing grid nodes [lat(λ_{ref},f,n)]** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	(1.e-6) deg	600	sl	150

N	Description	Units	Byte Length	Data Type	Dim.
23	**Longitude of the ray tracing grid nodes [lon(λ_{ref},f,n)]** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	(1.e-6) deg	600	sl	150
24	**Altitude of the ray tracing grid nodes [h(λ_{ref},f,n)]** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	(1.e-2) m	600	ul	150
25	**Air density at the tangent point [ρ_0(f)]** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	cm^{-3}	4	fl	1
26	**Atmospheric pressure at the tangent point [P_0(f)]** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	Pa	4	fl	1
27	**Air temperature at the ray tracing grid nodes [T(n)]** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	K	600	fl	150
28	**Sun zenith angle at the spacecraft** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	deg	4	fl	1
29	**Sun zenith angle at the tangent point** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	deg	4	fl	1
30	**Sun azimuth angle at the tangent point** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	deg	4	fl	1
31	**Apparent altitude of the central background** provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* - see the Occultation data GADS)	(1.e-2) m	4	fl	1
TOTAL (in bytes)		**-**	**2585**	**-**	

Note:

The instrument pointing direction (fields 13 and 14) is a theoretical value computed from the relative position of the satellite and of the star.

10.4.2 Geolocated Calibrated Background Spectra (Limb) Product

This product contains a reference to the Level 0 product, measured upper and lower background spectra, a copy or a reference to the auxiliary data used to generate the product, datation of the measurement and of the processing, and product confidence indicators at product and data level. This product is produced systematically and contains data corresponding to a single occultation. Its primary application is for calibration and validation of the instrument. The NRT version of the product is available from the PDHS 3 hours after the data acquisition. The OFL (fully consolidated) version is available from the LRAC 2 weeks after the acquisition.

10.4.2.1 Input Data

Nominal Level 0 product plus auxiliary data.

10.4.2.2 Auxiliary Data Used

Auxiliary data is the same as listed in Section 10.4.1.2.

10.4.2.3 Processing Performed

The processing chain is the same as that described in Section 10.4.1.3.

10.4.2.4 Product Structure

The high-level breakdown of the product is described here below:

MPH
Limb - SPH (includes DSDs)
Limb - SQ GADS
Limb - Occultation data GADS
Limb - Nominal wavelength assignment GADS
Limb - MDS (one MDSR per measurement)
Limb - ADS (one ADSR per measurement)

10.4.2.5 Main Product Header

The GOMOS MPH is of the same structural format as that given in Section 5.2.

10.4.2.6 Specific Product Header

The SPH for the Limb Product is similar to that of the Geolocated Calibrated Transmission Spectra Product, but with fewer DSDs. The SPH is in ASCII format as per Volume 5.

Table 10.4-13 Layout of the GOMOS Limb Product SPH

N	Description	Units	Byte Length	Data Type	Dim.
1-21	**Level 1B SPH fields 1-21 as described in Table 10.4-2**	-	696	-	-
	DSDs for attached data sets				
22	*DSD for the SQ GADS (G)*	-	280	dsd	1
23	*DSD for the occultation data (G)*	-	280	dsd	1
24	*DSD for the nominal wavelength assignment (G)*	-	280	dsd	1
25	*DSD for the limb MDS (M)*	-	280	dsd	1
26	*DSD for the limb ADS (A)*	-	280	dsd	1
	DSDs for reference files				
27	*DSD for the Level 0 product (R)*	-	280	dsd	1
28	*DSD for the Instrument Physical Charact. Database (R)*	-	280	dsd	1
29	*DSD for the Calibration Database (R)*	-	280	dsd	1
30	*DSD for the Level 1b Processing Config. Database (R)*	-	280	dsd	1
31	*DSD for the Star Catalogue (R)*	-	280	dsd	1
32	*DSD for the Stellar Spectra Databank (R)*	-	280	dsd	1
33	*DSD for the ECMWF file (R)* [a]	-	280	dsd	1
34	*DSD for the optional ECMWF file (R)* [a]	-	280	dsd	1
35	*DSD for the Orbit Data file used (R)*	-	280	dsd	1
36	*DSD for the Attitude file used (R)*	-	280	dsd	1
TOTAL (in bytes)			**4896**	**-**	

Note:
[a] *When the FILENAME of this DSD is reported as MISSING, it means either 1) no AUX_ECA_AX or AUX_ECF_AX file was used by the processor or 2) a GRIB encoded file was used locally. The distinction between 1) and 2) can be made by examining field 13 of the SQADS where a value > 200 will indicate case 2).*

The following strings will be used in the field DS_NAME for the DSDs listed in the SPH above.

Table 10.4-14 GOMOS Limb Product - DS_NAME Strings

DSD	DS_NAME String
DSDs for included Data Sets	
DSD (G) - SQ GADS	LIM_SUMMARY_QUALITY
DSD (G) - Occultation data	LIM_OCCULTATION_DATA
DSD (G) - Nominal wavelength assignment	LIM_NOM_WAV_ASSIGNMENT
DSD (M) - Limb MDS	LIM_MDS
DSD (A) - Limb ADS	LIM_ADS
DSDs for referenced files	
DSD (R) - Level 0 product	LEVEL_0_PRODUCT
DSD (R) - Instrument Physical Charact. Database	INST_PHYS_CHARACTERISTICS
DSD (R) - Calibration Database	CALIBRATION_DATABASE
DSD (R) - Level 1b Processing Config. Database	LEVEL-1B_PROC_CONFIG
DSD (R) - Star Catalogue	STAR_CATALOGUE
DSD (R) - Stellar Spectra Databank	STELLAR_SPECTRA_DATABANK
DSD (R) - ECMWF file	ECMWF_FILE
DSD (R) - Optional ECMWF file	OPTIONAL_ECMWF_FILE
DSD (R) - Orbit Data file used	ORBIT_DATA_FILE
DSD (R) - Attitude file used	ATTITUDE_FILE

10.4.2.7 Data Sets

The following sub-sections describe the individual data sets which together form the Limb product. Data sets are in mixed-binary format. ASCII strings may be included within the data sets, but the string is not surrounded by quotation marks as for the MPH/SPH structures.

10.4.2.7.1 Summary Quality GADS

The SQ GADS is identical to that described in Section 10.4.1.7.1.

10.4.2.7.2 Occultation Data GADS

This GADS contains a subset of the information contained in the Occultation GADS of the Geolocated Calibrated Transmission Spectra Product.

Table 10.4-15 GOMOS Limb Product - Layout of the Occultation Data GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Number of points of the spectra**	-	8	us	4
2	**Size of the radiometric sensitivity curve (background)**	-	1	uc	1
3	**Abscissae of the radiometric sensitivity curve (background)**	(1.e-3) nm	512	ul	128
4	**Radiometric sensitivity curve (background)**	If per e	512	fl	128
5	**Spectrometer effective sampling time**	s	4	fl	1
6	**Effective time shift for ray tracing / geolocation**	s	4	fl	1
7	**Sun coordinates in the geocentric equatorial inertial system**	-	12	fl	3
TOTAL (in bytes)		**-**	**1053**	**-**	

Note:

For fields #2 to #4: These curves are the radiometric sensitivity LUT useful to convert the limb spectra provided in number of electrons into physical units.

The physical unit is obtained by multiplying the flux (expressed in electrons) by the conversion factor (obtained by linear interpolation from the conversion LUT).

10.4.2.7.3 Nominal Wavelength Assignment GADS

The Nominal Wavelength Assignment GADS is identical to that of the Geolocated Calibrated Transmission Spectra Product as described in Section 10.4.1.7.3.

10.4.2.7.4 Limb MDS

The Limb MDS contained the Upper and Lower background spectra measurements. This MDS is made of several MDS records (one for each measurement time of 0.5 s).

The layout of each MDSR is described below:

Table 10.4-16 MDSR Layout of the GOMOS Limb Product

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the Data Set Record*	-	12	mjd	1
2	*Data quality indicator (-1 if MDSR is empty, 0 otherwise)*	-	1	sc	1
3	**Scaled upper & lower background spectra before straylight correction [$N'^{DC}_{k,b}(f)$]** (2336 upper followed by 2336 lower; See Note below)	e	9344	us	2* 2336

N	Description	Units	Byte Length	Data Type	Dim.
4	**Scaled upper & lower background spectra after straylight and IR-vignetting corrections [$N'^{NST}_{k,b}(f)$]** (2336 upper followed by 2336 lower; See Note below)	e	9344	us	2* 2336
5	**Error bar for the upper & lower background spectra after straylight and IR-vignetting corrections [$\delta N'^{NST}_{k,b}(f)$]** (2336 upper followed by 2336 lower)	%	4672	uc	2* 2336
6	**PCD at sample level (SP) [$FL_{sum}(k,f)$]** PCD at sample level for the Spectrometers. The contents of the unsigned integers are described in Table 10.4-9.	-	4672	us	2336
MDS TOTAL (in bytes)		**-**	**28045**	**-**	

Note (about Scaled upper & lower background spectra):

The coding is the same as for the field "Scaled Estimated central background" of the Transmission MDSR in GOM_TRA_1P, using for each DSR the offset and gain available in the Limb ADS.

There is only one coding for upper and lower background spectra. The wavelength assignment of the background spectra is assumed to be the nominal wavelength assignment available in the Nominal Wavelength Assignment GADS.

10.4.2.7.5 Limb ADS

The Limb ADS contains auxiliary information (including geolocation information) pertaining to each measurement in the limb product. This ADS is made of several ADS records (one for each measurement time of 0.5 s). The layout of each ADSR is described below:

Table 10.4-17 ADSR Layout of the GOMOS Limb Product

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the DSR*	-	12	mjd	1
2	*Attachment flag (set to 1 if there are no Limb MDSRs corresponding to this ADSR, set to zero otherwise)*	-	1	uc	1
3	**Offset for the background spectra coding [$O_{back}(f)$]**	e	4	fl	1
4	**Gain for the background spectra coding [$G_{back}(f)$]**	-	4	fl	1
5	**Latitude of the spacecraft [$S_{G\ sat}(f)$]** One value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing/geolocation* in the Occultation data GADS)	(1.e-6) deg	4	sl	1

N	Description	Units	Byte Length	Data Type	Dim.
6	**Longitude of the spacecraft [$S_{G\ sat}(f)$]** One value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing/geolocation* in the Occultation data GADS)	(1.e-6) deg	4	sl	1
7	**Altitude of the spacecraft [$S_{G\ sat}(f)$]** One value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing/geolocation* in the Occultation data GADS)	(1.e-2) m	4	ul	1
8	**Latitude of the apparent tangent point [$lat_b(f)$]** The two values for the apparent tangent points correspond to the upper (first value) and the lower (second value) background bands	(1.e-6) deg	8	sl	2
9	**Longitude of the apparent tangent point [$lon_b(f)$]** The two values for the apparent tangent points correspond to the upper (first value) and the lower (second value) background bands	(1.e-6) deg	8	sl	2
10	**Altitude of the apparent tangent point [$h_b(f)$]** The two values for the apparent tangent points correspond to the upper (first value) and the lower (second value) background bands	(1.e-2) m	8	ul	2
11	**Error on the latitude of the apparent tangent point [$Elat_b(f)$]** The two values for the apparent tangent points correspond to the upper (first value) and the lower (second value) background bands	(1.e-7) deg	8	sl	2
12	**Error on the longitude of the apparent tangent point [$Elon_b(f)$]** The two values for the apparent tangent points correspond to the upper (first value) and the lower (second value) background bands	(1.e-7) deg	8	sl	2
13	**Error on the altitude of the apparent tangent point [$Eh_b(f)$]** The two values for the apparent tangent points correspond to the upper (first value) and the lower (second value) background bands	(1.e-3) m	8	ul	2
14	**Sun zenith angle at the spacecraft** provided during the measurement, generally at half measurement (the temporal shift is given by the *Time shift for the ray tracing/geolocation* in the Occultation data GADS).	deg	4	fl	1
15	**Sun zenith angle at the tangent point** provided during the measurement, generally at half measurement (the temporal shift is given by the *Time shift for the ray tracing/geolocation* in the Occultation data GADS). One value for upper and lower band each.	deg	8	fl	2

N	Description	Units	Byte Length	Data Type	Dim.
16	**Sun azimuth angle at the tangent point** provided during the measurement, generally at half measurement (the temporal shift is given by the *Time shift for the ray tracing/geolocation* in the Occultation data GADS).One value for upper and lower band each.	deg	8	fl	2
17	**PCD at measurement level [FLAG$_{sum}$(f)]** the contents of each unsigned integer are described in Table 10.4-11.	-	32	us	16
ADS TOTAL (in bytes)			**133**		

10.4.2.8 Size Estimate

The product size depends on the duration of the occultation. In each ADS and MDS, the DSR duration is 0.5 seconds. In table below, the product size is estimated with NUM_DSR = (Occultation duration in seconds) / (0.5 second), for each ADS and MDS:

Table 10.4-18 Product file size

Data Sets	Occultation duration			
	25 s	**50 s**	**100 s**	**200 s**
MPH	1247	1247	1247	1247
SPH	4896	4896	4896	4896
GADSs	9801	9801	9801	9801
ADSs	6450	12900	25800	51600
MDSs	1405450	281090	5621800	11243600
Total Size (Bytes)	**1 427 844**	**2 839 744**	**5 663 544**	**1 1311 144**

10.5 LEVEL 2 PRODUCTS

There are three Level 2 GOMOS products: The GOMOS Temperature and Atmospheric Constituents Profiles product, the Residual Extinction product, and the Extracted Profiles for Meteo Users product. All Level 2 products contain data for an individual occultation.

10.5.1 GOMOS Temperature and Atmospheric Constituents Profiles

This product is produced systematically and contains vertical profiles of atmospheric parameters such as temperature and turbulence, along with gas concentrations for such gases as ozone, H_2O, NO_2, NO_3, and aerosols for a single occultation. The NRT version of the product is available from the PDHS 3 hours after the data acquisition. The OFL (fully consolidated) version is available from the PAC 3 to 4 weeks after the acquisition.

10.5.1.1 Input Data

Level 1B data plus auxiliary data.

10.5.1.2 Auxiliary Data Used

Auxiliary data needed to generate product includes.

Table 10.5-1 Auxiliary Data Files for GOMOS Level 2 Processing

Description	Auxiliary File ID
Cross section database	GOM_CRS_AX
Instrument physical characteristics data	GOM_INS_AX
Level 2 processing configuration database	GOM_PR2_AX

10.5.1.3 Processing Performed

This document is not the applicable document regarding GOMOS algorithms, and the following information is intended as a high level overview only. Algorithm steps at Level 2 include:

- Scintillation/Dilution/Chromatic refraction correction
- Spectral Inversion
- Smoothing
- Vertical Inversion
- Quality Check

10.5.1.4 Product Structure

The high-level breakdown of the product is described below:

MPH
Level 2 - SPH (includes DSDs)
Level 2 - Summary Quality GADS (SQ GADS)
Level 2 - Local species density MDS (one MDSR per measurement)
Level 2 - Tangent line density of species MDS (one MDSR per measurement)
Level 2 - Aerosols MDS (one MDSR per measurement)
Level 2 - High Resolution Temperature MDS (one MDSR per measurement)
Level 2 -Geolocation ADS (one ADSR per measurement)
Level 2 - Accuracy estimation ADS (one ADSR per measurement)

10.5.1.5 Main Product Header

The GOMOS MPH is of the same structural format as that given in Section 5.2.

10.5.1.6 Specific Product Header

The SPH for the GOMOS Level 2 Temperature and Atmospheric Profiles product is shown below.

Table 10.5-2 GOMOS Level 2 Product - Layout of the SPH

N	Description	Units	Byte Length	Data Type	Dim.
1	**SPH_DESCRIPTOR=**	keyword	15	uc	15
	quotation mark (“)	-	1	uc	1
	SPH descriptor is an ascii description of the product.	-	28	uc	28
	quotation mark (“)	-	1	uc	1
	newline character	terminator	1	uc	1
	Product Location Information				
2	**START_TIME=**	keyword	11	uc	11
	quotation mark (“)	-	1	uc	1
	Start time of the occultation UTC time format	utc	27	uc	27
	quotation mark (“)	-	1	uc	1
	newline character	terminator	1	uc	1
3	**STOP_TIME=**	keyword	10	uc	10
	quotation mark (“)	-	1	uc	1

N	Description	Units	Byte Length	Data Type	Dim.
	Time of the end of the occultation UTC time format	utc	27	uc	27
	quotation mark (“)	-	1	uc	1
	newline character	terminator	1	uc	1
4	**START_TANGENT_LAT=**	keyword	18	uc	18
	Latitude of the tangent point at the START_TIME WGS84 latitude, positive = North	(1e-6) deg	11	Al	1
	<10-6degN>	units	10	uc	10
	newline character	terminator	1	uc	1
5	**START_TANGENT_LONG=**	keyword	19	uc	19
	Longitude of the tangent point at the START_TIME WGS84 longitude, positive = East, 0 = Greenwich	(1e-6) deg	11	Al	1
	<10-6degE>	units	10	uc	10
	newline character	terminator	1	uc	1
6	**STOP_TANGENT_LAT=**	keyword	17	uc	17
	Latitude of the tangent point at the STOP_TIME WGS84 latitude, positive = North	(1e-6) deg	11	Al	1
	<10-6degN>	units	10	uc	10
	newline character	terminator	1	uc	1
7	**STOP_TANGENT_LONG=**	keyword	18	uc	18
	Longitude of the tangent point at the STOP_TIME WGS84 longitude, positive = East, 0 = Greenwich	(1e-6) deg	11	Al	1
	<10-6degE>	units	10	uc	10
	newline character	terminator	1	uc	1
8	**Spare**	-	50	uc	50
	newline character	terminator	1	uc	1
	General Product Information				
9	**OCC_DURATION=**	keyword	13	uc	13
	Occultation duration [Δtocc] This value is the product of fields 10 and 11.	(1.e-2) s	6	As	1
	<10-2s>	units	7	uc	7
	newline character	terminator	1	uc	1

N	Description	Units	Byte Length	Data Type	Dim.
10	**SAMP_DURATION=**	keyword	14	uc	14
	Sampling duration [Δt_{sp}] [a]	(1.e-3) s	6	As	1
	<10-3s>	units	7	uc	7
	newline character	terminator	1	uc	1
11	**NUM_MEASURE=**	keyword	12	uc	12
	Number of measurements [f_{size}]	-	6	As	1
	newline character	terminator	1	uc	1
12	**INS_STATUS=**	keyword	11	uc	11
	Status of the instrument [INS_{stat}] redundancy definition vector + instrument configuration. The value is 0 if the instrument is in nominal extended mode. This is the case if: 1) bit 12 of the redundancy definition vector is set to 1 and bit 13 is set to 0, 2) and bits 14 and 15 of the instrument configuration are set to 1 and bits 4 and 5 are set to zero. For all other cases the value will be 1.	-	1	uc	1
	newline character	terminator	1	uc	1
13	**OCC_NUM=**	keyword	8	uc	8
	Occultation number in the orbit [N_{occ}] First Occultation = 1	-	4	Ac	1
	newline character	terminator	1	uc	1
14	**STAR=**	keyword	5	uc	5
	Star name [N_{star}]	-	13	uc	13
	newline character	terminator	1	uc	1
15	**STAR_ID=**	keyword	8	uc	8
	Star identifier in the star catalogue [ID_{star}]	-	6	As	1
	newline character	terminator	1	uc	1
16	**STAR_MAG=**	keyword	9	uc	9
	Star apparent magnitude [mv_{star}]	(1.e-3)	6	As	1
	<10-3>	units	6	uc	6
	newline character	terminator	1	uc	1
	STAR_TEMP=	keyword	10	uc	10

N	Description	Units	Byte Length	Data Type	Dim.
17	**Star temperature [T_{star}]**	(1.e-1) K	11	Al	1
	<10-1K>	units	7	uc	7
	newline character	terminator	1	uc	1
18	**STAR_DIRECT1=**	keyword	13	uc	13
	Star direction in the heliocentric JD2000 frame Two float values, the right ascension of the occulted star (α_{star}), and the declination of the occultated star (δ_{star}).	deg	30	Afl	2
	<deg>	units	5	uc	5
	newline character	terminator	1	uc	1
19	**STAR_DIRECT2=**	keyword	13	uc	13
	Star direction in the quasi-true of date frame (cartesian) Three float values.	-	45	Afl	3
	newline character	terminator	1	uc	1
20	**BRIGHT_LIMB=**	keyword	12	uc	12
	Dark/bright limb flag [$FLAG_{DB}$] Set to 1 for bright limb, 0 for dark limb.	-	1	uc	1
	newline character	terminator	1	uc	1
21	**NUM_LV2PROC=**	keyword	12	uc	12
	Number of acquisitions processed by the Level 2 processor [N_{sp}]	-	6	As	1
	newline character	terminator	1	uc	1
22	**Spare**	-	31	uc	31
	newline character	terminator	1	uc	1
	Retrieval Information				
23	**REF_WAVELENGTH=**	keyword	15	uc	15
	Reference wavelength used for the ray tracing [$\lambda_{rt\ ref}$]	(1.e-3) nm	11	Al	1
	<10-3nm>	units	8	uc	8
	newline character	terminator	1	uc	1
24	**TIME_SHIFT=**	keyword	11	uc	11
	Time shift for the ray tracing/geolocation [Δt_{rt}][a]	(1.e-3) s	6	As	1
	<10-3s>	units	7	uc	7

N	Description	Units	Byte Length	Data Type	Dim.
	newline character	terminator	1	uc	1
	TURB_START=	keyword	11	uc	11
25	**Start of the Turbulence fluctuations processing (measurement index) [$j_{turb,min}$]** A value of -1 indicates no turbulence computation was performed.	-	6	As	1
	newline character	terminator	1	uc	1
	TURB_SIZE=	keyword	10	uc	10
26	**Size of the Turbulence fluctuations processing (number of measurements) [N_{turb}]** A value of 0 indicates no turbulence computation was performed.	-	6	As	1
	newline character	terminator	1	uc	1
	CC_WIND_LENGTH=	keyword	15	uc	15
27	**Length of the cross-correlation window [corwim]** No condition convert unit.	m	15	Afl	1
	<m>	units	3	uc	3
	newline character	terminator	1	uc	1
28	**Spare**	-	50	uc	50
	newline character	terminator	1	uc	1
	DSDs included in the product				
29	*DSD for the SQ GADS*	-	280	dsd	1
30	*DSD for the local species density MDS*	-	280	dsd	1
31	*DSD for the tangent line density of species MDS*	-	280	dsd	1
32	*DSD for the aerosols MDS (set to NOT USED if MDS is not included in the product)*	-	280	dsd	1
33	*DSD for the high resolution temperature MDS*	-	280	dsd	1
34	*DSD for the Geolocation ADS*	-	280	dsd	1
35	*DSD for the accuracy estimation ADS*	-	280	dsd	1
	DSDs referencing other files				
36	*DSD for the Level 1b product used to create this product* [b]	-	280	dsd	1
37	*DSD for the Instrument Physical Characteristics Database*	-	280	dsd	1
38	*DSD for the Level 2 Processing Configuration Database*	-	280	dsd	1

N	Description	Units	Byte Length	Data Type	Dim.
39	*DSD for the Cross-section Database*	-	280	dsd	1
40	*DSD -spare (279 blank space characters followed by 1 newline character)*	-	280	dsd_sp	1
TOTAL (in bytes)		**-**	**4236**	**-**	

Note:

[a] *Note that the description of fields #10 and #24 has been modified. The sampling duration and time shift provided in the SPH are the nominal values. When a more accurate value is needed, the spectrometer effective integration time has to be used instead (see the Occultation Data GADS).*

[b] *When the FILENAME of this DSD is reported as MISSING, it means that the GOM_TRA_1P product was not made externally available by the processor.*

The following strings will be used in the field DS_NAME for the DSDs listed in the SPH above.

Table 10.5-3 GOMOS Level 2 Product - DS_NAME Strings

DSD	DS_NAME String
DSDs for included Data Sets	
DSD (G) - SQ GADS	NL_SUMMARY_QUALITY
DSD (M) - Local species density MDS	NL_LOCAL_SPECIES_DENSITY
DSD (M) - Tangent line density of species MDS	NL_TANGENT_LINE_DENSITY
DSD (M) - Aerosols MDS	NL_AEROSOLS
DSD (M) - High resolution temperature MDS	NL_HIGH_RES_TEMPERATURE
DSD (A) - Geolocation ADS	NL_GEOLOCATION
DSD (A) - Accuracy estimation ADS	NL_ACCURACY_ESTIMATION
DSDs for referenced files	
DSD (R) - Level 1b product used to create this product	LEVEL-1B_PRODUCT
DSD (R) - Instrument Physical Characteristics Database	INST_PHYS_CHARACTERISTICS
DSD (R) - Level 2 Processing Configuration Database	LEVEL-2_PROC_CONFIG
DSD (R) - Cross-section Database	CROSS_SECTIONS_FILE

10.5.1.7 Data Sets

The following sub-sections describe the individual data sets which

together form the Level 2 product. Data sets are in mixed-binary format. ASCII strings may be included within the data sets, but the string is not surrounded by quotation marks as for the MPH/SPH structures.

10.5.1.7.1 Summary Quality GADS

The Summary Quality (SQ) GADS provides a summary of the quality of the data at the level of the product. The format is shown below.

Table 10.5-4 GOMOS Level 2 Product - Layout of the SQ GADS

N	Description	Units	Byte Length	Data Type	Dim.
	Level 1B PCD information				
1 - 30	**Contents of the Level 1B SQ GADS (see Table 10.4-4)**	-	76	-	-
	Level 2 PCD information				
31	**Spectrometer effective sampling time**	s	4	fl	1
32	**Time shift for ray tracing geolocation**	s	4	fl	1
33	**Level 1B PCD check** 0 = no unrecoverable errors detected in Level 1B PCD 1 = no valid data 2 = second part of a tangent occultation 3 = geolocation is not valid 4 = reference star spectra is missing	-	2	us	1
34	**Chromatic refraction mode for the measured transmission [NFCR]** 0 = no correction 1 = correction is performed	-	2	us	1
35	**Chromatic refraction mode for transmission model [NFCR20] (second spectral inversion)** 0 = no correction 1 = correction is performed	-	2	us	1
36	**Chromatic refraction mode for transmission model: (third and further spectral inversion) [NFCR21]** 0 = no correction 1 = correction is performed	-	2	us	1
37	**Instrument function mode for the transmission model and modelling error activation switch [NFI_0, err_mod]) NFI_0 value** 0 = no correction 1 = correction is performed	-	2	us	1

N	Description	Units	Byte Length	Data Type	Dim.
	err_mod value 0 = not computed 1 = computed (default)				
38	**First altitude where the ratio U/C is greater than 25%**a	km	2	us	1
39	**Vertical inversion mode [NFV]** 2 = linear mode, no other values	-	2	us	1
40	**Smoothing mode (after the spectral inversion) [NFS]** 0 = no smoothing 1 = Gaussian filter 2 = Tikhonov's regularisation	-	2	us	1
41	**Time mode for transmission model [NFT0] (second spectral inversion)** 0 = zero order term 1 = second order term	-	2	us	1
42	**Time mode for transmission model: (third and further spectral inversion) [NFT1]** 0 = zero order term 1 = second order term	-	2	us	1
43	**number of iterations for main loop**	-	2	us	1
44	**number of iterations for inversion loop**	-	2	us	1
45	**number of points in profile tangent line densities where $\chi 2 > \chi 2$ warn**	-	2	us	1
46	**number of flagged points in profile for AIR column densities**	-	2	us	1
47	**number of flagged points in profile for AEROSOL column densities**	-	2	us	1
48	**number of flagged points in profile for O_3 column densities**	-	2	us	1
49	**number of flagged points in profile for NO_2 column densities**	-	2	us	1
50	**number of flagged points in profile for NO_3 column densities**	-	2	us	1
51	**number of flagged points in profile for OClO column densities**	-	2	us	1
52	**number of flagged points in profile for O_2 column densities**	-	2	us	1
53	**number of flagged points in profile for H_2O column densities**	-	2	us	1
54	**number of flagged points in profile for AIR local densities**	-	2	us	1
55	**number of flagged points in profile for AEROSOL local densities**	-	2	us	1

N	Description	Units	Byte Length	Data Type	Dim.
56	**number of flagged points in profile for O_3 local densities**	-	2	us	1
57	**number of flagged points in profile for NO_2 local densities**	-	2	us	1
58	**number of flagged points in profile for NO_3 local densities**	-	2	us	1
59	**number of flagged points in profile for OClO local densities**	-	2	us	1
60	**number of flagged points in profile for O_2 local densities**	-	2	us	1
61	**number of flagged points in profile for H_2O local densities**	-	2	us	1
62	**Activation of modelling error**	-	2	us	1
63	**Aerosol model**	-	2	us	1
64	**Spectral inversion scheme Spectral inversion mode Vertical Inversion mode (always in linear mode)** 0 = spectral inversion global (no GDI) 1 = spectral inversion global GDI NO_2 2 = spectral inversion global GDI NO_2+NO_3 (default)	-	2	us	1
65	**Source of GOMOS data for GOMOS atmospheric profile** Bit 0 - Rayleigh extinction Bit 1 - Oxygen absorption from spectrometer B Bit 2 - Refractive dilution including scintillations Bit 3 - Time delay between the two photometers Bit 6 - Rayleigh scattering from day-time background Value =0 disabled, value =1 enabled**.**	-	1	uc	1
66	**Obliquity of the occultation at 35 Km altitude.**	deg	4	fl	1
TOTAL (in bytes)		**-**	**153**	**-**	

Note:

The first altitude where the ratio U/C is greater than 25 km is computed from the PCD at measurement level provided in the level 1b product. Note that the altitude is specified in km, truncated to the nearest integer value. If all ratios are lower than 25%, the altitude is set to 0 km.

10.5.1.7.2 Local Species Density MDS

This MDS provides the density measurements for the target species of interest. This MDS is made of several MDSRs (one for each measurement time of 0.5 s). The layout of each MDSR is described below:

Table 10.5-5 GOMOS Level 2 Product - Layout of the Local Species Density MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the Data Set Record*	-	12	mjd	1
2	*Data quality indicator (-1 if MDSR is empty, 0 otherwise)*	-	1	sc	1
3	**Local O_3 density**	cm^{-3}	4	fl	1
4	**Standard deviation for the local O_3 density**	cm^{-3}	2	us	1
5	**Vertical resolution for the local O_3 density**	m	2	us	1
6	**Local NO_2 density**	cm^{-3}	4	fl	1
7	**Standard deviation for the local NO_2 density**	cm^{-3}	2	us	1
8	**Vertical resolution for the local NO_2 density**	m	2	us	1
9	**Local NO_3 density**	cm^{-3}	4	fl	1
10	**Standard deviation for the local NO_3 density**	cm^{-3}	2	us	1
11	**Vertical resolution for the local NO_3 density**	m	2	us	1
12	**Local air density**	cm^{-3}	4	fl	1
13	**Standard deviation for the local air density**	cm^{-3}	2	us	1
14	**Vertical resolution for the local air density**	m	2	us	1
15	**Local O_2 density**	cm^{-3}	4	fl	1
16	**Standard deviation for the local O_2 density**	cm^{-3}	2	us	1
17	**Vertical resolution for the local O_2 density**	m	2	us	1
18	**Local H_2O density**	cm^{-3}	4	fl	1
19	**Standard deviation for the local H_2O density**	cm^{-3}	2	us	1
20	**Vertical resolution for the local H_2O density**	m	2	us	1
21	**Local OClO density**	cm^{-3}	4	fl	1
22	**Standard deviation for the local OClO density**	cm^{-3}	2	us	1
23	**Vertical resolution for the local OClO density**	m	2	us	1
24	**PCD summary [PCDV(i,j)]** Contains the PCD for the species in the following order: O_3, NO_2, NO_3, Air, O_2, H_2O, and OClO.	-	12	uc	12
TOTAL (in bytes)		**-**	**81**	**-**	

Note:
The standard deviations for the local species density are written in absolute value (in cm^{-3}) and no more in relative value (in %). In order to keep the internal storage unchanged (unsigned short), the following coding equation is applied to the standard deviation:

$$std_{new}=nint\ [log_{10}(std)]/K$$

where: std is the computed standard deviation, stdnew is the new value to be written in the level 2 product (unsigned short). K is a constant and has the following value:*
• K=0.005 for all species
• K=0.05 for H_2O
** note that the old implicit scaling factor included in the parameter unit (0.1) has been discarded.*

10.5.1.7.3 Tangent Line Density of Species MDS

This MDS contains the tangent line densities for the target species and is made of several MDS records (one for each measurement time of 0.5 s). The layout of each MDSR is described below:

Table 10.5-6 GOMOS Level 2 Product - Layout of the Tangent Line Density of Species MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the Data Set Record*	-	12	mjd	1
2	*Data quality indicator (-1 if MDSR is empty, 0 otherwise)*	-	1	sc	1
3	**Tangent line density for O_3**	cm^{-2}	4	fl	1
4	**Standard deviation for O_3 tangent line density**	cm^{-2}	2	us	1
5	**Tangent line density for NO_2**	cm^{-2}	4	fl	1
6	**Standard deviation for NO_2 tangent line density**	cm^{-2}	2	us	1
7	**Tangent line density for NO_3**	cm^{-2}	4	fl	1
8	**Standard deviation for NO_3 tangent line density**	cm^{-2}	2	us	1
9	**Tangent line density for air**	cm^{-2}	4	fl	1
10	**Standard deviation for air tangent line density**	cm^{-2}	2	us	1
11	**Tangent line density for O_2**	cm^{-2}	4	fl	1
12	**Standard deviation for O_2 tangent line density**	cm^{-2}	2	us	1
13	**Tangent line density for H_2O**	cm^{-2}	4	fl	1
14	**Standard deviation for H_2O tangent line density**	cm^{-2}	2	us	1
15	**Tangent line density for OClO**	cm^{-2}	4	fl	1
16	**Standard deviation for OClO tangent line density**	cm^{-2}	2	us	1
16.5	**Number of iterations in the spectral inversion**	-	2	us	1
17	**PCD summary [PCDS (i,j)]** Contains the PCD for the species in the following order: O_3, NO_2, NO_3, Air, O_2, H_2O, and OClO.	-	12	uc	12
18	**Spare**	-	12	uc	12
TOTAL (in bytes)		**-**	**81**	**-**	

Note:
The standard deviations for the tangent line density for all the species are written in absolute value (in cm^{-2}) and no more in relative value (in %). In order to keep the internal storage unchanged (unsigned short), the following coding equation is applied to the standard deviation:

$$std_{new}=nint\ [log_{10}(std)]/K$$

where: std is the computed standard deviation, stdnew is the new value to be written in the level 2 product (unsigned short). K is a constant and has the following value:*
- *K=0.005 for all species*
- *K=0.05 for H^2O*

** note that the old implicit scaling factor included in the parameter unit (0.1) has been discarded.*

10.5.1.7.4 Aerosols MDS

This MDS contains aerosol information and is made of several MDS records (one for each measurement time of 0.5 s). The layout of each MDSR is described below:

Table 10.5-7 GOMOS Level 2 Product - Layout of the Aerosols MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the Data Set Record*	-	12	mjd	1
2	*Data quality indicator (-1 if MDSR is empty, 0 otherwise)*	-	1	sc	1
3	**Extinction coefficient**	km^{-1}	4	fl	1
4	**Standard deviation of the extinction coefficient**	(1.e-1) %	2	us	1
5	**Spectral parameters of the extinction coefficients**	-,nm^{-1},nm^{-2} ...	20	fl	5
6	**Standard deviation of the spectral parameters of the extinction coefficients**	(1.e-1) %	10	us	5
7	**Tangent integrated extinction profile**	-	4	fl	1
8	**Standard deviation of the tangent integrated extinction profile**	(1.e-1) %	2	us	1
9	**Spectral parameters of the tangent integrated extinction profile**	-,nm^{-1},nm^{-2} ...	20	fl	5
10	**Standard deviation of the spectral parameters of the integrated extinction profile**	(1.e-1) %	10	us	5

N	Description	Units	Byte Length	Data Type	Dim.
11	**PCD summary [PCDS (aerosol,j)]** 0 = valid value other = invalid value Provides the spectral and vertical PCD (first and sixth values) of the extinction coefficient at the reference wavelength, the order are set to 0.	-	12	uc	12
TOTAL (in bytes)		**-**	**97**	**-**	

Note:

The standard deviations of the aerosol quantities are still stored in relative value.

10.5.1.7.5 High Resolution Temperature MDS

This MDS is made of several MDS records (one for each processed measurement during the level 2 processing, starting at jturb, min). The layout of each MDSR is described below:

Table 10.5-8 GOMOS Level 2 Product - Layout of the High Resolution Temperature MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the Data Set Record*	-	12	mjd	1
2	*Data quality indicator (-1 if MDSR is empty, 0 otherwise)*	-	1	sc	1
3	**Tangent altitude including fluctuations [$h_{turb,j}$]** a maximum of 20 information per measurement is provided corresponding to a frequency of 40 Hz	m	40	us	20
4	**High resolution vertical temperature profile [$T_{turb,j}$]** a maximum of 20 information per measurement is provided corresponding to a frequency of 40 Hz	(1.e-2) K	40	us	20
5	**High resolution vertical density profile**	cm^{-3}	80	fl	20
6	**Error bar of the high resolution temperature profile**	0.1%	40	us	20
7	**Error bar of the high resolution density profile**	0.1%	40	us	20
TOTAL (in bytes)		**-**	**253**	**-**	

Note:

If data are valid, the error bars (fields #6 and #7) represent 10 times the relative error in percent else the error bar is set to 65000.

There is no high resolution temperature MDS when the occultation is made in bright limb condition.

A maximum of 20 information per measurement is provided corresponding

to a frequency of 40 Hz for the variables.

10.5.1.7.6 Geolocation ADS

This ADS provides the geolocation information for the measurements in the MDSs and is made of several ADS records (one for each measurement time of 0.5 s). The layout of each ADSR is described below:

Table 10.5-9 GOMOS Level 2 Product - Layout of the Geolocation ADSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the measurement*	mjd	12	mjd	1
2	*Attachment flag (set to 1 if there are no Aerosol MDSRs or Local Species MDSRs, or Turbulence MDSRs or Tangent Line Density MDSRs corresponding to this ADSR; set to 0 otherwise)*	-	1	uc	1
3*	**Latitude of the spacecraft [Θ_{sat}]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-6) deg	4	sl	1
4*	**Longitude of the spacecraft [Ψ_{sat}]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-6) deg	4	sl	1
5*	**Altitude of the spacecraft [h_{sat}]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-2) m	4	ul	1
6*	**Latitude of the tangent point [$lat_0(\lambda_{ref,j})$]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-6) deg	4	sl	1
7*	**Longitude of the tangent point [$lon_0(\lambda_{ref,j})$]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-6) deg	4	sl	1
8*	**Altitude of the tangent point [$h_0(\lambda_{ref,j})$]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-2) m	4	ul	1
9*	**Error on the latitude of the tangent point [$E_{lat0}(\lambda_{ref,j})$]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-7) deg	4	sl	1
10*	**Error on the longitude of the tangent point**	(1.e-7) deg	4	sl	1

N	Description	Units	Byte Length	Data Type	Dim.
	[$E_{lon0}(\lambda_{ref,j})$] value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)				
11*	**Error on the altitude of the tangent point [$E_{h0}(\lambda_{ref,j})$]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-3) m	4	ul	1
12*	**Instrument pointing direction (azimuth)**	(1.e-6) deg	4	sl	1
13*	**Instrument pointing direction (elevation)**	(1.e-6) deg	4	sl	1
14	**Tangent point atmospheric pressure (from external model) [$P_{0\text{-}EM}(j)$]**	Pa	4	fl	1
15	**Tangent point temperature (from external model) [$T_{0\text{-}EM}(j)$]**	K	4	fl	1
16	**Tangent point density (from external model)**	cm^{-3}	4	fl	1
17	**Local air density from GOMOS atmospheric profile**	cm^{-3}	4	fl	1
18	**Standard deviation for the local air density [$\Delta n(j)$]**	(1.e-1) %	2	us	1
19	**Local temperature [T(j)]**	K	4	fl	1
20	**Standard deviation for the local temperature [$\Delta T(j)$]**	(1.e-1) %	2	us	1
21	**PCD summary [$PCDS_{GAP,j}$]** 0 = atmospheric processing was valid other = atmospheric processing was not valid	-	1	uc	1
22*	**Sun zenith angle at the spacecraft**	deg	4	fl	1
23*	**Sun zenith angle at the tangent point**	deg	4	fl	1
24*	**Sun azimuth angle at the tangent point**	deg	4	fl	1
TOTAL (in bytes)			**94**		

Note:
** Variables marked with an asterisk are provided during the measurement, generally at half measurement (the temporal shift is given by the Time shift for the ray tracing).*

10.5.1.7.7 Accuracy Estimation ADS

This ADS provides accuracy information pertaining to the measurements in the MDSs. It is made of several ADS records (one for each measurement time of 0.5 s). The layout of each ADSR is described below:

Table 10.5-10 GOMOS Level 2 Product - Layout of the Accuracy Estimation ADSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the Data Set Record*	-	12	mjd	1
2	*Attachment flag (set to 1 if there are no Aerosols MDSRs or Local Species MDSRs or Turbulence MDSRs or Tangent Line Density MDSRs corresponding to this ADSR; set to 0 otherwise)*	-	1	uc	1
3	**Chi-2 final value [χ^2_{ng}]**	-	4	fl	1
4	**Scale factor for the elements of the co-variance matrix (spectral inversion) [FSCI]** The scale factor is a power of 10 to be applied on each of the covariance matrix element: Scaled covariance matrix element (field below) = Covariance matrix element (computed in level-2 processing) * $10^{-(\text{scale factor})}$.	-	1	sc	1
5	**Covariance matrix for line densities after spectral inversion [CSI i,i',j]** 12x12 matrix corresponding to the 6 species specified in the MDS plus one potential spare species plus 5 parameters for aerosol spectral dependency. The matrix is symmetrical: only half of the matrix (78 values) is written in the product The order of the 12 parameters is: O3, NO2, NO3, Air, OClO, Aerosol, 5 parameters for aerosol spectral dependence, 1 spare gas.	cm^{-4}	312	fl	78
6	**Scale factor for the elements of the co-variance matrix (vertical inversion) [FVCI]** The scale factor is a power of 10 to be applied on each of the covariance matrix element: Scaled covariance matrix element (field below) = Covariance matrix element (computed in level-2 processing) * $10^{-(\text{scale factor})}$.	-	1	sc	1
7	**Covariance matrix for local densities after vertical inversion [σn i,i',j]** 12*7 matrix corresponding to the 7 altitude dependent covariance terms per species. The order of the 12 parameters is: O_3, NO_2, NO_3, Air, O_2, H_2O, OClO, Aerosol, and 4 spare gases. The diagonal element is always written in the last column of the 12*7 matrix. For a given line (i.e. given by species) and for the six first acquisitions (or layers) the information is written in the DSR are those initially on the right of the diagonal of the covariance matrix. For others, the natural order is used, that is to record the values initially on the left of the diagonal of the covariance matrix.	cm^{-6}	336	fl	84
8	**Spare**	-	4	uc	4
TOTAL (in bytes)		**-**	**671**	**-**	

10.5.2 GOMOS Residual Extinction

This product contains re-computed transmission spectra corrected for scintillation and dilution effects, before and after inversion. The NRT

version of the product is available from the PDHS 3 hours after the data acquisition. The OFL (fully consolidated) version is generated in PAC. The primary application for this product is for evaluation of the Level 2 product (atmospheric profiles) and it also contains information needed to build a high resolution aerosol product.

10.5.2.1 Input Data

Level 1B data plus auxiliary data.

10.5.2.2 Auxiliary Data Used

See Section 10.5.1.2.

10.5.2.3 Processing Performed

The same processing chain which is used for the Temperature and Atmospheric Profiles product is used for the Residual Extinction product. See Section 10.5.1.3.

10.5.2.4 Product Structure

The high-level breakdown of the product is described below:

MPH
Residual extinction - SPH
Residual Extinction - SQ GADS
Residual extinction - GADS of the nominal wavelength assignment
Residual extinction - MDS (one MDSR per measurement)
Residual extinction - ADS (one ADSR per measurement)

10.5.2.5 Main Product Header

The GOMOS MPH is of the same structural format as that given in Section 5.2.

10.5.2.6 Specific Product Header

The SPH of the Residual Extinction Product is an ASCII header of the type described in Volume 5. The detailed format is described below:

Table 10.5-11 Residual Extinction Product - Layout of the SPH

N	Description	Units	Byte Length	Data Type	Dim.
1	**SPH_DESCRIPTOR=**	keyword	15	uc	15
	quotation mark (“)	-	1	uc	1
	SPH descriptor is an ascii description of the product.	-	28	uc	28

N	Description	Units	Byte Length	Data Type	Dim.
	quotation mark (“)	-	1	uc	1
	newline character	terminator	1	uc	1
	Product Location Information				
2	**START_TIME=**	keyword	11	uc	11
	quotation mark (“)	-	1	uc	1
	Start time of the occultation UTC time format	utc	27	uc	27
	quotation mark (“)	-	1	uc	1
	newline character	terminator	1	uc	1
3	**STOP_TIME=**	keyword	10	uc	10
	quotation mark (“)	-	1	uc	1
	Time of the end of the occultation UTC time format	utc	27	uc	27
	quotation mark (“)	-	1	uc	1
	newline character	terminator	1	uc	1
4	**START_TANGENT_LAT=**	keyword	18	uc	18
	Latitude of the tangent point at the START_TIME WGS84 latitude, positive = North	(1e-6) deg	11	AI	1
	<10-6degN>	units	10	uc	10
	newline character	terminator	1	uc	1
5	**START_TANGENT_LONG=**	keyword	19	uc	19
	Longitude of the tangent point at the START_TIME WGS84 longitude, positive = East, 0 = Greenwich	(1e-6) deg	11	AI	1
	<10-6degE>	units	10	uc	10
	newline character	terminator	1	uc	1
6	**STOP_TANGENT_LAT=**	keyword	17	uc	17
	Latitude of the tangent point at the STOP_TIME WGS84 latitude, positive = North	(1e-6) deg	11	AI	1
	<10-6degN>	units	10	uc	10
	newline character	terminator	1	uc	1
	STOP_TANGENT_LONG=	keyword	18	uc	18

N	Description	Units	Byte Length	Data Type	Dim.
7	**Longitude of the tangent point at the STOP_TIME** WGS84 longitude, positive = East, 0 = Greenwich	(1e-6) deg	11	Al	1
	<10-6degE>	units	10	uc	10
	newline character	terminator	1	uc	1
8	**Spare**	-	50	uc	50
	newline character	terminator	1	uc	1
	General Product Information				
9	**OCC_DURATION=**	keyword	13	uc	13
	Occultation duration [Δt_{occ}] This value is the product of field 10 and field 11.	(1.e-2) s	6	As	1
	<10-2s>	units	7	uc	7
	newline character	terminator	1	uc	1
10	**SAMP_DURATION=**	keyword	14	uc	14
	Nominal Sampling duration [Δt_{sp}]	(1.e-3) s	6	As	1
	<10-3s>	units	7	uc	7
	newline character	terminator	1	uc	1
11	**NUM_MEASURE=**	keyword	12	uc	12
	Number of measurements [f_{size}]	-	6	As	1
	newline character	terminator	1	uc	1
12	**INS_STATUS=**	keyword	11	uc	11
	Status of the instrument [INS_{stat}] Redundancy definition vector + instrument configuration The value is 0 if the instrument is in nominal extended mode. This is the case if: 1) bit 12 of the redundancy definition vector is set to 1 and bit 13 is set to 0, 2) and bits 14 and 15 of the instrument configuration are set to 1 and bits 4 and 5 are set to zero. For all other cases the value will be 1.	-	1	uc	1
	newline character	terminator	1	uc	1
13	**OCC_NUM=**	keyword	8	uc	8
	Occultation number in the orbit [N_{occ}] First occultation = 1	-	4	Ac	1
	newline character	terminator	1	uc	1
	STAR=	keyword	5	uc	5

N	Description	Units	Byte Length	Data Type	Dim.
14	**Star name [N_{star}]** (left-justified, unused characters are set to ASCII blank space characters)	-	13	uc	13
	newline character	terminator	1	uc	1
15	**STAR_ID=**	keyword	8	uc	8
	Star identifier in the star catalogue [ID_{star}]	-	6	As	1
	newline character	terminator	1	uc	1
16	**STAR_MAG=**	keyword	9	uc	9
	Star apparent magnitude [mv_{star}]	(1.e-3)	6	As	1
	<10-3>	units	6	uc	6
	newline character	terminator	1	uc	1
17	**STAR_TEMP=**	keyword	10	uc	10
	Star temperature [T_{star}]	(1.e-1) K	11	Al	1
	<10-1K>	units	7	uc	7
	newline character	terminator	1	uc	1
18	**STAR_DIRECT1=**	keyword	13	uc	13
	Star direction in the heliocentric JD2000 frame Two float values, the right ascension of the occulted star [α_{star}], and the declination of the occulted star [δ_{star}].	deg	30	Afl	2
	<deg>	units	5	uc	5
	newline character	terminator	1	uc	1
19	**STAR_DIRECT2=**	keyword	13	uc	13
	Star direction in the quasi-true of date frame (cartesian) Three float values.	-	45	Afl	3
	newline character	terminator	1	uc	1
20	**BRIGHT_LIMB=**	keyword	12	uc	12
	Dark/bright limb flag [$FLAG_{DB}$] Set to 1 for bright limb, 0 for dark limb.	-	1	uc	1
	newline character	terminator	1	uc	1
21	**NUM_LV2PROC=**	keyword	12	uc	12
	Number of acquisitions processed by the Level 2 processor [N_{sp}]	-	6	As	1
	newline character	terminator	1	uc	1

N	Description	Units	Byte Length	Data Type	Dim.
22	**Spare**	-	31	uc	31
	newline character	terminator	1	uc	1
	Residual Extinction Information				
23	**REF_WAVELENGTH=**	keyword	15	uc	15
	Reference wavelength used for the ray tracing [λ_{ref}^{rt}]	(1.e-3) nm	11	Al	1
	<10-3nm>	units	8	uc	8
	newline character	terminator	1	uc	1
24	**TIME_SHIFT=**	keyword	11	uc	11
	Nominal Time shift for the geolocation [Δt_{rt}]	(1.e-3) s	6	As	1
	<10-3s>	units	7	uc	7
	newline character	terminator	1	uc	1
25	**MEAN_WAVELENGTH=**	keyword	16	uc	16
	Mean wavelength of the photometer used for the scintillation correction (λ_0)	(1.e-3) nm	11	Al	1
	<10-3nm>	units	8	uc	8
	newline character	terminator	1	uc	1
25	**Spare**	-	50	uc	50
	newline character	terminator	1	uc	1
	DSDs for attached data sets				
27	*DSD for the SQ GADS (G)*	-	280	dsd	1
28	*DSD for the Nominal wavelength assignment GADS (G)*	-	280	dsd	1
29	*DSD for the Residual Extinction MDS (M)*	-	280	dsd	1
30	*DSD for the Residual Extinction ADS (A)*	-	280	dsd	1
	DSDs for reference files				
31	*DSD for the Level 1b product used to create this product (R)*[a]	-	280	dsd	1
32	*DSD for the Instrument Physical Characteristics database (R)*	-	280	dsd	1
33	*DSD for the Level 2 processing configuration (R)*	-	280	dsd	1
34	*DSD for the Cross-sections database (R)*	-	280	dsd	1
35	*DSD - spare (279 blank space characters followed by 1 newline character)*	-	280	dsd_sp	1

N	Description	Units	Byte Length	Data Type	Dim.
TOTAL (in bytes)		**-**	**3363**	**-**	

Note:

[a] *When the FILENAME of this DSD is reported as MISSING, it means that the GOM_TRA_1P product was not made externally available by the processor. The following strings will be used in the field DS_NAME for the DSDs listed in the SPH above.*

Table 10.5-12 Residual Extinction Product - DS_NAME Strings

DSD	DS_NAME String
DSDs for included Data Sets	
DSD (G) - SQ GADS	EXT_SUMMARY_QUALITY
DSD (G) - Nominal wavelength assignment GADS	EXT_NOM_WAV_ASSIGNMENT
DSD (M) - Residual Extinction MDS	EXT_MDS
DSD (A) - Residual Extinction ADS	EXT_ADS
DSDs for referenced files	
DSD (R) - Level 1b product used to create this product	LEVEL-1B_PRODUCT
DSD (R) - Instrument Physical Characteristics Database	INST_PHYS_CHARACTERISTICS
DSD (R) - Level 2 Processing Configuration Database	LEVEL-2_PROC_CONFIG
DSD (R) - Cross-section Database	CROSS_SECTIONS_FILE

10.5.2.7 Data Sets

The following sub-sections describe the individual data sets which together form the Residual Extinction product. Data sets are in mixed-binary format. ASCII strings may be included within the data sets, but the string is not surrounded by quotation marks as for the MPH/SPH structures.

10.5.2.7.1 SQ GADS

The SQ GADS is identical to the SQ GADS described in Section10.5.1.7.1.

10.5.2.7.2 Nominal Wavelength Assignment GADS

This GADS is identical in format to the Nominal Wavelength Assignment GADS from the Level 1B product described in Section 10.4.1.7.3.

Recorded by wavelength in ascending order.

10.5.2.7.3 Residual Extinction MDS

This MDS is made of several MDS records (one for each measurement time of 0.5 s). The layout of each MDSR is described below:

Table 10.5-13 Residual Extinction Product - Layout of the MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the DSR*	-	12	mjd	3
2	*Data quality indicator (-1 if MDSR is empty, 0 otherwise)*	-	1	sc	1
3	**Transmission corrected for scintillation and dilution effects [$T_{a,k}$]**	-	9344	fl	2336
4	**Covariance function of the transmission after scintillation and dilation corrections**	-	9344	fl	2336
5	**Transmission model function** The transmission model function uses the full coding range: 0 to 65535, which corresponds to values 0.0 and 2.0 respectively (3.0518e-5 for LSB).	-	4672	us	2336
6	**Flags for Transmission model** Definition of the flags for transmission model (spectrometer A) 0 = transmission is valid 1 = the pixel is flagged in the level 1b processing 2 = the pixel is not in the spectral range of the level 2 processing 3 = the pixel is flagged during multiplicative factor computation 4 = the pixel was not flagged and that at least one species is flagged Definition of the flags for transmission model (spectrometer B): 0 = transmission is valid 1 = the pixel is flagged in the level 1b processing 2 = the measured transmission is lower than a specified minimum value (value t_min read from the level 2 configuration product) 3 = standard deviation of the transmission is greater than a specified value (fixed value set to 1.e+06) 4 = reference transmission is lower than a specified minimum value (value t_min read from the level 2 configuration product) 5 = PCDSi,j=NI_PCD_B_CONV 6 = t PCDSi,j=NI_PCD_B_COV 7 = PCDSi,j=NI_PCD_B_NA Contributors to PCDS(i,j), i=air, aerosol, O_3, NO_2, NO_3, OClO	-	2336	uc	2336
TOTAL (in bytes)		**-**	**25709**	**-**	

10.5.2.7.4 Residual Extinction ADS

This ADS is made of several ADS records (one for each measurement time of 0.5 s). The layout of each ADSR is described below:

Table 10.5-14 Residual Extinction Product - Layout of the ADSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Start time of the measurement*	-	12	mjd	1
2	*Attachment flag (set to 1 if there are no Residual Extinction MDSRs corresponding to this ADSR; set to 0 otherwise)*	-	1	uc	1
3	**Latitude of the spacecraft [Θ_{sat}]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-6) deg	4	sl	1
4	**Longitude of the spacecraft [Ψ_{sat}]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-6) deg	4	sl	1
5	**Altitude of the spacecraft [h_{sat}]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-2) m	4	ul	1
6	**Latitude of the tangent point [$lat_0(\lambda_{ref,j})$]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-6) deg	4	sl	1
7	**Longitude of the tangent point [$lon_0(\lambda_{ref,j})$]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-6) deg	4	sl	1
8	**Altitude of the tangent point [$h_0(\lambda_{ref,j})$]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-2) m	4	ul	1
9	**Error on the latitude of the tangent point [$E_{lat0}(\lambda_{ref,j})$]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-7) deg	4	sl	1
10	**Error on the longitude of the tangent point [$E_{lon0}(\lambda_{ref,j})$]** value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)	(1.e-7) deg	4	sl	1
11	**Error on the altitude of the tangent point**	(1.e-3) m	4	ul	1

N	Description	Units	Byte Length	Data Type	Dim.
	[$E_{h0}(\lambda_{ref,j})$] value provided during the measurement, generally at half-measurement (the temporal shift is given by the *time shift for the ray tracing* in the SPH)				
12	**Tangent point atmospheric pressure (from external model) [$P_{0\text{-}EM}(j)$]**	Pa	4	fl	1
13	**Tangent point temperature (from external model) [$T_{0\text{-}EM}(j)$]**	K	4	fl	1
14	**Tangent point density (from external model)**	cm^{-3}	4	fl	1
15	**Spectral grid correction for the transmission model function computed from retrieved vertical profiles [$\delta\lambda_k(j)$]**	(1.e-3) nm	4672	us	2336
TOTAL (in bytes)		**-**	**4733**	**-**	

10.5.3 GOMOS Extracted Profiles for Meteo Users

This product contains selected vertical profiles extracted from the NRT GOMOS Temperature and Atmospheric Constituents Profiles product for NRT distribution to Meteo users. It is produced systematically and available within 3 hours from the PDHS. The primary application of this product is NRT global atmospheric modelling and monitoring.

The product may be converted to BUFR format outside the PDS for GTS communications.

10.5.3.1 Input Data

Level 2 NRT GOMOS Temperature and Atmospheric Constituents Profiles product data plus auxiliary data.

10.5.3.2 10.5.3.2 Auxiliary Data Used

No new files are needed.

10.5.3.3 10.5.3.3 Processing Performed

Extraction only.

10.5.3.4 Product Structure

The high-level breakdown of the product is described below:

MPH
Auxiliary Data SPH (as described in Volume 16) with 3 DSDs: *DSD (M) for the Local Species Density MDS* *DSD (A) for the Geolocation ADS* *DSD (A) for the High Resolution Temperature MDS*
Level 2 - Local Species Density MDS (one MDSR per measurement)
Level2 - Geolocation ADS (one ADSR per measurement)
Level2 - High Resolution Temperature MDS (one ADSR per measurement)

10.5.3.5 Main Product Header

The MPH is described in Volume 5.

10.5.3.6 Specific Product Header

The SPH will be of the form used for auxiliary data files, as described in Volume 16. It will have 3 DSDs as described below:

Table 10.5-15 Extracted Profiles Product - Layout of the SPH

N	Description	Units	Byte Length	Data Type	Dim.
1	**SPH_DESCRIPTOR=**	keyword	15	uc	15
	quotation mark (“)	-	1	uc	1
	SPH descriptor ASCII string describing the file**.**	-	28	uc	28
	quotation mark (“)	-	1	uc	1
	newline character	terminator	1	uc	1
2	**Spare**	-	51	uc	51
	newline character	terminator	1	uc	1
	DSDs for attached data sets				
3	*DSD for the Local Species Density MDS (M)*	-	280	dsd	1
4	*DSD for the Geolocation ADS (A)*	-	280	dsd	1
5	*DSD for the High Resolution Temperature MDS (M)*	-	280	dsd	1
	DSD for reference file				
6	*DSD for the Level 1b product used to create this product (R)*[a]	-	280	dsd	1
TOTAL (in bytes)		**-**	**1218**	**-**	

Note:

[a] *When the FILENAME of this DSD is reported as MISSING, it means that the Level-1B parent product was not made externally available by the processor.*

The following strings will be used in the field DS_NAME for the DSDs listed in the SPH above.

Table 10.5-16 Extracted Profiles Product - DS_NAME Strings

DSD	DS_NAME String
DSDs for included Data Sets	
DSD (M) - Local Species Density MDS	RR_LOCAL_SPECIES_DENSITY
DSD (A) - Geolocation ADS	RR_GEOLOCATION
DSD(M) - High Resolution Temperatures	RR_HIGH_RES_TEMPERATURE
DSDs for referenced files	
DSD (R) - Level 1b product used to create this product	LEVEL-1B_PRODUCT

10.5.3.7 Data Sets

The following sub-sections describe the individual data sets which together form the Level 2 product. Data sets are in mixed-binary format. ASCII strings may be included within the data sets, but the string is not surrounded by quotation marks as for the MPH/SPH structures.

10.5.3.7.1 Local Species Density MDS

The MDS format will be identical to that of the Level 2 product described in Section 10.5.1.7.2.

10.5.3.7.2 Geolocation ADS

The ADS format will be identical to that of the Level 2 product described in Section 10.5.1.7.6.

10.5.3.7.3 High Resolution Temperature MDS

The MDS format will be identical to that of the Level 2 product described in Section 10.5.1.7.5.

10.6 AUXILIARY DATA FILES

10.6.1 Instrument Physical Characteristics

The instrument physical characteristics file contains instrument parameters used during the Level 1b and the Level 2 processing chains. These parameters will not vary with time.

FILE ID: GOM_INS_AX

TYPE: Auxiliary

USE: Used for Level 1B and Level 2 processing

UPDATED: infrequently, if ever

SIZE (in bytes): MPH (1247) + SPH (1498) + DSs (7628) = 10373 Bytes

10.6.1.1 Format

The high-level breakdown of the file is described here below:

MPH
Auxiliary Data SPH (see Volume 16) with 5 DSDs: *DSD for the General GADS* *DSD for the static spectral PSF GADS for SPA* *DSD for the static spectral PSF GADS for SPB* *DSD for the static spatial PSF GADS for SPA* *DSD for the static spatial PSF GADS for SPB*
Instrument physical char. - General GADS
Instrument physical char. - GADS of the static spectral PSF for SPA
Instrument physical char. - GADS of the static spectral PSF for SPB
Instrument physical char. - GADS of the static spatial PSF for SPA
Instrument physical char. - GADS of the static spatial PSF for SPB

The following strings will be used in the field DS_NAME for the DSDs listed in the SPH above.

Table 10.6-1 Auxiliary Data Files - DS_NAME Strings

DSD	DS_NAME String
DSDs for included Data Sets	
DSD (G) - General GADS	INS_GENERAL
DSD (G) - Static spectral PSF for SPA GADS	INS_SPA_SPECTRAL_PSF
DSD (G) - Static spectral PSF for SPB GADS	INS_SPB_SPECTRAL_PSF
DSD (G) - Static spatial PSF for SPA GADS	INS_SPA_SPATIAL_PSF
DSD (G) - Static spatial PSF for SPB GADS	INS_SPB_SPATIAL_PSF

10.6.1.1.1 General GADS

The General GADS provides general information relating to the contents of the full file.

Table 10.6-2 Instrument Physical Characteristics File - General GADS Layout

N	Description	Units	Byte Length	Data Type	Dim.
1	**Spectrometers sampling frequency [$freq_{sp}$]** nominal value is 2 Hz	Hz	2	us	1
2	**Photometers sampling frequency [$freq_{fp}$]** nominal value is 1000 Hz	Hz	2	us	1
3	**SATU sampling frequency [$freq_{SATU}$]** nominal value is 100 Hz	Hz	2	us	1
4	**SFA sampling frequency [$freq_{sfa}$]** nominal value is 10 Hz	Hz	2	us	1
5	**Spectrometers sampling time [Δt_{SP}]** nominal value is 0.5 s (1/$freq_{sp}$)	(1.e-9) s	4	ul	1
6	**Photometers sampling time [Δt_{FP}]** nominal value is 0.001 s (1/$freq_{fp}$)	(1.e-9) s	4	ul	1
7	**SATU measurements coding offset [b_{SATU}]** nominal value is -146 µrad	(1.e-9) rad	4	sl	1
8	**SATU measurements coding gain [a_{SATU}]** nominal value is 0.1 µrad/LSB	(1.e-9) rad/ ADU	4	ul	1
9	**SATU reference wavelength [$\lambda_{SATU\ ref}$]** nominal value is 700 nm	(1.e-3) nm	4	ul	1
10	**SFA Angles conversion factor**	-	40	fl	10
11	**Spectrometers focal lengths [$F_{SP\ focal}$ (c)]** nominal value is 1.050 m c=SPA1, SPA2, SPB1, SPB2	(1.e-4) m	8	us	4
12	**Photometers focal lengths [$F_{FP\ focal}$ (fc)]** nominal value is 0.479 m fc=FP1, FP2	(1.e-4) m	4	us	2
13	**Slit width [W_{slit}]** nominal value is 200 µm	(1.e-9) m	4	ul	1
14	**Mean pixel size in the spatial direction (SP) [ΔY_c]** nominal value is 27 µm c=SPA1, SPA2, SPB1, SPB2	(1.e-9) m	8	us	4
15	**Mean pixel size in the spectral direction (SP) [ΔX_c]** nominal value is 20 µm c=SPA1, SPA2, SPB1, SPB2	(1.e-9) m	8	us	4
16	**Mean pixel size (FP) [$\Delta X_{FP\ fc}$, $\Delta Y_{FP\ fc}$]** X and Y directions nominal value is 23 µm in X and	(1.e-9) m	4	us	2

N	Description	Units	Byte Length	Data Type	Dim.
	Y fc=FP1, FP2				
17	**Lower wavelength of the invalid spectral range [$\lambda_{off\ min}$]** nominal value = 375 nm	nm	4	fl	1
18	**Higher wavelength of the invalid spectral range [$\lambda_{off\ max}$]** nominal value = 405 nm	nm	4	fl	1
19	*Spare*	-	24	uc	24
TOTAL (in bytes)			**136**		

10.6.1.1.2 Spectral PSFs GADS

Note concerning the spatial and spectral PSFs presented below: the PSFs are defined for several reference wavelengths (see fields #1 and #2 below) covering the spectrometer spectral range (SPA or SPB). Up to 15 reference wavelengths can be defined.

The PSFs are assumed to be constant around each reference wavelengths.

For each reference wavelength, the local PSF is defined by a set of points (see field #3), the discretisation step (see field #4) and the PSF values (see field #5).

Remark: the discretisation step is provided in physical unit (distance on the CCD array).

Table 10.6-3 Instrument Physical Characteristics Layout of the Static Spectral PSF GADS for Spectrometer A, and B

N	Description	Units	Byte Length	Data Type	Dim.
1	**Number of reference wavelengths for the static spectral PSF[$n\lambda_{PSF\ H}$]** Where H = A for spectrometer A GADS, H = B for spectrometer B GADS.	-	1	uc	1
2	**Reference wavelengths of the static spectral PSF [$\lambda_{PSF\ H}$]** Where H = A for spectrometer A GADS, H = B for spectrometer B GADS.	(1.e-3) nm	60	ul	15
3	**Number of points for the static spectral PSF[$np_{PSF\ H}$]** Where H = A for spectrometer A GADS, H = B for spectrometer B GADS.	-	1	uc	1
4	**Discretisation step of the PSF**	(1.e-3) µm	4	ul	1
5	**Static spectral PSF values**	-	1800	fl	450
TOTAL (in bytes)		**-**	**1866**	**-**	

Above GADS repeated once for Spectrometer A and once for Spectrometer B.

Table 10.6-4 Instrument Physical Characteristics Layout of the Static Spatial PSF GADS for Spectrometer A and B

N	Description	Units	Byte Length	Data Type	Dim.
1	**Number of reference wavelengths for the static spatial PSF**	-	1	uc	1
2	**Reference wavelengths of the static spatial PSF**	(1.e-3) nm	60	ul	15
3	**Number of points for the static spatial PSF**	-	1	uc	1
4	**Discretisation step of the static spatial PSF**	(1.e-3) µm	4	ul	1
5	**Static spatial PSF values**	-	1800	fl	450
TOTAL (in bytes)		**-**	**1866**	**-**	

Above GADS repeated once for Spectrometer A and once for Spectrometer B.

10.6.2 Calibration Database

The GOMOS Calibration database file contains instrument parameters used by the Level 1b spectrometers and photometers processing chains. These parameters will be initialised with the GOMOS characterisation database and on-ground measurements then updated during the commissioning phase and by the calibration sequences during the instrument lifetime.

FILE ID: GOM_CAL_AX

TYPE: Auxiliary

USE: Used for Level 1B processing

UPDATED: infrequently

SIZE (in bytes): 2520353 bytes (max size, depending on PRNU)

10.6.2.1 Format

The high-level breakdown of the file is described here below:

MPH
Auxiliary Data SPH (refer to Volume 16) with 11 DSDs: DSD for the General GADS DSD for the Bad Pixels maps GADS DSD for the Non-linearity functions GADS DSD for the Fast Photometer Dark Charge maps GADS DSD for the Fast Photometer Non-uniformity maps GADS DSD for the Fast Photometer Straylight functions GADS DSD for the Instrument noise GADS DSD for the Spectrometer Dark Charge maps MDS DSD for the Spectrometer Non-uniformity maps MDS DSD for the External Sun Straylight maps MDS
Calibration - General GADS
Calibration - GADS of the Bad Pixels map
Calibration - GADS of the Non-linearity functions
Calibration - GADS of the Fast Photometer Dark Charge maps
Calibration - GADS of the Fast Photometer Non-uniformity maps
Calibration - GADS of the Fast Photometer Straylight functions
Calibration - GADS of the Instrument noise
Calibration - MDS of the Spectrometer Dark Charge maps (one MDSR per CCD line)
Calibration - MDS of the Spectrometer Non-uniformity maps (one MDSR per CCD line)
Calibration - MDS of the External Sun Straylight maps (one MDSR per Sun-star angle)
Calibration - MDS of the External Earth Straylight maps (one MDSR per tangent point

The following strings will be used in the field DS_NAME for the DSDs listed in the SPH above.

Table 10.6-5 Calibration Database - DS_NAME Strings

DSD	DS_NAME String
DSDs for included Data Sets	
DSD (G) - General GADS	CAL_GENERAL
DSD (G) - Bad Pixels map GADS	CAL_BAD_PIXEL
DSD (G) - Non-linearity functions GADS	CAL_NON_LINEARITY
DSD (G) - Fast Photometer Dark Charge maps GADS	CAL_FP_DARK_CHARGE
DSD (G) - Fast Photometer Non-uniformity maps GADS	CAL_FP_PRNU
DSD (G) - Straylight functions GADS	CAL_FP_STRAYLIGHT
DSD (G) - Instrument noise GADS	CAL_INSTRUMENT_NOISE
DSD (M) - Spectrometer Dark Charge maps MDS (one MDSR per CCD line)	CAL_SP_DARK_CHARGE

DSD	DS_NAME String
DSD (M) - Spectrometer Non-uniformity maps MDS (one MDSR per CCD line)	CAL_SP_PRNU
DSD (M) - External Sun Straylight maps MDS (one MDSR per Sun-star angle)	CAL_SUN_STRAYLIGHT
DSD (M) - External Earth Straylight maps MDS (one MDSR per tangent point altitude)	CAL_EARTH_STRAYLIGHT

10.6.2.1.1 General GADS

The General GADS contains information relevant to the whole file.

Table 10.6-6 Calibration Database File - Layout of the General GADS

N	Description	Unit	Byte Length	Data Type	Dim.
1	**Validity duration of the Calibration database**	-	12	mjd	1
2	**First used column on the CCD array for SPA and SPB [S0(c)]** programmable c=CCD index	-	8	us	4
3	**Number of used columns for the CCD arrays of SPA and SPB [k_{len}(c)]** nominal is 456, 955 for SPA, 410, 515 for SPB	-	8	us	4
4	**First used lines of the CCD arrays [$n_{min\ b}$ (c)]** nominal is line number 56 for all CCD	-	8	us	4
5	**Number of lines of the background bands [$n_{len\ L}$ (c), $n_{len\ U}$ (c)]** nominal is 10 lines	-	8	us	4
6	**Number of lines of the isolation bands [H2(c)]** nominal is 2 lines	-	8	us	4
7	**Number of lines of the target bands [$n_{len\ c}$ (c)]** nominal is 7 lines	-	8	us	4
8	**First used column of the FP1 CCD array [$k_{FP\ min}$(fc)]** nominal is 6 fc=FP1	-	1	uc	1
9	**Last used column of the FP1 CCD array [$k_{FP\ max}$(fc)]** nominal is 10 fc=FP1	-	1	uc	1
10	**First used column of the FP2 CCD array[$k_{FP\ min}$(fc)]** nominal is 6 fc=FP2	-	1	uc	1
11	**Last used column of the FP2 CCD array[$k_{FP\ max}$(fc)]** nominal is 10 fc=FP2	-	1	uc	1
12	**First used line of the FP1 CCD array [$n_{FP\ min}$(fc)]**	-	1	uc	1

N	Description	Unit	Byte Length	Data Type	Dim.
	nominal is 1, fc=FP1				
13	**Last used line of the FP1 CCD array [$n_{FP\ max}(fc)$]** nominal is 14, fc=FP1	-	1	uc	1
14	**First used line of the FP2 CCD array[$n_{FP\ min}(fc)$]** nominal is 1, fc=FP2	-	1	uc	1
15	**Last used line of the FP2 CCD array[$n_{FP\ max}(fc)$]** nominal is 14, fc=FP2	-	1	uc	1
16	**Column index for the nominal wavelength assignment**	-	8	us	4
17	**Nominal wavelength assignment of one CCD column**	(1.e-3) nm	16	ul	4
18	**Star spot semi axis length in the X axis frame of the FP CCD array [$\Delta X_{FP\ spot}$]** nominal value is 12.5 µm	(1.e-9) m	4	ul	1
19	**Star spot semi axis length in the Y axis frame of the FP CCD array [$\Delta Y_{FP\ spot}$]** nominal value is 12.5 µm	(1.e-9) m	4	ul	1
20	**Size of LUT giving the star spectrum location on the CCD arrays**	-	4	uc	4
21	**CCD columns for the specification of the star location in the CCD arrays**	-	128	us	4*16
22	**CCD lines for the specification of the star location in the CCD arrays**	-	256	fl	4*16
23	**Nominal CCD column of the star spot centre (FP) [$k_{FP\ 0}$ (fc)]** nominal is column 8 fc=FP1, FP2	-	2	uc	2
24	**Nominal CCD line of the star spot centre (FP) [$n_{FP\ 0}$ (fc)]** nominal is line 7 fc=FP1, FP2	-	2	uc	2
25	**Wavelength assignment of the lowest used CCD column for SPA CCD1 [$\lambda_{min\ c\ ,\ c=SPA1}$]** nominal is 250	(1.e-3) nm	4	ul	1
26	**Wavelength assignment of the lowest used CCD column for SPA CCD2 [$\lambda_{min\ c\ ,\ c=SPA2}$]** nominal is 390	(1.e-3) nm	4	ul	1
27	**Wavelength assignment of the lowest used CCD column for SPB CCD1 [$\lambda_{min\ c\ ,\ c=SPB1}$]** nominal is 756	(1.e-3) nm	4	ul	1
28	**Wavelength assignment of the lowest used CCD column for SPB CCD2 [$\lambda_{min\ c\ ,\ c=SPB2}$]** nominal is 926	(1.e-3) nm	4	ul	1
29	**Size of the spectral dispersion LUT [np_{disp}]**	-	1	uc	1
30	**Wavelength values for the spectral dispersion LUT [λ_{disp}]**	(1.e-3) nm	120	ul	30

N	Description	Unit	Byte Length	Data Type	Dim.
31	**Spectral dispersion of the spectrometers as a function of the wavelength LUT [TBdisp]**	(1.e-3) nm/ mm	120	ul	30
32	**Lower wavelength of the band of FP1 [λFP min (fc)]** nominal is 470 nm, fc = FP1 Nominal values differs only slightly. It is recommended to verify and convert.	(1.e-3) nm	4	ul	1
33	**Higher wavelength of the band of FP1[λFP max (fc)]** nominal is 520 nm, fc=FP1 Nominal values differs only slightly. It is recommended to verify and convert.	(1.e-3) nm	4	ul	1
34	**Lower wavelength of the band of FP2 [λFP min (fc)]** nominal is 650 nm, fc = FP1 Nominal values differs only slightly. It is recommended to verify and convert.	(1.e-3) nm	4	ul	1
35	**Higher wavelength of the band of FP2 [λFP max (fc)]** nominal is 700 nm, fc=FP2 Nominal values differs only slightly. It is recommended to verify and convert.	(1.e-3) nm	4	ul	1
36	**Size of the FP transmission curves**	-	2	uc	2
37	**Wavelength of the FP transmission curves**	(1.e-3) nm	256	ul	2*32
38	**FP transmission curves**	%	256	fl	2*32
39	**Size of the slit transmission LUT**	-	1	uc	1
40	**Angles for the slit transmission LUT** nominal is 0°	(1.e-6) deg	40	sl	10
41	**Slit transmission LUT** nominal is a transmission of 1.0	(1.e-4)	20	us	10
42	**Size of the LUT for the conversion between spectrometers and photometers** nominal is 1 point	-	2	uc	2
43	**Spectral grid for the transformation between electrons received by the spectrometers and by the photometers** The dimension 2*10 is for the 2 fast photometers (order FP1, FP2) and 10 is the maximum number of entries of the LUT	(1.e-3) nm	80	ul	2*10
44	**Transformation between electrons received by spectrometers and electrons received by photometers** The dimension 2*10 is for the 2 fast photometers (order FP1, FP2) and 10 is the maximum number of entries of the LUT	-	80	fl	2*10
45	**Size of the radiometric sensitivity LUT (star spectra)**	-	1	uc	1
46	**Spectral grid of the radiometric sensitivity LUT (limb spectra)**	(1.e-3) nm	512	ul	128
47	**Radiometric sensitivity LUT (limb spectra)**	lf per e	512	fl	128
48	**Size of the radiometric sensitivity LUT (star spectra)**	-	1	uc	1

N	Description	Unit	Byte Length	Data Type	Dim.
49	**Spectral grid of the radiometric sensitivity LUT (star spectra)**	(1.e-3) nm	512	ul	128
50	**Radiometric sensitivity LUT (star spectra)**	sf per e	512	fl	128
51	**Relative spectral orientation of the CCD wrt to the column index**	-	4	sc	4
52	**Relative orientation of the CCD wrt the SATU** Dimension 6*2 is for the 6 CCD (in the order SPA1, SPA2, SPB1, SPB2, FP1, FP2), for azimuth and elevation angles. The order is SPA1 azimuth, SPA1 elevation, SPA2 azimuth, ..., FP2 elevation.	-	12	sc	6*2
53	**Number of azimuth angles used to define the vignetting LUT**	-	1	uc	1
54	**Azimuth angles used to define the vignetting LUT**	(1.e-2) deg	14	ss	7
55	**Number of elevation angles used to define the vignetting LUT**	-	1	uc	1
56	**Elevation angles used to define the vignetting LUT**	(1.e-2) deg	10	ss	5
57	**Vignetting LUT**	%	35	uc	5*7
58	**Number of azimuth angles for which a reflectivity LUT is specified**	-	1	uc	1
59	**Number of elevation angles for which a reflectivity LUT is specified**	-	1	uc	1
60	**Azimuth angles for the reflectivity LUT**	deg	64	fl	16
61	**Elevation angles for the reflectivity LUT**	deg	20	fl	5
62	**Size of the reflectivity LUT**	-	1	uc	1
63	**Wavelengths used to define the reflectivity LUT**	nm	256	fl	64
64	**Reflectivity LUT**	(1.e-2) % / deg	10240	ss	5*16*64
65	**Number of instable measurements at the beginning of the occultation**	-	4	ul	1
66	**SATU window shift during the wavelength calibration**	-	4	uc	1
67	**Percentage of total star signal on the central and background bands**	%	48	fl	4*3
68	**Spare**	-	57	uc	57
TOTAL (in bytes)			**14322**		

Note:
If field #58 (Number of azimuth angles for which a reflectivity LUT is specified) is equal to 0, it is assumed that a single LUT covering all CCD pixels is provided in the ADF. In this case, the field #64 has to be read as a single vector where the first 2336 columns are the reflectivity LUT values. The wavelengths of the reflectivity LUT have to be set to the reference wavelengths (nominal spectral grid of the CCDs). Both the number of elevation and azimuth angles must be set to 1 and the corresponding angles must be set to 0. The size of the reflectivity LUT has to be set to 2336.

10.6.2.1.2 Bad Pixels GADS

The Bad Pixels GADS is described below:

Table 10.6-7 Layout of the Bad Pixels GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Number of bad pixels in the SPA CCD1 [$np_{bad}(c)$, c=SPA1]**	-	1	uc	1
2	**Column index of the bad pixels of SPA CCD1 [$k_{bad}(c)(np)$, c=SPA1]**	-	256	us	128
3	**Line index of the bad pixels of SPA CCD1 [$n_{bad}(c)(np)$, c=SPA1]**	-	128	uc	128
4	**Number of bad pixels in the SPA CCD2 [$np_{bad}(c)$, c=SPA2]**	-	1	uc	1
5	**Column index of the bad pixels of SPA CCD2 [$k_{bad}(c)(np)$, c=SPA2]**	-	256	us	128
6	**Line index of the bad pixels of SPA CCD2 [$n_{bad}(c)(np)$, c=SPA2]**	-	128	uc	128
7	**Number of bad pixels in the SPB CCD1 [$np_{bad}(c)$, c=SPB1]**	-	1	uc	1
8	**Column index of the bad pixels of SPB CCD1 [$k_{bad}(c)(np)$, c=SPB1]**	-	256	us	128
9	**Line index of the bad pixels of SPB CCD1 [$n_{bad}(c)(np)$, c=SPB1]**	-	128	uc	128
10	**Number of bad pixels in the SPB CCD2 [$np_{bad}(c)$, c=SPB2]**	-	1	uc	1
11	**Column index of the bad pixels of SPB CCD2 [$k_{bad}(c)(np)$, c=SPB2]**	-	256	us	128
12	**Line index of the bad pixels of SPB CCD2 [$n_{bad}(c)(np)$, c=SPB2]**	-	128	uc	128
13	**Number of bad pixels in FP1 [$np_{FP\ bad}(fc)$, fc=FP1]**	-	1	uc	1
14	**Column index of the bad pixels of FP1 [$k_{FP\ bad}(fc)$, fc=FP1]**	-	16	uc	16
15	**Line index of the bad pixels of FP1 [$n_{FP\ bad}(fc)$, fc=FP1]**	-	16	uc	16
16	**Number of bad pixels in FP2 [$np_{FP\ bad}(fc)$, fc=FP2]**	-	1	uc	1
17	**Column index of the bad pixels of FP2 [$k_{FP\ bad}(fc)$, fc=FP2]**	-	16	uc	16
18	**Line index of the bad pixels of FP2 [$n_{FP\ bad}(fc)$, fc=FP2]**	-	16	uc	16
19	*Spare*	-	64	uc	64
TOTAL (in bytes)		**-**	**1670**	**-**	

10.6.2.1.3 Non-Linearity Function GADS

The layout of the Non-Linearity Function GADS is described below:

Table 10.6-8 Layout of the Non-linearity Functions GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Spectrometer A electronic chain gain** four values are specified (one per gain) for each CCD. Order: SPA1 (resp. SPB1) gain 0, 1, 2 and 3 then SPA2 (resp. SPB2) gain 0, 1, 2, 3	(1.e-3) e/ADU	32	ul	2*4
2	**Spectrometer B electronic chain gain** dimension follows the same rules used for the field concerning Spectrometer A.	(1.e-3) e/ADU	32	ul	2*4
3	**Photometers electronic chain gain [$G_{FP}(fc,r)$]** dimension 2 is for the 2 photometers.	(1.e-3) e/ADU	8	ul	2
4	**ADC offsets for the spectrometers [$ADC_0(c)$, c = SPA1..SPB2]** dimension 4*4 is for the 4 spectrometer CCDs and for the 4 gains.	(1.e-1) ADU	32	us	4*4
5	**ADC offset for photometers [$ADC_{FP\ 0}$ (fc), fc = FP1, FP2]**	(1.e-1) ADU	4	us	2
6	**Non-linearity look-up table for SPA CCD 1 [$TB_{nlin}(c,r,g)$]** dimension 4*4096 is for the nominal mode and the 4 gains. The first 4096 values are the factors for the first gain. The next 4096 values are for the second gain.	(1.e-2) %	32768	ss	4* 4096
7	**Non-linearity look-up table for SPA CCD 2 [$TB_{nlin}(c,r,g)$]** dimension follows the same rules used for the field concerning CCD1.	(1.e-2) %	32768	ss	4* 4096
8	**Non-linearity look-up table for SPB CCD 1 [$TB_{nlin}(c,r,g)$]** dimension follows the same rules used for the field concerning SPA CCD1.	(1.e-2) %	32768	ss	4* 4096
9	**Non-linearity look-up table for SPB CCD 2 [$TB_{nlin}(c,r,g)$]** dimension follows the same rules used for the field concerning CCD1.	(1.e-2) %	32768	ss	4* 4096
10	**Non-linearity look-up table for FP1 [$TB_{FP\ nlin}(fc,r)$]**	(1.e-2) %	8192	ss	4096
11	**Non-linearity look-up table for FP2 [$TB_{FP\ nlin}(fc,r)$]**	(1.e-2) %	8192	ss	4096
12	**Detection chain offset for the spectrometers [$N_{off}(c)$]**	(1.e-1) e	16	ul	4
13	**Detection chain offset for the fast photometers [$N_{off\ FP}(c)$]**	(1.e-1) e	8	ul	2
14	*Spare*	-	32	uc	32
TOTAL (in bytes)		**-**	**147620**	**-**	

Note:

In the database, the non-linearity factors are expressed in percentage of nonlinearity. They are converted into ratios of non-linearity.

10.6.2.1.4 Fast Photometer Dark Charge Maps GADS

The Fast Photometer Dark Charge Maps GADS is described below:

Table 10.6-9 Layout of the Fast Photometer Dark Charge Maps GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Index of the first CCD line for the spectrometers dark charge maps [I_{DC}]**	-	4	uc	4
2	**Spectrometers dark charge maps width (in number of lines) [n_{DC}]**	-	1	uc	1
3	**Size of the thermistor coding LUT [$np_{temp}(c)$ and $np_{FP\ temp}(fc)$]** there is one look-up table per CCD array (4 LUT for the spectrometers ordered SPA1, SPA2, SPB1, SPB2, and 2 LUT for the photometers ordered FP1 and FP2).	-	6	uc	6
4	**Abscissae of the thermistor coding LUT [$X_{temp}(c)$ and $X_{FP\ temp}(fc)$]** there is one look-up table per CCD array (4 LUT for the spectrometers and 2 LUT for the photometers, order SPA1, SPA2, SPB1, SPB2, FP1, FP2). The first 64 values are the LUT for the spectrometer A CCD 1.	ADU	768	us	6*64
5	**Thermistor coding LUT [$TB_{temp}(c)$ and $TB_{FP\ temp}(fc)$]** there is one look-up table per CCD array (4 LUT for the spectrometers and 2 LUT for the photometers, order SPA1, SPA2, SPB1, SPB2, FP1, FP2). The first 64 values are the LUT for the spectrometer A CCD 1.	(1.e-2) °C	768	ss	6*64
6	**Thermistor reference temperature for the spectrometers dark charge maps [$TB_{ref\ therm}(c)$]**	(1.e-3) K	16	ul	4
7	**Thermistor reference temperature for the photometers dark charge maps [$TB_{FPref\ therm}(fc)$]**	(1.e-3) K	8	ul	2
8	**Offset between the thermistor temperature and the CCD temperature [$T_{off\ therm}(c)$, $T_{FP,off\ therm}(fc)$]** the first 4 values are for the spectrometers and the 2 last values are for the photometers (order : SPA1, SPA2, SPB1, SPB2, FP1, FP2).	(1.e-3) °C	12	ss	6
9	**SPA1 dark charge at band level at the**	e	16236	fl	3*1353

N	Description	Units	Byte Length	Data Type	Dim.
	thermistor reference temperature				
10	**SPA2 dark charge at band level at the thermistor reference temperature**	e	16236	fl	3*1353
11	**SPB1 dark charge at band level at the thermistor reference temperature**	e	16236	fl	3*1353
12	**SPB2 dark charge at band level at the thermistor reference temperature**	e	16236	fl	3*1353
13	**Dark charge map at the thermistor reference temperature FP_Tref for the photometer FP1 [$DC_{FPref\ k,n}(fc)$, fc=FP1]** dimension 14*14 is for each pixel of the fast photometers CCD array. The first 14 values are for the first line of the FP CCD array.	(1.e-1) e	784	ul	14*14
14	**Dark charge map at the thermistor reference temperature FP_Tref for the photometer FP2 $DC_{FPref\ k,n}(fc)$, fc=FP2]** dimension 14*14 is for each pixel of the fast photometers CCD array. The first 14 values are for the first line of the FP CCD array.	(1.e-1) e	784	ul	14*14
15	**Temperature variation which doubles the dark charge for FP1 [$\Delta T_{FP\ k,n}(fc)$, fc=FP1]** dimension 14*14 is for each pixel of the fast photometers CCD array. The first 14 values are for the first line of the FP CCD array.	(1.e-3) K	392	us	14*14
16	**Temperature variation which doubles the dark charge for FP2 [$\Delta T_{FP\ k,n}(fc)$, fc=FP2]** dimension 14*14 is for each pixel of the fast photometers CCD array. The first 14 values are for the first line of the FP CCD array.	(1.e-3) K	392	us	14*14
17	*Spare*	-	16	uc	16
TOTAL (in bytes)		**-**	**68895**	**-**	

Note:

The spectrometer dark charge maps are stored in the "MDS of the Dark Charge Maps".

10.6.2.1.5 Fast Photometer Non-uniformity Maps GADS

The Non-uniformity Maps GADS is described below:

Table 10.6-10 Layout of the Fast Photometer Non-uniformity Maps GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Index of the first CCD line for the spectrometer non-uniformity maps [I_{Nu}]**	-	4	uc	4
2	**Spectrometers non-uniformity maps width (in number of lines) [n_{Nu}]**	-	1	uc	1
3	**Spectrometer SPA1 non-uniformity (band level)** 1353 PRNU values are provided for each band of each CCD (order upper, central and lower bands).	-	16236	fl	3*1353
4	**Spectrometer SPA2 non-uniformity (band level)** 1353 PRNU values are provided for each band of each CCD (order upper, central and lower bands).	-	16236	fl	3*1353
5	**Spectrometer SPB1 non-uniformity (band level)** 1353 PRNU values are provided for each band of each CCD (order upper, central and lower bands).	-	16236	fl	3*1353
6	**Spectrometer SPB2 non-uniformity (band level)** 1353 PRNU values are provided for each band of each CCD (order upper, central and lower bands).	-	16236	fl	3*1353
7	**Slit width variation**	-	2288	fl	4*143
8	**FP1 relative pixel response non-uniformity [$q^{FP}_{k,n}$(fc) fc=FP1]** dimension 14*14 is for each pixel of the fast photometers CCD array. The first 14 values are for the first line of the FP CCD array.	(1.e-4)	392	us	14*14
9	**FP2 relative pixel response non-uniformity [$q^{FP}_{k,n}$(fc) fc=FP2]** dimension 14*14 is for each pixel of the fast photometers CCD array. The first 14 values are for the first line of the FP CCD array.	(1.e-4)	392	us	14*14
10	*Spare*	-	16	uc	16
TOTAL (in bytes)		**-**	**68037**	**-**	

Note:
The intra-pixel non-uniformity map can be specified in the "Spectrometer nonuniformity maps MDS".
In this case, the "Spectrometer non-uniformity maps width" (field #2) must be set to 33 (the fixed size of the spectrometer PRNU map) + the number of lines of the intra-pixel non-uniformity map. If the maps width is equal to 33, it is assumed that there is no specified intra-pixel non-uniformity map (intra-pixel PRNU) and the corresponding correction is not activated during the processing.
Example: if field #2 is set to 79, it means that the intra-pixel PRNU is activated during the processing using the last 46 lines (79-33) of the field #2 (PRNU map specified in the Spectrometer Non-Uniformity Maps MDS). The 33 first lines are used for the nominal PRNU correction during the processing.

10.6.2.1.6 Fast Photometer Straylight GADS

The Straylight GADS is described below:

Table 10.6-11 Layout of the Fast Photometer Straylight GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Number of CCD regions for the reduced straylight maps (spatial and spectral directions)**	-	2	uc	2
2	**Number of CCD pixels per region (spatial and spectral directions)**	-	2	uc	2
3	**First column index for the reduced straylight maps**	-	8	us	4
4	**First line index for the reduced straylight maps**	-	8	us	4
5	**Reduced internal straylight map for SPA CCD 1 [$LUT_{internal\ straylight}$]**	e	8160	fl	136*15
6	**Reduced internal straylight map for SPA CCD 2 [$LUT_{internal\ straylight}$]**	e	8160	fl	136*15
7	**Reduced internal straylight map for SPB CCD 1 [$LUT_{internal\ straylight}$]**	e	8160	fl	136*15
8	**Reduced internal straylight map for SPB CCD 2 [$LUT_{internal\ straylight}$]**	e	8160	fl	136*15
9	**Full internal straylight map for FP1 [$LUT_{FP\ ist}$]**	e	784	fl	14*14
10	**Full internal straylight map for FP2 [$LUT_{FP\ ist}$]**	e	784	fl	14*14
11	*Spare*	-	10	uc	10
TOTAL (in bytes)		**-**	**34228**	**-**	

Note:

*136*15 allows the storage of 136 pixels in the spatial direction and 15 in the spectral direction. The order is : {first column, first line}, {first column, second line}, {first column, third line}, ... , {second column, first line}, {second column, second line}, ...*

10.6.2.1.7 Instrument Noise GADS

The Instrument Noise GADS is described below:

Table 10.6-12 Layout of the Instrument Noise GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Spectrometers electronic chain noise [$n_0(c)$]** nominal is 100 electrons dimension 4*4 is for the 4 CCD arrays of the spectrometers A and B and for the 4 possible gains.	(1.e-1) e	32	us	4*4
2	**Photometers electronic chain noise [$fp\_n_0(fc)$]**	(1.e-1) e	4	us	2
3	**Size of the Spectrometers noise LUT[$np_{noise\ c}$ (g)]** dimension 4*4 is for the 4 CCD arrays of the spectrometers A and B and for the 4 possible gains.	-	16	uc	4*4
4	**Abscissae of the Spectrometers noise LUT [$X_{noise\ c}$ (g)]**	ADU	2048	us	4*4*64

N	Description	Units	Byte Length	Data Type	Dim.
	dimension 4*4*64 is for the 4 CCD arrays of the spectrometers A and B (SPA1, SPA2, SPB1, SPB2) and for the 4 possible gains. 64 is the maximum number of entries of the look-up table. The first 64 values are for the first gain. The next 64 values are for the second gain.				
5	**Spectrometers noise LUT [$TB_{noise\ c}$ (g)]** dimension 4*4*64 is for the 4 CCD arrays of the spectrometers A and B and for the 4 possible gains. 64 is the maximum number of entries of the look-up table. The first 64 values are for the first gain. The next 64 values are for the second gain.	e	4096	fl	4*4*64
6	**Size of the Photometers noise LUT** dimension 2 is for the 2 photometers FP1 and FP2.	-	2	uc	2
7	**Abscissae of the Photometers noise LUT** dimension 2*64 is for the 2 photometers FP1 and FP2. 64 is the maximum number of entries of the look-up table. The first 64 values are for FP1. The next 64 values are for FP2.	ADU	256	us	2*64
8	**Photometers noise LUT** dimension 2*64 is for the 2 photometers FP1 and FP2. 64 is the maximum number of entries of the look-up table. The first 64 values are for FP1. The next 64 values are for FP2.	e	512	fl	2*64
9	**Start Julian date for the correction of the modulation**	-	2	us	1
10	**Modulation signal amplitude**	ADU	64	fl	4*4
11	*Spare*	-	16	uc	16
TOTAL (in bytes)		**-**	**7048**	**-**	

10.6.2.1.8 Spectrometer Dark Charge Maps MDS

This MDS is made of several MDS records (one MDSR per CCD line). The first MDSR is provided for the CCD line number found in the Dark charge maps GADS. The number of MDSRs is given in the Data Set Descriptor of this MDS but also in the Dark charge maps GADS. This is a convenient way to allow the storage of the maps for the useful CCD lines only.

The nominal values for these parameters are 1 for the first CCD line and 143 for the number of CCD lines.

The layout of each MDSR is described below:

Table 10.6-13 Layout of the Spectrometer Dark Charge Maps MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Spectrometer A CCD1 dark charge map at the thermistor reference temperature [$\tilde{DC}_{ref\ k',n'}$ (c), c=SPA1]**	(1.e-1) e	5412	ul	1353
4	**Spectrometer A CCD2 dark charge map at the thermistor reference temperature [$\tilde{DC}_{ref\ k',n'}$ (c), c=SPA2]**	(1.e-1) e	5412	ul	1353
5	**Spectrometer B CCD1 dark charge map at the thermistor reference temperature [$\tilde{DC}_{ref\ k',n'}$ (c), c=SPB1]**	(1.e-1) e	5412	ul	1353
6	**Spectrometer B CCD2 dark charge map at the thermistor reference temperature [$\tilde{DC}_{ref\ k',n'}$ (c), c=SPB2]**	(1.e-1) e	5412	ul	1353
7	**Temperature variation which doubles the dark charge (SPA CCD 1) [$\Delta\tilde{T}_{SP\ k',n'}$(c) c=SPA1]**	(1.e-3) K	2706	us	1353
8	**Temperature variation which doubles the dark charge (SPA CCD 2) [$\Delta\tilde{T}_{SP\ k',n'}$(c) c=SPA2]**	(1.e-3) K	2706	us	1353
9	**Temperature variation which doubles the dark charge (SPB CCD 1) [$\Delta\tilde{T}_{SP\ k',n'}$(c) c=SPB1]**	(1.e-3) K	2706	us	1353
10	**Temperature variation which doubles the dark charge (SPB CCD 2) [$\Delta\tilde{T}_{SP\ k',n'}$(c) c=SPB2]**	(1.e-3) K	2706	us	1353
11	*Spare*	-	32	uc	32
TOTAL (in bytes)		**-**	**32517**	**-**	

10.6.2.1.9 Spectrometer Non-uniformity Maps MDS

This MDS is made of several MDS records (one MDSR per CCD line). The first MDSR is provided for the CCD line number found in the Non-uniformity maps GADS. The number of MDSRs is given in the Data Set Descriptor of this MDS but also in the Non-uniformity maps GADS. This is a convenient way to allow the storage of the maps for the useful CCD lines only.

The nominal values for these parameters are 1 for the first CCD line and 143 for the number of CCD lines.

The layout of each MDSR is described below:

Table 10.6-14 Layout of the Spectrometers Non-uniformity Maps MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**SPA CCD1 pixel relative response non-uniformity [~ $q_{k',n'}(c)$, c=SPA1]**	(1.e-4)	2706	us	1353
4	**SPA CCD 2 pixel relative response non-uniformity [~ $q_{k',n'}(c)$, c=SPA2]**	(1.e-4)	2706	us	1353
5	**SPB CCD 1 pixel relative response non-uniformity [~ $q_{k',n'}(c)$, c=SPB1]**	(1.e-4)	2706	us	1353
6	**SPB CCD 2 pixel relative response non-uniformity [~ $q_{k',n'}(c)$, c=SPB2]**	(1.e-4)	2706	us	1353
7	*Spare*	-	32	uc	32
MDS TOTAL (in bytes)		**-**	**10869 (*)**	**-**	

Note:
The intra-pixel non-uniformity map can be specified in the "Spectrometer nonuniformity maps MDS". The size of the map is specified by the "Spectrometer nonuniformity maps width" minus 33 (see the "Fast photometer non-uniformity maps GADS" above).
The first 33 records of fields 3 to 6 represent the nominal pixel response nonuniformity maps while the remaining last lines represent the intra-pixel nonuniformity maps.

(*) Size when PRNU has 33 records (so, if no intra-pixel PRNU is specified)

10.6.2.1.10 External Sun Straylight Map MDS

This MDS is made of several MDS records (one MDSR per Sun-star angle). The number of MDSRs is specified in the Data Set Descriptor of this MDS (nominal value is 10 MDSRs).

The layout of each MDSR is described below:

Table 10.6-15 Layout of the External Sun Straylight Map MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Sun-star angle**	deg	4	fl	1
4	**Reduced external Sun straylight map for SPA CCD 1 [$LUT_{sun\ straylight}$]**	e	8160	fl	136*15
5	**Reduced external Sun straylight map for SPA CCD 2 [$LUT_{sun\ straylight}$]**	e	8160	fl	136*15
6	**Reduced external Sun straylight map for SPB CCD 1 [$LUT_{sun\ straylight}$]**	e	8160	fl	136*15
7	**Reduced external Sun straylight map for SPB**	e	8160	fl	136*15

N	Description	Units	Byte Length	Data Type	Dim.
	CCD 2 [LUT$_{\text{sun straylight}}$]				
8	**Full external Sun straylight map for FP1 [LUT$_{\text{FP sst}}$]**	e	784	fl	14*14
9	**Full external Sun straylight map for FP2 [LUT$_{\text{FP sst}}$]**	e	784	fl	14*14
10	*Spare*	-	16	uc	16
TOTAL (in bytes)		**-**	**34241**	**-**	

Note:

*136*15 allows the storage of 136 pixels in the spatial direction and 15 in the spectral direction. The order is : {first column, first line}, {first column, second line}, {first column, third line}, ... , {second column, first line}, {second column, second line}, ...*

10.6.2.1.11 External Earth Straylight Map MDS

This MDS is made of several MDS records (one MDSR per tangent-point altitude). The number of MDSRs is specified in the Data Set Descriptor of this MDS (nominal value is 10 MDSRs).

The layout of each MDSR is described below:

Table 10.6-16 Layout of the External Earth Straylight Map

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Altitude**	m	4	fl	1
4	**Reduced external Earth straylight map for SPA CCD 1 [LUT$_{\text{earth straylight}}$]**	e	8160	fl	136*15
5	**Reduced external Earth straylight map for SPA CCD 2 [LUT$_{\text{earth straylight}}$]**	e	8160	fl	136*15
6	**Reduced external Earth straylight map for SPB CCD 1 [LUT$_{\text{earth straylight}}$]**	e	8160	fl	136*15
7	**Reduced external Earth straylight map for SPB CCD 2 [LUT$_{\text{earth straylight}}$]**	e	8160	fl	136*15
8	**Full external Earth straylight map for FP1 [LUT$_{\text{FP est}}$]**	e	784	fl	14*14
9	**Full external Earth straylight map for FP2 [LUT$_{\text{FP est}}$]**	e	784	fl	14*14
10	*Spare*	-	16	uc	16
TOTAL (in bytes)		**-**	**34241**	**-**	

Note:

*136*15 allows the storage of 136 pixels in the spatial direction and 15 in the spectral direction. The order is : {first column, first line}, {first column, second line}, {first column, third line}, ... , {second column, first line}, {second column, second line}, ...*

10.6.3 Level 1b Processing Configuration

This file contains all the configuration parameters of the different algorithms used during the Level 1b processing. Some parameters are thresholds which are used to raise flags during the processing. These flags will be written in the Level 1b and Limb products.

FILE ID: GOM_PR1_AX

TYPE: Auxiliary

USE: Used for Level 1B processing

UPDATED: infrequently

SIZE (in bytes): MPH (1247) + SPH (658) + DSs (446) = 2351 bytes

10.6.3.1 Format

The high-level breakdown of the file is described here below:

MPH
Auxiliary Data SPH (refer to Volume 16) with 2 DSDs: *DSD for General GADS* *DSD for Atmosphere GADS*
Level 1b processing configuration - General GADS
Level 1b processing configuration - Atmosphere GADS

The following strings will be used in the field DS_NAME for the DSDs listed in the SPH above.

Table 10.6-17 Level 1b Processing Configuration - DS_NAME Strings

DSD	DS_NAME String
DSDs for included Data Sets	
DSD (G) - General GADS	PR1_GENERAL
DSD (G) - Atmosphere GADS	PR1_ATMOSPHERE

10.6.3.1.1 General GADS

The General GADS is described below:

Table 10.6-18 Layout of the Level 1b Processing Configuration File General GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Cosmic rays processing activation flag [CR$_{mode}$]** value: 0 : no detection 1 : absolute variation 2 : relative variation	-	1	uc	1
2	**Modulation correction switch** value: 0 : no correction 1 : modulation correction	-	1	uc	1
3	**Dark charge correction processing activation flag [DC$_{mode}$]** value: 0 : no correction 1 : use DC maps 2 : use first measurements 3: use DC maps from ADF	-	1	uc	1
4	**Internal straylight correction activation flag [OK$_{ist}$]** value: 0 : correction 1 : no correction	-	1	uc	1
5	**External earth straylight correction activation flag [OK$_{earth}$]** value: 0 : correction 1 : no correction	-	1	uc	1
6	**External sun straylight correction activation flag [OK$_{sun}$]** value: 0 : correction 1 : no correction	-	1	uc	1
7	**Central background estimation mode [OK$_{back}$]** value: 0 : no correction 1 : linear interpolation 2 : exponential interpolation 3 : general method	-	1	uc	1
8	**SATU data use activation flag [OK$_{SATU}$]** value: 0 : do not use SATU data 1 : use SATU data	-	1	uc	1
9	**Vignetting activation flag** value: 0 : do not perform vignetting 1 : perform vignetting	-	1	uc	1
10	**Flat-field correction mode [OK$_{flat}$]** value: 0 : no flat-field correction 1 : flat-field correction active 2 : use FP data	-	1	uc	1
11	**Flat-field correction flag** value: 0 : correction	-	4	uc	4

N	Description	Units	Byte Length	Data Type	Dim.
	1 : no correction				
12	**Interpolation mode for spectra resampling [OK_{spline}]** value: 0 : cubic spline 1 : linear interpolation	-	1	uc	1
13	**Spectral grid selection for transmission computation** value: 0 : acquisition spectral grid 1 : nominal spectral grid	-	1	uc	1
14	**Covariance computation mode [COV_{mode}]** 0 : computed from the star spectra 1 : computed from a covariance LUT	-	1	uc	1
15	**Non-linearity correction activation flag** value: 0 : correction 1 : no correction	-	1	uc	1
16	**Reflectivity correction activation flag** value: 0 : correction 1 : no correction	-	1	uc	1
17	*Spare*	-	2	uc	2
18	**Identifier of Earth model [ID_{earth}]** 0 : WGS84 model	-	1	uc	1
19	**Flattening of the Earth [F_{earth}]** nominal value is 0.003353	-	4	fl	1
20	**Earth equatorial radius [r_{equ}]** nominal value is 6378.1370 km	m	4	fl	1
21	**Atmosphere thickness [Δh_{atm}]** nominal value is 150 km	m	4	fl	1
22	**Earth orbit eccentricity [e_S]** nominal is 0.0166781	-	4	fl	1
23	**Gravitational constant for the sun [G_{sun}]** nominal is 1.3271249e+20 m^3/s^2	m^3/s^2	4	fl	1
24	**Angle between the vernal axis and the Earth orbit perihelion direction [α_o]** nominal is 102.78 deg	deg	4	fl	1
25	**Earth orbit semi-major axis [R_S]** nominal is 149.5986e+09 m	m	4	fl	1
26	**Speed of light [c]** nominal is 299792458 m/s	m/s	4	ul	1
27	**Parameters for the determination of the occultation type (full dark/bright/twilight/straylight)** Only the 5 first values are useful: 1. TGP altitude threshold for bright limb condition (km)	-	32	fl	8

N	Description	Units	Byte Length	Data Type	Dim.
	ñ nominal is 50 km 2. TGP sun zenith angle threshold for bright limb condition (deg) ñ nominal is 97 deg 3. TGP altitude threshold for twilight condition (km) ñ nominal is 100 km 4. TGP sun zenith angle threshold for twilight condition (deg) ñ nominal is 110 deg 5. Satellite sun zenith angle threshold for straylight condition (deg) ñ nominal is 120 deg				
28	*Spare*	-	8	uc	8
29	**Ray tracing parameters [rt_{param}]** 10 values are read in the database	-	40	fl	10
30	**Time shift for ray tracing computation [Δtrt]** nominal is 0.25 s	(1.e-3) s	4	ul	1
31	**Minimum wavelength value for ray-tracing [$\lambda_{rt\ min}$]** nominal value is 250 nm	(1.e-3) nm	4	ul	1
32	**Maximum wavelength value for ray-tracing [$\lambda_{rt\ max}$]** nominal value is 1000 nm	(1.e-3) nm	4	ul	1
33	**Reference wavelength for the ray tracing [$\lambda_{rt\ ref}$]** nominal value is 500 nm	(1.e-3) nm	4	ul	1
34	*Spare*	-	8	uc	8
35	**Spectrometer sample saturation level [SAT_{ADC}]** one amplitude level is specified for each gain of each spectrometer. Order: SPA1 gains 0, 1, 2, 3 followed by SPA2 gains 0, 1, 2, 3 and then SPB1 and SPB2	ADU	32	us	4*4
36	**Photometer data saturation level [$SAT_{FP\ ADC}$]** nominal is 4095 (FP1 and FP2)	ADU	4	us	2
37	**Half-number of measurements for CR detection [k_{med}]** nominal is 0	-	1	uc	1
38	**Half-number of CCD columns for CR detection [f_{med}]** nominal is 2	-	1	uc	1
39	**Threshold for relative variation of the signal for cosmic rays detection [$thrCR_{rel}$]** nominal is 100% for all gains	%	16	uc	4*4
40	**Threshold for absolute variation of the signal for cosmic rays detection [$thrCR_{abs}$]** nominal is nominal is 50 ADU for gain 0, 1, 3 and 200 ADU for gain 2 (Sirius)	ADU	32	us	4*4
41	**Threshold for cosmic rays detection activation [CR_{min}]** minimum sample value for which the cosmic rays	ADU	32	us	4*4

N	Description	Units	Byte Length	Data Type	Dim.
	detection processing is applied. nominal is 10				
42	**Number of frames for dark charge estimation [f_{dark}]** nominal is 10	-	1	uc	1
43	**Threshold for background correction (dark limb) [$thr_{back\ dl}$]** nominal is 0	e	4	ul	1
44	**Threshold for background correction (bright limb) [$thr_{back\ bl}$]** nominal is 0	e	4	ul	1
45	**Altitude range used in the estimated central background computation (general method) [Δh]** nominal is 3.0 km	m	4	ul	1
46	**Order of the polynomial used in the estimated central background computation (general method) [nd]** nominal is 3	-	1	uc	1
47	**Photometer index for the scintillation correction in the flat-field correction processing [$f_{FF\ c}$]** nominal is FP1	-	2	us	1
48	*Spare*	-	8	uc	8
49	**Number of measurements to be used for the reference star spectrum computation [f_{ref}]** nominal is 10	-	2	us	1
50	**Maximum number of star spectra used to be checked for the computation of the reference star spectrum[$f_{ref\ max}$]** nominal is 20	-	2	us	1
51	**Minimum number of star spectra used to compute the reference star spectrum before a flag is raised[$f_{ref\ min}$]** nominal is 3	-	2	us	1
52	**Threshold for the validity of the reference star spectrum** Nominal is 0 electrons	e	8	us	4
53	**Number of neighbouring pixels flagged if the reference star spectrum is below the validity threshold** Nominal is 0	-	4	uc	4
54	**Threshold for MPH error indicator computation** Nominal is 90%	(1.e-2) %	4	ul	1
55	**Minimum altitudes for the computation of the reference star spectrum** Nominal is 105 km	km	16	ul	4
56	*Spare*	-	8	uc	8
TOTAL (in bytes)			**346**		

10.6.3.1.2 Atmosphere GADS

The Atmosphere GADS is described below:

Table 10.6-19 Layout of the Level 1b Processing Configuration File Atmosphere GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Standard acceleration of gravity[g_0]** nominal value is 9.80665 ms^{-2}	$m.s^{-2}$	4	fl	1
2	**Reference pressure[P_0]** nominal value is P_0 = 1000 hPa	hPa	4	fl	1
3	**Air density in standard conditions of temperature and pressure (T=288K, P=reference pressure)**	kg/m^3	4	fl	1
4	**Absolute Reference pressure [$P_{0,ref}$]** nominal value is $P_{0,ref} = 10^5$ Pa	Pa	4	fl	1
5	**Avogadro number [η]** nominal value is η=6.022098 10^{23} $mole^{-1}$	$mole^{-1}$	4	fl	1
6	**Universal gas constant[R]** nominal value is R=8.314 J/mole/K	J/mole/K	4	fl	1
7	**Molecular weight of the dry air [M]** nominal value is M=28.964 10^{-3} kg/mole	kg/mole	4	fl	1
8	**Reference pressure level values [$P_{ref,lev}$]** nominal values are: 1000, 925, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 29, 24, 16, 12-9, 7, 5, 3, 2, 1	hPa	84	fl	21
9	**Number of altitude grid points for lower part of the atmosphere [n1]** nominal value is n1=31	-	2	us	1
10	**Number of altitude grid points for upper part of the atmosphere [n2]** nominal value is n2=35	-	2	us	1
11	**Minimum altitude for lower part of the atmosphere [$Z_{1,ref}$]** nominal value is $Z_{1,ref}$=0 km	km	4	fl	1
12	**Minimum altitude for upper part of the atmosphere [$Z_{2,ref}$]** nominal value is $Z_{2,ref}$ =27.5 km	km	4	fl	1
13	**Altitude step for lower part of the atmosphere [dZ_1]** nominal value is dZ_1=1 km	km	4	fl	1
14	**Altitude step for upper part of the atmosphere [dZ_2]** nominal value is dZ_2=2.5 km	km	4	fl	1
15	**Number of pressure levels for lower part of the atmosphere [nlev1]**	-	2	us	1

N	Description	Units	Byte Length	Data Type	Dim.
	nominal value is 15				
16	**Number of pressure levels for upper part of the atmosphere [nlev2]** nominal value is 26	-	2	us	1
17	**Index of the reference level for the iterative verification of hydrostaticity [nlev3]** nominal value is 9	-	2	us	1
18	**Index for the spatial resolution [ires]** used only in case of ECMWF data unavailability ires=0 : low resolution ires=1 : high resolution	-	2	ss	1
19	**Initial latitude value for the spatial grid (ref.) [$\theta_{0,ref}$]** nominal value is -90°	10^{-6} deg	4	sl	1
20	**Initial longitude value for the spatial grid (ref.) [$\Psi_{0,ref}$]** nominal value is 0°	10^{-6} deg	4	sl	1
21	**Reference discretisation step in latitude[$\Delta\theta_{ref}$]** nominal value is: $\Delta\theta_{ref}(1)$=1.125° (high resolution) $\Delta\theta_{ref}(0)$=2.5° (low resolution)	deg	4	fl	1
22	**Reference discretisation step in longitude [$\Delta\Psi_{ref}$]** nominal value is: $\Delta\Psi_{ref}(1)$=1.125° (high resolution) $\Delta\Psi_{ref}(0)$=2.5° (low resolution)	deg	4	fl	1
23	**Threshold for the convergence of the iterative process [H_{thresh}]** nominal value is 1 m	m	4	fl	1
24	**Maximum iteration number for the iterative process [k_{max}]** nominal value is 10	-	2	us	1
25	**Delta angle for the atmosphere zone in the occultation area** nominal value is 0.1 deg	deg	4	fl	1
26	**Transition height expressed in number of atmospheric scale heights** nominal value is 6	-	4	fl	1
27	**Size of the reference atmospheric profile[$N_{n\rho}$]** nominal is 101 points	-	2	us	1
28	**First altitude of the profile [$h_{n\rho min}$]** nominal is 0 km	km	4	fl	1

N	Description	Units	Byte Length	Data Type	Dim.
29	**Altitude discretisation [δhnρ]** nominal is 1 km	km	4	fl	1
30	*Spare*	-	64	uc	64
TOTAL (in bytes)		**-**	**244**	**-**	

10.6.4 Star Catalogue File

This file contains the Star Catalogue used by the Level 1b processing chain. The star catalogue contains all the stars of the general star catalogue Hipparcos up to magnitude 4.5 (898 stars), planets (Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune), the Moon, and a set of dark areas. Each target is annotated with information such as: name, location, magnitude, temperature, parallax, quality indicators... This catalogue is used for the geolocation of the data and quality check.

FILE ID: GOM_CAT_AX

TYPE: Auxiliary

USE: Used for Level 1B processing

UPDATED: infrequently

SIZE (in bytes): MPH (1247) + SPH (938) + DSs (423995) = 426180 bytes.

10.6.4.1 Format

The high-level breakdown of the file is described here below. The following strings will be used in the field DS_NAME for the DSDs listed in the SPH above.

MPH
Auxiliary Data SPH (refer to Volume 16) with 3 DSDs: *DSD for the General GADS* *DSD for the Star Catalogue Annotation GADS* *DSD for the Star Catalogue MDS*
Star Catalogue -General GADS
Star Catalogue - Annotation GADS
Star Catalogue - MDS (one MDSR per star)

Table 10.6-20 Star Catalogue File - DS_NAME Strings

DSD	DS_NAME String
DSDs for included Data Sets	
DSD (G) - General GADS	CAT_GENERAL
DSD (G) - Star Catalogue Annotation GADS	CAT_ANNOTATION
DSD (M) - Star Catalogue MDS	CAT_STAR_INFORMATION

10.6.4.1.1 General GADS

The General GADS is described below:

Table 10.6-21 Star Catalogue File - Layout of the General GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Number of stars in the Star Catalogue**	-	4	ul	1
2	*Spare*	-	8	uc	8
TOTAL (in bytes)		**-**	**12**	**-**	

10.6.4.1.2 Annotation GADS

The Annotation GADS is described below:

Table 10.6-22 Star Catalogue File - Layout of the Annotation GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Number of input star catalogues**	-	1	uc	1
2	**Filenames of the input star catalogue**	-	320	uc	10*32
3	**Filename of the dark areas list**	-	32	uc	32
4	*Spare*	-	8	uc	8
5	**Minimum temperature for tracking**	K	4	fl	1
6	**Maximum temperature for tracking**	K	4	fl	1
7	*Spare*	-	8	uc	8
8	**Magnitude threshold for minimum temperature (red stars)**	-	4	fl	1
9	**Magnitude threshold for maximum temperature (blue stars)**	-	4	fl	1
10	*Spare*	-	8	uc	8
11	**Maximum angular separation under which a 'double' star is considered as one target by the star detector**	deg	4	fl	1
12	**Distance between 2 stars to identify a 'single' or a**	deg	4	fl	1

N	Description	Units	Byte Length	Data Type	Dim.
	'multiple' (outer cone)				
13	**Magnitude difference between 2 stars to identify a 'single' or a 'multiple' (outer cone)**	-	4	fl	1
14	**Distance between 2 stars to identify a 'single' or a 'multiple' (inner cone)**	deg	4	fl	1
15	**Magnitude difference between 2 stars to identify a 'single' or a 'multiple' (inner cone)**	-	4	fl	1
16	*Spare*	-	8	uc	8
17	**Maximum brightness variability for a star to be in the GOMOS star catalogue**	%	4	fl	1
18	**Period for maximum variability for a star to be in the GOMOS star catalogue**	s	4	fl	1
19	*Spare*	-	8	uc	8
20	**Magnitude detection limit for dark areas**	-	4	fl	1
21	**FOV detection cone radius for dark areas**	deg	4	fl	1
22	**Magnitude detection limit for single/double stars**	-	4	fl	1
23	*Spare*	-	8	uc	8
TOTAL (in bytes)		**-**	**457**	**-**	

10.6.4.1.3 Star Catalogue File MDS

The MDS is made of several MDS records (one MDSR for each star). The layout of each MDSR is described below:

Table 10.6-23 Star Catalogue File - Layout of the MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Data Quality indicator (set to -1 if all values in MDSR are zero, set to zero otherwise)*	-	1	sc	1
3	**Star identifier in the GOMOS catalogue [ID_{star}]**	-	4	ul	1
4	**Hipparcos Input Catalogue**	-	4	ul	1
5	**Component(s) considered**	-	4	uc	4
6	**Satellite target**	-	1	uc	1
7	**HD/HDE number**	-	4	ul	1
8	**BD number**	-	13	uc	13
9	**CD number**	-	13	uc	13
10	**CPD number**	-	13	uc	13
11	**FK5**	-	7	uc	7
12	**AGK3/CPC number**	-	10	uc	10
13	**SAO number**	-	4	ul	1
14	**First of the two selected identifiers**	-	9	uc	9

N	Description	Units	Byte Length	Data Type	Dim.
15	**Second of the two selected identifiers**	-	11	uc	11
16	**Star Identifier**	-	13	uc	13
17	**Right ascension hours (JD2000)**	hours	4	ul	1
18	**Right ascension minutes (JD2000)**	minutes	4	ul	1
19	**Right ascension seconds (JD2000)**	seconds	4	fl	1
20	**Declination degrees (JD2000)**	deg	4	sl	1
21	**Declination arcmin (JD2000)**	arcmin	4	ul	1
22	**Declination arcsec (JD2000)**	arcsec	4	fl	1
23	**Right ascension decimal degrees (JD2000) [α_{star}]**	deg	4	fl	1
24	**Declination decimal degrees (JD2000) [δ_{star}]**	deg	4	fl	1
25	**Mean error of the right ascension**	milliarcsec	4	fl	1
26	**Mean error of the declination**	milliarcsec	4	fl	1
27	**Source of position**	-	1	uc	1
28	**Right ascension hours (B1950)**	hours	4	ul	1
29	**Right ascension minutes (B1950)**	minutes	4	ul	1
30	**Right ascension seconds (B1950)**	seconds	4	fl	1
31	**Declination degrees (B1950)**	deg	4	sl	1
32	**Declination arcmin (B1950)**	arcmin	4	ul	1
33	**Declination arcsec (B1950)**	arcsec	4	fl	1
34	**Epoch for the position (years)**	years	4	ul	1
35	**Galactic latitude (decimal degrees)**	10^{-6} deg	4	sl	1
36	**Galactic longitude (decimal degrees)**	10^{-6} deg	4	sl	1
37	**Ecliptic latitude (decimal degrees)**	10^{-6} deg	4	sl	1
38	**Ecliptic longitude (decimal degrees)**	10^{-6} deg	4	sl	1
39	**Magnitude in the Hipparcos photometric system**	-	4	fl	1
40	**V magnitude [mv_{star}]**	-	4	fl	1
41	**Error of V magnitude**	-	4	fl	1
42	**B-V**	-	4	fl	1
43	**Error of B-V**	-	4	fl	1
44	**Source of photometry**	-	1	uc	1
45	**Variability code 1**	-	1	uc	1
46	**Variability code 2**	-	1	uc	1
47	**CCDM number**	-	10	uc	10
48	**Components considered**	-	2	uc	2
49	**Position angle (degrees) between the components**	deg	4	uc	4
50	**Separation (arcsec) between the components considered**	arcsec	4	fl	1
51	**Magnitude difference between the components**	-	4	fl	1

N	Description	Units	Byte Length	Data Type	Dim.
	considered				
52	**Multiplicity type**	-	1	uc	1
53	**Variable star name**	-	9	uc	9
54	**Type of variability**	-	3	uc	3
55	**Period of variation (days)**	days	4	fl	1
56	**V magnitude at maximum luminosity**	-	4	fl	1
57	**V magnitude at minimum luminosity**	-	4	fl	1
58	**Coded error of the V**	-	1	uc	1
59	**Code specifying the magnitudes**	-	1	uc	1
60	**Parallax**	milli-arcsec	4	sl	1
61	**Probable error of parallax**	milli-arcsec	4	ul	1
62	**Type of parallax**	-	1	uc	1
63	**Proper motion in right ascension**	arcsec/year	4	fl	1
64	**Proper motion in declination**	arcsec/year	4	fl	1
65	**Error of the proper motion in right ascension**	milli-arcsec/ year	4	fl	1
66	**Error of the proper motion in declination**	milli-arcsec/ year	4	fl	1
67	**Source of proper motion**	-	1	uc	1
68	**Radial velocity (km/s)**	km/s	4	fl	1
69	**Quality of radial velocity**	-	1	uc	1
70	**Source of radial velocity**	-	1	uc	1
71	**Spectral type and luminosity class**	-	11	uc	11
72	**Source of the spectral type data**	-	1	uc	1
73	**Survey/identification chart**	-	1	uc	1
74	**Hr number**	-	4	ul	1
75	**Star Name (BSC catalogue) (N_{star})**	-	25	uc	25
76	**U-B on Johnson system**	-	4	fl	1
77	**R-I on Johnson system**	-	4	fl	1
78	**vsini km/s (Projected rotational velocities)**	km/s	5	uc	5
79	**Effective temperature (T_{star})**	K	4	ul	1
80	**Quality codes 1**	-	10	uc	10
81	**Quality codes 2**	-	10	uc	10
82	*Spare*	-	28	uc	28
TOTAL (in bytes)		**-**	**421**	**-**	

10.6.5 Stellar Spectra File

This data base contains the stellar spectra that are used as quality control and also as back-up of the reference spectra computed with star spectra

measured outside the atmosphere.

FILE ID: GOM_STS_AX

TYPE: Auxiliary

USE: Used for Level 1B processing

UPDATED: infrequently

SIZE (in bytes): MPH (1247) + SPH(1498) + DS (11 265 932) = 11 268 677 bytes*

* : The size of this file is a function of the number of stars. The calculation above assumes 900 stars in the file.

10.6.5.1 Format

The high-level breakdown of the file is described here below:

MPH
Auxiliary Data SPH (refer to Volume 16) with 5 DSDs: *DSD for the General GADS* *DSD for the Annotation GADS* *DSD for the Star information MDS* *DSD for the Star spectrum MDS* *DSD for the Star Catalogue file (R)*
Stellar Spectra Databank - General GADS
Stellar Spectra Databank -Annotation GADS
Stellar Spectra Databank - Star Information MDS (one MDSR per star)
Stellar Spectra Databank - Star Spectrum MDS (one MDSR per star)

The following strings will be used in the field DS_NAME for the DSDs listed in the SPH above.

Table 10.6-24 Stellar Spectra Databank File - DS_NAME Strings

DSD	DS_NAME String
DSDs for included Data Sets	
DSD (G) - General GADS	STS_GENERAL
DSD (G) - Annotation GADS	STS_ANNOTATION
DSD (M) - Star information MDS	STS_STAR_INFORMATION
DSD (M) - Star spectrum MDS	STS_STAR_SPECTRUM
DSDs for reference files	
DSD (R) - Star Catalogue File	STAR_CATALOGUE_REFERENCE

10.6.5.1.1 General GADS

The General GADS is described below:

Table 10.6-25 Stellar Spectra Databank File - Layout of the General GADS

N	Description	Unit	Byte Length	Data Type	Dim.
1	**Number of targets in the Stellar Spectra Databank**	-	2	us	1
2	**Index of the stellar spectrum versus the GOMOS star identifier [$id_{sdb}(i)$]**	-	2048	ss	1024
3	*Spare*	-	16	uc	16
TOTAL (in bytes)			**2066**		

10.6.5.1.2 Annotation GADS

The Annotation GADS is described below:

Table 10.6-26 Stellar Spectra Databank File - Layout of the Annotation GADS

N	Description	Unit	Byte Length	Data Type	Dim.
1	**Number of input star catalogues**	-	1	uc	1
2	**Filenames of the input star catalogue**	-	320	uc	10*32
3	**File name of the dark areas list**	-	32	uc	32
4	*Spare*	-	8	uc	8
5	**Minimum temperature for tracking**	K	4	fl	1
6	**Maximum temperature for tracking**	K	4	fl	1
7	*Spare*	-	8	uc	8
8	**Magnitude threshold for minimum temperature (red stars)**	-	4	fl	1
9	**Magnitude thresholds for minimum temperature (blue stars)**	-	4	fl	1
10	*Spare*	-	8	uc	8
11	**Maximum angular separation under which a 'double' star is considered as one target by the star detector**	deg	4	fl	1
12	**Distance between 2 stars to identify a 'single' or a 'multiple' (outer cone)**	deg	4	fl	1
13	**Magnitude difference between 2 stars to identify a 'single' or a 'multiple' (outer cone)**	-	4	fl	1
14	**Distance between 2 stars to identify a 'single' or a 'multiple' (inner cone)**	deg	4	fl	1
15	**Magnitude difference between 2 stars to identify a 'single' or a 'multiple' (inner cone)**	-	4	fl	1

N	Description	Unit	Byte Length	Data Type	Dim.
16	*Spare*	-	8	uc	8
17	**Maximum brightness variability for a star to be in the GOMOS star catalogue**	%	4	fl	1
18	**Period for maximum variability for a star to be in the GOMOS star catalogue**	s	4	fl	1
19	*Spare*	-	8	uc	8
20	**Magnitude detection limit for dark areas**	-	4	fl	1
21	**FOV detection cone radius for dark areas**	deg	4	fl	1
22	**Magnitude detection limit for single/double stars**	-	4	fl	1
23	*Spare*	-	8	uc	8
TOTAL (in bytes)		**-**	**457**	**-**	

10.6.5.1.3 Star Information MDS

This MDS is made of several MDS records (one MDSR for each star). The layout of each MDSR is described below.

The MDSR layout of the star information MDS of the stellar spectra product is identical to the MDSR layout of the star catalogue MDS. However, since there might be different stars in the star catalogue and in the stellar spectra product, the two MDSs might be different. In addition, the stellar spectra product should be self-standing, i.e.it should contain the star parameters associated to the spectra, hence the need for the star information MDS.

Table 10.6-27 Stellar Spectra Databank File - Layout of the Star Information MDS

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Data Quality indicator (set to -1 if all values in MDSR are zero, set to zero otherwise)*	-	1	sc	1
3	**Star identifier in the GOMOS catalogue [ID_{star}]**	-	4	ul	1
4	**Hipparcos Input Catalogue**	-	4	ul	1
5	**Component(s) considered**	-	4	uc	4
6	**Satellite target**	-	1	uc	1
7	**HD/HDE number**	-	4	ul	1
8	**BD number**	-	13	uc	13
9	**CD number**	-	13	uc	13
10	**CPD number**	-	13	uc	13
11	**FK5**	-	7	uc	7
12	**AGK3/CPC number**	-	10	uc	10
13	**SAO number**	-	4	ul	1
14	**First of the two selected identifiers**	-	9	uc	9
15	**Second of the two selected identifiers**	-	11	uc	11

N	Description	Units	Byte Length	Data Type	Dim.
16	**Star Identifier**	-	13	uc	13
17	**Right ascension hours (JD2000)**	hours	4	ul	1
18	**Right ascension minutes (JD2000)**	minutes	4	ul	1
19	**Right ascension seconds (JD2000)**	seconds	4	fl	1
20	**Declination degrees (JD2000)**	deg	4	sl	1
21	**Declination arcmin (JD2000)**	arcmin	4	ul	1
22	**Declination arcsec (JD2000)**	arcsec	4	fl	1
23	**Right ascension decimal degrees (JD2000) [α_{star}]**	deg	4	fl	1
24	**Declination decimal degrees (JD2000) [δ_{star}]**	deg	4	fl	1
25	**Mean error of the right ascension**	milliarcsec	4	fl	1
26	**Mean error of the declination**	milliarcsec	4	fl	1
27	**Source of position**	-	1	uc	1
28	**Right ascension hours (B1950)**	hours	4	ul	1
29	**Right ascension minutes (B1950)**	minutes	4	ul	1
30	**Right ascension seconds (B1950)**	seconds	4	fl	1
31	**Declination degrees (B1950)**	deg	4	sl	1
32	**Declination arcmin (B1950)**	arcmin	4	ul	1
33	**Declination arcsec (B1950)**	arcsec	4	fl	1
34	**Epoch for the position (years)**	years	4	ul	1
35	**Galactic latitude (decimal degrees)**	10^{-6} deg	4	sl	1
36	**Galactic longitude (decimal degrees)**	10^{-6} deg	4	sl	1
37	**Ecliptic latitude (decimal degrees)**	10^{-6} deg	4	sl	1
38	**Ecliptic longitude (decimal degrees)**	10^{-6} deg	4	sl	1
39	**Magnitude in the Hipparcos photometric system**	-	4	fl	1
40	**V magnitude [mv_{star}]**	-	4	fl	1
41	**Error of V magnitude**	-	4	fl	1
42	**B-V**	-	4	fl	1
43	**Error of B-V**	-	4	fl	1
44	**Source of photometry**	-	1	uc	1
45	**Variability code 1**	-	1	uc	1
46	**Variability code 2**	-	1	uc	1
47	**CCDM number**	-	10	uc	10
48	**Components considered**	-	2	uc	2
49	**Position angle (degrees) between the components**	deg	4	uc	4
50	**Separation (arcsec) between the components considered**	arcsec	4	fl	1
51	**Magnitude difference between the components considered**	-	4	fl	1
52	**Multiplicity type**	-	1	uc	1

N	Description	Units	Byte Length	Data Type	Dim.
53	**Variable star name**	-	9	uc	9
54	**Type of variability**	-	3	uc	3
55	**Period of variation (days)**	days	4	fl	1
56	**V magnitude at maximum luminosity**	-	4	fl	1
57	**V magnitude at minimum luminosity**	-	4	fl	1
58	**Coded error of the V**	-	1	uc	1
59	**Code specifying the magnitudes**	-	1	uc	1
60	**Parallax**	milli-arcsec	4	sl	1
61	**Probable error of parallax**	milli-arcsec	4	ul	1
62	**Type of parallax**	-	1	uc	1
63	**Proper motion in right ascension**	arcsec/year	4	fl	1
64	**Proper motion in declination**	arcsec/year	4	fl	1
65	**Error of the proper motion in right ascension**	milli-arcsec/year	4	fl	1
66	**Error of the proper motion in declination**	milli-arcsec/year	4	fl	1
67	**Source of proper motion**	-	1	uc	1
68	**Radial velocity (km/s)**	km/s	4	fl	1
69	**Quality of radial velocity**	-	1	uc	1
70	**Source of radial velocity**	-	1	uc	1
71	**Spectral type and luminosity class**	-	11	uc	11
72	**Source of the spectral type data**	-	1	uc	1
73	**Survey/identification chart**	-	1	uc	1
74	**Hr number**	-	4	ul	1
75	**Star Name (BSC catalogue) (N_{star})**	-	25	uc	25
76	**U-B on Johnson system**	-	4	fl	1
77	**R-I on Johnson system**	-	4	fl	1
78	**vsini km/s (Projected rotational velocities)**	km/s	5	uc	5
79	**Effective temperature (T_{star})**	K	4	ul	1
80	**Quality codes 1**	-	10	uc	10
81	**Quality codes 2**	-	10	uc	10
82	*Spare*	-	28	uc	28
TOTAL (in bytes)		**-**	**421**	**-**	

10.6.5.1.4 Star Spectrum MDS

This MDS is made of several MDS records (one MDSR for each star). The layout of each MDSR is described below:

Table 10.6-28 Stellar Spectra Databank File - Layout of the Star Spectrum MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Identifier of the star in the star catalogue**	-	4	sc	1
4	**Spectrum origin**	-	128	uc	128
5	**Size of the star spectrum**	-	2	us	1
6	**Wavelength assignment**	nm	12000	fl	3000
7	**Star spectrum**	sf	12000	fl	3000
8	*Spare*	-	64	uc	64
TOTAL (in bytes)		**-**	**24211**	**-**	

10.6.6 Level 2 Processing Configuration File

This file contains all the configuration parameters of the different algorithms used during the Level 2 processing including thresholds used by the different algorithms of the Level 2 processing chain. Most of these thresholds are used to set flags during the processing; these flags will be written in the Level 2 file.

FILE ID: GOM_PR2_AX

TYPE: Auxiliary

USE: Used for Level 2 processing

UPDATED: infrequently

SIZE (in bytes): MPH (1247) + SPH (2618) + DSs (22423) = 26288 Bytes

10.6.6.1 Format

The high-level breakdown of the file is described here below:

MPH
Auxiliary Data SPH (refer to Volume 16) with 9 DSDs
DSD for the Atmosphere GADS
DSD for the General GADS
DSD for the Convergence criteria GADS
DSD for the Convergence criteria MDS
DSD for the Reference line densities MDS
DSD for Group of species (initialisation phase) MDS
DSD for Group of species MDS
DSD for Spectral windows (initialisation phase) MDS
DSD for Spectral windows MDS

Level 2 processing configuration - Atmosphere GADS
Level 2 processing configuration - General GADS
Level 2 processing configuration - Convergence criteria GADS
Level 2 processing configuration - Convergence criteria MDS (one MDSR per altitude)
Level 2 processing configuration - Reference line densities MDS (one MDSR per altitude)
Level 2 processing configuration - Group of species (initialisation phase) MDS (one MDSR per altitude)
Level 2 processing configuration - Group of species MDS (one MDSR per altitude)
Level 2 processing configuration - Spectral windows (initialisation phase) MDS (one MDSR per altitude)
Level 2 processing configuration - Spectral windows MDS (one MDSR per altitude)

The following strings will be used in the field DS_NAME for the DSDs listed in the SPH above.

Table 10.6-29 Level 2 Processing Configuration File - DS_NAME Strings

DSD	DS_NAME String
DSDs for included Data Sets	
DSD (G) -Atmosphere GADS	PR2_ATMOSPHERE
DSD (G) - General GADS	PR2_GENERAL
DSD (G) - Convergence criteria GADS	PR2_CONV_CRITERIA_GADS
DSD (M) - Convergence criteria MDS	PR2_CONV_CRITERIA_MDS
DSD (M) - Reference line densities MDS	PR2_REF_LINES_DENSITIES
DSD (M) - Group of species (initialisation phase) MDS	PR2_GROUP_OF_SPECIES_INIT
DSD (M) - Group of species MDS	PR2_GROUP_OF_SPECIE
DSD (M) - Spectral windows (initialisation phase) MDS	PR2_SPECTRAL_WINDOWS_INIT
DSD (M) - Spectral windows MDS	PR2_SPECTRAL_WINDOWS

10.6.6.1.1 Atmosphere GADS

The Atmosphere GADS is described below:

Table 10.6-30 Atmosphere GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Standard acceleration of gravity[g_0]** nominal value is 9.80665 ms^{-2}	$m.s^{-2}$	4	fl	1
2	**Air density in standard conditions of temperature and pressure (T=288K,**	kg/m^3	4	fl	1

N	Description	Units	Byte Length	Data Type	Dim.
	P=reference pressure) nominal value is 1.225 kgm^{-3}				
3	**Absolute Reference pressure [$P_{0,ref}$]** nominal value is $P_{0,ref} = 10^5$ Pa	Pa	4	fl	1
4	**Avogadro number [η]** nominal value is $\eta=6.022098\ 10^{23}\ mole^{-1}$	$mole^{-1}$	4	fl	1
5	**Universal gas constant[R]** nominal value is R=8.314 J/mole/K	J/mole/K	4	fl	1
6	**Molecular weight of the dry air [M]** nominal value is $M=28.964\ 10^{-3}$ kg/mole	kg/mole	4	fl	1
7	**O2 contribution to air density [χ_{02}]** nominal value is 0.209476	-	4	fl	1
8	**Pressure at the top of the atmosphere [P_{top}]** nominal value is 0.000043 Pa	Pa	4	fl	1
9	**Limit value for the relative variation of density [ρ_{thresh}]** nominal value is 10^{-5}	-	4	fl	1
10	**Maximum number of iteration for the iterative process [nmax]** nominal value is 20	-	2	us	1
11	**Number of GOMOS source data (used in GAP)** nominal value is 0 maximum value is 7	-	1	uc	1
12	**Activation flag for GOMOS source data (used in GAP)** 7 values are read value = 0: disabled value = 1: activated nominal values are: 0 0 0 0 0 0 0 Flag1 - Rayleigh extinction Flag2 - Oxygen absorption from spectrometer B Flag3 - Refractive dilution including scintillations Flag4 - Time delay between the two photometers Flag5 - O3 cross sections Flag6 - Angle of refraction from star pointer Flag7 - Rayleigh scattering from day-time background spectra	-	7	uc	7
13	**Weighting factor on O_2 data (used in GAP)** nominal value is 1	-	4	fl	1
14	*Spare*	-	64	uc	64
TOTAL (in bytes)		**-**	**114**	**-**	

10.6.6.1.2 General GADS

The Parameters GADS is described below:

Table 10.6-31 Level 2 Processing Configuration File - Layout of the General GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Chromatic refraction mode for the measured transmission [NFCR]** 0 = no correction (default) 1 = correction performed	-	1	uc	1
2	**Chromatic refraction mode for transmission model [NFCR2$_0$, NFCR2$_1$]** the 1st parameter is for the 2nd spectral inversion, and the 2nd one if for the third and subsequent spectral inversions. 0 = no correction 1 = correction performed (default)	-	2	uc	2
3	**Instrument function mode for the transmission model and modelling error activation switch [NFI$_0$, err_mod]** the 1st parameter is for the 2nd spectral inversion, and the 2nd one if for the third and subsequent spectral inversions. **NFI$_0$ value** 0 = no correction 1 = correction performed (default) **err_mod value** 0 = not computed 1 = computed (default)	-	2	uc	2
4	**Inversion mode [NFSV] : Spectral inversion mode Vertical Inversion mode (always in linear mode)** 0 = spectral inversion global (no GDI) 1 = spectral inversion global GDI NO_2 2 = spectral inversion global GDI NO_2+NO_3 (default)	-	1	uc	1
5	**Smoothing mode (during the vertical inversion) [NFS]** 0 = No smoothing 1 =Gaussian filter 2 = Tikhonov's regularisation	-	1	uc	1
6	**Time mode in the transmission model [NFT$_0$, NFT$_1$]** the 1st parameter is for the 2nd spectral inversion, and the 2nd one if for the third and subsequent spectral inversions.	-	2	uc	2

N	Description	Units	Byte Length	Data Type	Dim.
	0 = zero order term 1 = second order term (default)				
7	**Choice of atmospheric model for SPB (02 and H20 transmissions) [natmB]** 0 = US 76 standard (default) 1 = model dependent on season + latitude	-	1	uc	1
8	**Maximum value of the occultation obliquity [ζmax]** nominal value is 5 deg	deg	4	fl	1
9	*Spare*	-	8	uc	8
10	**Identifier of Earth model [IDearth]** 0 : WGS84 model	-	1	uc	1
11	**Flattening of the Earth [fe]** nominal value is 0.003353	-	4	fl	1
12	**Earth equatorial radius [ae]** nominal value is 6378.1370 km	m	4	ul	1
13	**Atmosphere thickness [Δh_{atm}]** nominal value is 160 km	m	4	fl	1
14	*Spare*	-	8	uc	8
15	**Max. number of iterations for the ray deviation computation [Nδ]** nominal is 50	-	1	uc	1
16	**Threshold value for the ray deviation computation [εδ]** nominal is 1.e-8	deg	4	fl	1
17	**First altitude step for the ray tracing [ε]** 0.5 km	m	4	fl	1
18	**Altitude step for the ray tracing [Δh_0]** 0.2 km	m	4	fl	1
19	**Altitude sampling for density second derivative calculation** 0.1 km	m	4	fl	1
20	**Max. number of iterations for impact parameter computation** nominal is 50	-	1	uc	1
21	**Precision for impact parameter computation** 1.e-9 km	m	4	fl	1
22	**Minimum wavelength value for ray-tracing [$\lambda_{rt\ min}$]** nominal value is 200 nm	(1.e-3) nm	4	ul	1
23	**Maximum wavelength value for ray-tracing [$\lambda_{rt\ max}$]** nominal value is 1000 nm	(1.e-3) nm	4	ul	1

N	Description	Units	Byte Length	Data Type	Dim.
24	*Spare*	-	8	uc	8
25	**Altitude range for turbulence fluctuations processing [$h_{turb,min}$ $h_{turb,max}$]** nominal values are 10 and 50 km	m	8	fl	2
26	**Length of the cross-correlation window [corwin]** nominal value is150 m	m	4	fl	1
27	*Spare*	-	8	uc	8
28	**Number of altitudes for reference line density [$num_{z,ref}$]** nominal is 66: working parameter used to decode the reference line density ADS	-	1	uc	1
29	**Choice of atmospheric model for SPA (reference line density) [$natm_A$]** 0 = US 76 standard 1 = model dependent on latitude + season	-	1	uc	1
30	**Air reference line density computation model** 0 = computed from Level 1B data (default) 1 = use atmospheric model selected in field29	-	1	uc	1
31	**Total number of species for spectrometer A [$N_{species}$]** nominal value is 5	-	1	uc	1
32	**Number of species groups (initialisation phase) [NG_0]** nominal value is 5	-	1	uc	1
33	**Number of species groups (spectral inversion phase) [NG_1]** nominal value is 5	-	1	uc	1
34	**Number of altitudes for spectral windows [N_{SW}]** nominal value is 5	-	1	uc	1
35	**Hanning filter cut-off frequency (half extent) [H_{cutoff}]** nominal value is 3 km	m	4	fl	1
36	**Time sampling for the time delay computation** nominal value is 5 ms	ms	4	fl	1
37	**Air number density at sea level [N_0]** nominal value is 2.54697×10^{19}	cm^{-3}	4	fl	1
38	**Aerosol model selection** 0 = 1/λ model 1 = polynomial model (default)	-	1	uc	1
39	**Order of the polynomial aerosol model** nominal value is 1	-	1	uc	1

N	Description	Units	Byte Length	Data Type	Dim.
40	**Aerosol model coefficients [σ0, b]** nominal values are $3x10^{-7}$ and 1	cm^2 nm	8	fl	2
41	**DOAS sliding window size in pixels [Δp_{DOAS}]** nominal value is 17	-	2	us	1
42	**Maximum value of chi2 before a warning flag is raised [χ_{war}]** nominal value is 100	-	4	fl	1
43	**Number of atmosphere zones for Tikhonov regularisation (max=5)** nominal value is 2 A maximum of 5 values can be specified. Only the $2*n_{tikho}$ first values are used among the 5 read	-	1	uc	1
44	**Altitudes for Tikhonov regularisation (max=5)** nominal values are 30 and 40 km	m	40	fl	10
45	**Regularisation parameter for air (max=5) and associated vertical resolution** nominal values are 14.2 and 15.5 nominal values are 3 and 5 km 2 * 5 values are read. The first five contains Tikhonov regularisation parameters. The last five contain the vertical resolution at the boundaries of the altitude ranges. Only n_{tikho} data are relevant.	-	40	fl	10
46	**Regularisation parameter for aerosol (max=5) and associated vertical resolution** nominal values are 15.2 and 15.2 nominal values are 4 and 4 km 2 * 5 values are read. The first five contains Tikhonov regularisation parameters. The last five contain the vertical resolution at the boundaries of the altitude ranges. Only n_{tikho} data are relevant.	-	40	fl	10
47	**Regularisation parameter for O_3 (max=5) and associated vertical resolution** nominal values are 13.5 and 14.5 nominal values are 2 and 3 km 2 * 5 values are read. The first five contains Tikhonov regularisation parameters. The last five contain the vertical resolution at the boundaries of the altitude ranges. Only n_{tikho} data are relevant.	-	40	fl	10
48	**Regularisation parameter for NO_2 (max=5) and associated vertical resolution** nominal values are 15.2 and 15.2 nominal values are 4 and 4 km 2 * 5 values are read. The first five contains Tikhonov regularisation parameters. The last five contain the vertical resolution at the boundaries of the altitude ranges. Only n_{tikho} data are relevant.	-	40	fl	10
49	**Regularisation parameter for NO_3 (max=5) and associated vertical resolution**	-	40	fl	10

N	Description	Units	Byte Length	Data Type	Dim.
	nominal values are 15.2 and 15.2 nominal values are 4 and 4 km 2 * 5 values are read. The first five contains Tikhonov regularisation parameters. The last five contain the vertical resolution at the boundaries of the altitude ranges. Only n_{tikho} data are relevant.				
50	**Regularisation parameter for O_2 (max=5) and associated vertical resolution** nominal values are 14.2 and 15.5 nominal values are 3 and 5 km 2 * 5 values are read. The first five contains Tikhonov regularisation parameters. The last five contain the vertical resolution at the boundaries of the altitude ranges. Only n_{tikho} data are relevant.	-	40	fl	10
51	**Regularisation parameter for H_2O (max=5) and associated vertical resolution** nominal values are 15.2 and 15.2 nominal values are 4 and 4 km 2 * 5 values are read. The first five contains Tikhonov regularisation parameters. The last five contain the vertical resolution at the boundaries of the altitude ranges. Only n_{tikho} data are relevant.	-	40	fl	10
52	**Regularisation parameter for OClO and associated vertical resolution** nominal values are 15.2 and 15.2 nominal values are 0 and 0 km 2 * 5 values are read. The first five contains Tikhonov regularisation parameters. The last five contain the vertical resolution at the boundaries of the altitude ranges. Only n_{tikho} data are relevant.	-	40	fl	10
53	*Spare*	-	20	uc	20
54	**Turbulence parameters** Threshold value on fluctuation level for turbulent computation (nominal 1.5) Temporal range for searching the time delay (nominal 20 ms) Minimum value for time delay to compute meaningful refractivity (nominal : 0.005 ms) Altitude upper limit for GDI NO_2 (vertical occultations) (38 km) Slope GDI NO_2 (0.6 km/deg.) Obliquity limit for GDI NO_2 (20 deg) Altitude upper limit for GDI NO2 (occultations>obliquity limit) 50 km Altitude lower limit for GDI NO_3 (35 km) Altitude upper limit for GDI NO_3 (45 km) Obliquity limit for GDI NO_3 (10 deg)	dl, ms, ms, km, km/deg, deg, km, km, km, deg	40	fl	10
55	**Characteristic vertical length scale for**	m	4	fl	1

N	Description	Units	Byte Length	Data Type	Dim.
	Gaussian smoothing: half width at half maximum Expressed in km baseline is 1.5km				
56	**Flag for negative densities in LMA** 0: not used 1: used (default)	-	2	ss	1
57	**Photometer flag - scintillation processing** 0: blue 1: red (default)	-	2	ss	1
58	**Minimum value for transmission terms** nominal value is 1.e-30	-	4	fl	1
59	**Maximum value for transmission terms** nominal value is 1	-	4	fl	1
60	**Minimum value for optical thickness** nominal value is -10	-	4	fl	1
61	**Maximum value for optical thickness** nominal value is 20	-	4	fl	1
62	**Minimum value for column densities** nominal value is 1	cm^{-2}	4	fl	1
63	**Maximum value for column densities** nominal value is 1.e-30	cm^{-2}	4	fl	1
64	**Minimum value for local densities** nominal value is 1.e-8	cm^{-3}	4	fl	1
65	**Maximum value for local densities** nominal value is 1.e30	cm^{-3}	4	fl	1
66	**Maximum altitude for H_2O retrieval** nominal is 50 km	m	4	fl	1
67	**Scale factor (spectral inversion) for the elements of the covariance matrix written in the level 2 product** The covariance matrix terms are divided by 10^{FSCI} before being written into the product Nominal is 30 Correspondence between species and identifier number: 0: Rayleigh 1: Aerosol 2: O_3 3: NO_2 4: NO_3 5: O_2 6: H_2O 7:OClO	-	1	sc	1

N	Description	Units	Byte Length	Data Type	Dim.
68	**Scale factor (vertical inversion) for the elements of the covariance matrix written in the level 2 product** The covariance matrix terms are divided by $10^{FS\,CI}$ before being written into the product Nominal is 15 Correspondence between species and identifier number: 0: Rayleigh 1: Aerosol 2: O_3 3: NO_2 4: NO_3 5: O_2 6: H_2O 7:OClO	-	1	sc	1
69	*Spare*	-	16	uc	16
TOTAL (in bytes)		**-**	**619**	**-**	

10.6.6.1.3 Convergence Criteria GADS

The Convergence Criteria GADS is described below:

Table 10.6-32 Layout of the Convergence Criteria GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**Number of altitudes for all convergence criteria** the convergence criteria are provided on a number of discretised altitudes. nominal value is 55	-	1	uc	1
2	**Maximum number of iterations for the main loop** nominal value is 1	-	1	uc	1
3	**Maximum number of iterations for the inversion process** nominal value is 1	-	1	uc	1
4	**Maximum number of iterations for the spectral inversion of SPA** nominal value is 1	-	1	uc	1
5	**Maximum number of iterations for the spectral inversion of LMA** nominal value is 25	-	1	uc	1
6	**Maximum for relative standard deviation evolution** nominal value is 0.99	-	4	fl	1
7	*Spare*	-	4	uc	4
TOTAL (in bytes)		**-**	**13**	**-**	

10.6.6.1.4 Convergence Criteria MDS

This MDS is made of several MDS records (one MDSR for each altitude). The total number of altitudes is specified in the Convergence criteria GADS.

Table 10.6-33 Layout of the Convergence Criteria MDS

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Altitude of species dispersion for the error grid and for LMA criteria (provided in increasing order).**	m	4	fl	1
4	*Not used*	-	4	fl	1
5	**Density dispersion for turbulence error modelling for air**	cm^{-2}	4	fl	1
6	**Density dispersion for turbulence error modelling for aerosol**	cm^{-2}	4	fl	1
7	**Density dispersion for turbulence error modelling for O_3**	cm^{-2}	4	fl	1
8	**Density dispersion for turbulence error modelling for NO_2**	cm^{-2}	4	fl	1
9	**Density dispersion for turbulence error modelling for NO_3**	cm^{-2}	4	fl	1
10	**Density dispersion for turbulence error modelling for O_2**	cm^{-2}	4	fl	1
11	**Density dispersion for turbulence error modelling for H_2O**	cm^{-2}	4	fl	1
12	**Density dispersion for turbulence error modelling for OClO**	cm^{-2}	4	fl	1
13	*Spare*	-	8	uc	8
14	**Chi2 criteria value (for LMA)**	-	4	fl	1
15	*Spare*	-	4	uc	4
TOTAL (in bytes)		**-**	**69**	**-**	

10.6.6.1.5 Reference Line Densities MDS

This MDS is made of several MDS records (one MDSR for each altitude). The total number of altitudes is specified in the Parameters GADS.

Table 10.6-34 Layout of the Reference Line Densities MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Altitude**	m	4	fl	1
4	**Reference tangent line density for Air**	cm^{-2}	24	fl	6
5	**Reference tangent line density for Aerosols**	cm^{-2}	24	fl	6
6	**Reference tangent line density for O_3**	cm^{-2}	24	fl	6
7	**Reference tangent line density for NO_2**	cm^{-2}	24	fl	6
8	**Reference tangent line density for NO_3**	cm^{-2}	24	fl	6

N	Description	Units	Byte Length	Data Type	Dim.
9	**Reference tangent line density for O_2**	cm^{-2}	24	fl	6
10	**Reference tangent line density for H_2O**	cm^{-2}	24	fl	6
11	**Reference tangent line density for OCIO**	cm^{-2}	24	fl	6
12	*Spare*	-	48	uc	48
TOTAL (in bytes)		**-**	**257**	**-**	

Note:
There is a maximum of 6 reference atmospheric models. One of these models is selected during the processing as a function of the latitude and the season of the occultation:
1. *tropical;*
2. *mid-latitude summer;*
3. *mid-latitude winter;*
4. *sub-arctic summer;*
5. *sub-arctic winter;*
6. *US76 standard.*

10.6.6.1.6 Group of Species (Initialisation Phase) MDS

This MDS is made of several MDS records (one MDSR for each species group). The total number of groups for the initialisation phase is specified in the Parameters GADS.

The layout of each MDSR is described below:

Table 10.6-35 Layout of the Group of Species (Initialisation Phase) MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Inversion method choice (LMA=0, DOAS=1)**	-	1	uc	1
4	**Number of species**	-	1	uc	1
5	**Species list**	-	10	uc	10
6	*Spare*	-	8	uc	8
TOTAL (in bytes)		**-**	**33**	**-**	

10.6.6.1.7 Group of Species MDS

This MDS is made of several MDS records (one MDSR for each species group). The total number of groups is specified in the Parameters GADS. The layout of each MDSR is described below:

Table 10.6-36 Layout of the Group of Species MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Inversion method choice (LMA=0, DOAS=1)**	-	1	uc	1
4	**Number of species**	-	1	uc	1
5	**Species list**	-	10	uc	10
6	*Spare*	-	8	uc	8
TOTAL (in bytes)		**-**	**33**	**-**	

Note:

The Group of Species during the initialisation phase may be different from the Group of Species during the inversion process.

10.6.6.1.8 Spectral Windows (Initialisation Phase) MDS

This MDS is made of several MDS records (one MDSR for each altitude). The total number of altitudes is specified in the Parameters GADS.

The layout of each MDSR is described below:

Table 10.6-37 Layout of the Spectral Windows (Initialisation Phase) MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Altitude**	m	4	fl	1
4	**Number of spectral windows for Air**	-	1	uc	1
5	**Spectral window for Air**	nm	40	fl	2*5
6	**Number of spectral windows for Aerosols**	-	1	uc	1
7	**Spectral window for Aerosols**	nm	40	fl	2*5
8	**Number of spectral windows for O_3**	-	1	uc	1
9	**Spectral window for O_3**	nm	40	fl	2*5
10	**Number of spectral windows for NO_2**	-	1	uc	1
11	**Spectral window for NO_2**	nm	40	fl	2*5
12	**Number of spectral windows for NO_3**	-	1	uc	1
13	**Spectral window for NO_3**	nm	40	fl	2*5
14	**Number of spectral windows for O_2**	-	1	uc	1
15	**Spectral window for O_2**	nm	40	fl	2*5
16	**Number of spectral windows for H_2O**	-	1	uc	1

N	Description	Units	Byte Length	Data Type	Dim.
17	**Spectral window for H_2O**	nm	40	fl	2*5
18	**Number of spectral windows for OCIO**	-	1	uc	1
19	**Spectral window for OCIO**	nm	40	fl	2*5
20	*Spare*	-	82	uc	82
TOTAL (in bytes)		**-**	**427**	**-**	

Note:
The Spectral windows during the initialisation phase may be different from the Spectral windows during the inversion process.
*The dimension 2*5 stands for the lower and upper wavelength of the spectral window. A maximum of five spectral windows may be specified per species (for each altitude).*

10.6.6.1.9 Spectral Windows MDS

This MDS is made of several MDS records (one MDSR for each altitude). The total number of altitudes is specified in the Parameters GADS.
The layout of each MDSR is described below:

Table 10.6-38 Layout of the Spectral Windows MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Altitude**	m	4	fl	1
4	**Number of spectral windows for Air**	-	1	uc	1
5	**Spectral window for Air**	nm	40	fl	2*5
6	**Number of spectral windows for Aerosols**	-	1	uc	1
7	**Spectral window for Aerosols**	nm	40	fl	2*5
8	**Number of spectral windows for O_3**	-	1	uc	1
9	**Spectral window for O_3**	nm	40	fl	2*5
10	**Number of spectral windows for NO_2**	-	1	uc	1
11	**Spectral window for NO_2**	nm	40	fl	2*5
12	**Number of spectral windows for NO_3**	-	1	uc	1
13	**Spectral window for NO_3**	nm	40	fl	2*5
14	**Number of spectral windows for O_2**	-	1	uc	1
15	**Spectral window for O_2**	nm	40	fl	2*5
16	**Number of spectral windows for H_2O**	-	1	uc	1
17	**Spectral window for H_2O**	nm	40	fl	2*5
18	**Number of spectral windows for OCIO**	-	1	uc	1
19	**Spectral window for OCIO**	nm	40	fl	2*5
20	*Spare*	-	82	uc	82
TOTAL (in bytes)		**-**	**427**	**-**	

Note:
*The dimension 2*5 stands for the lower and upper wavelength of the spectral window. A maximum of five spectral windows may be specified per species (for each altitude).*

10.6.7 Cross-section File

This database contains the definition of the cross-section used in the Level 2 processing.

FILE ID: GOM_CRS_AX

TYPE: Auxiliary

USE: Used for Level 2 processing

UPDATED: infrequently

SIZE (in bytes): MPH (1247) + SPH (5418) + DSs (approx. 14 MBytes) = approx. 15 Mbytes

The size of this file is a function of the number of temperatures for the O_3, NO_2, NO_3, and OCLO cross-sections and the number of altitudes for the O_2 and H_2O transmissions. As a representative example, the size of a cross-section file will be close to 12.0 Mbytes.

10.6.7.1 Format

The high-level breakdown of the file is described here below:

MPH
Auxiliary Data SPH (refer to Volume 16) with 19 DSDs:
DSD for the O_3 cross-sections (SPA) GADS
DSD for the O_3 cross-sections (SPB) GADS
DSD for the NO_2 cross-sections GADS
DSD for the NO_3 cross-sections GADS
DSD for the OCLO cross-sections GADS
DSD for the O_2 transmissions GADS
DSD for the H_2O transmissions GADS
DSD for the O_3 cross-sections (SPA) MDS
DSD for the O_3 cross-sections (SPB) MDS
DSD for the NO_2 cross-sections MDS
DSD for the NO_3 cross-sections MDS
DSD for the OCLO cross-sections MDS
DSD for the O_2 transmissions MDS
DSD for the H_2O transmissions MDS
DSD-spare (279 blank space characters followed by 1 newline character)
DSD-spare (279 blank space characters followed by 1 newline character)
DSD-spare (279 blank space characters followed by 1 newline character)
DSD-spare (279 blank space characters followed by 1 newline character)
DSD-spare (279 blank space characters followed by 1 newline character)

Cross-sections - O_3 cross-sections (SPA) GADS
Cross-sections - O_3 cross-sections (SPB) GADS
Cross-sections - NO_2 cross-sections GADS
Cross-sections - NO_3 cross-sections GADS
Cross-sections - OCLO cross-sections GADS
Cross-sections - O_2 transmissions GADS
Cross-sections - H_2O transmissions GADS
Cross-sections - O_3 cross-sections (SPA) MDS (1 MDSR per temperature)
Cross-sections - O_3 cross-sections (SPB) MDS (1 MDSR per temperature)
Cross-sections - NO_2 cross-sections MDS (1 MDSR per temperature)
Cross-sections - NO_3 cross-sections MDS (1 MDSR per temperature)
Cross-sections - OCLO cross-sections MDS (1 MDSR per temperature)
Cross-sections - O_2 transmissions MDS (1 MDSR per altitude)
Cross-sections - H_2O transmissions MDS (1 MDSR per altitude)

The following strings will be used in the field DS_NAME for the DSDs listed in the SPH above.

Table 10.6-39 Cross-section File - DS_NAME Strings

DSD	DS_NAME String
DSDs for included Data Sets	
DSD (G) - O_3 cross-sections (SPA) GADS	CRS_O_3_CROSS_SECT_SPA_GADS
DSD (G) - O_3 cross-sections (SPB) GADS	CRS_O_3_CROSS_SECT_SPB_GADS
DSD (G) - NO_2 cross-sections GADS	CRS_NO_2_CROSS_SECT_GADS
DSD (G) - NO_3 cross-sections GADS	CRS_NO_3_CROSS_SECT_GADS
DSD (G) - OCLO cross-sections GADS	CRS_OCLO_CROSS_SECT_GADS
DSD (G) - O_2 transmissions GADS	CRS_O_2_CROSS_SECT_GADS
DSD (G) - H_2O transmissions GADS	CRS_H_2O_CROSS_SECT_GADS
DSD (M) - O_3 cross-sections (SPA) MDS	CRS_O_3_CROSS_SECT_SPA_ MDS
DSD (M) -O_3 cross-sections (SPB) MDS	CRS_O_3_CROSS_SECT_SPB_MDS
DSD (M) - NO_2 cross-sections MDS	CRS_NO_2_CROSS_SECT_MDS
DSD (M) - NO_3 cross-sections MDS	CRS_NO_3_CROSS_SECT_MDS
DSD (M) - OCLO cross-sections MDS	CRS_OCLO_CROSS_SECT_MDS
DSD (M) - O_2 transmissions MDS	CRS_O_2_CROSS_SECT_MDS
DSD (M) - H_2O transmissions MDS	CRS_H_2O_CROSS_SECT_MDS

10.6.7.1.1 O3 Cross-sections (SPA) GADS

The O_3 Cross-sections GADS for spectrometer A is described below:

Table 10.6-40 Layout of the O_3 Cross-sections (SPA) GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**O_3 cross-sections summary description (SPA)** 20 lines of 128 characters are available to describe the origin and characteristics of the O_2 transmissions.	-	2560	uc	20*128
2	**Number of points in the spectral grid**	-	2	us	1
3	**Spectral grid**	nm	36004	fl	9001
4	*Spare*	-	64	uc	64
TOTAL (in bytes)		**-**	**38630**	**-**	

10.6.7.1.2 O_3 Cross-sections (SPB) GADS

The O_3 cross section GADS for Spectrometer B is described below:

Table 10.6-41 Layout of the O3 Cross-sections (SPB) GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**O_3 cross-sections summary description (SPB)** 20 lines of 128 characters are available to describe the origin and characteristics of the O_3 cross-sections.	-	2560	uc	20*128
2	**Number of points in the spectral grid**	-	2	us	1
3	**Spectral grid**	nm	2000	fl	500
4	*Spare*	-	64	uc	64
TOTAL (in bytes)		**-**	**4626**	**-**	

10.6.7.1.3 NO_2 Cross-sections GADS

This GADS is identical to the one for SPA described above in 10.6.7.1.1, but contains information pertaining to NO_2.

10.6.7.1.4 NO3 Cross-sections GADS

This GADS is identical to the one for SPA described above in 10.6.7.1.1, but contains information pertaining to NO_3.

10.6.7.1.5 OCLO Cross-sections GADS

This GADS is identical to the one for SPA described above in 10.6.7.1.1, but contains information pertaining to OCLO.

10.6.7.1.6 O_2 Transmissions GADS

The O_2 transmission GADS is described below:

Table 10.6-42 Layout of the O2 Transmissions GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	**O_2 transmissions summary description** 20 lines of 128 characters are available to describe the origin and characteristics of the O_2 transmissions.	-	2560	uc	20* 128
2	**Number of models**	-	2	us	1
3	**Number of points in the spectral grid**	-	2	us	1
4	**Spectral grid**	nm	10800	fl	2700
5	*Spare*	-	64	uc	64
TOTAL (in bytes)		**-**	**13428**	**-**	

Note:

A maximum of six different atmosphere models used to generate the O_2 transmissions may be defined.

10.6.7.1.7 H2O Transmissions GADS

This GADS is identical to the one described above in 10.6.7.1.6, but contains information pertaining to H_2O.

10.6.7.1.8 O3 Cross-sections (SPA) MDS

This MDS is made of several MDS records (one for each temperature). The layout of each MDSR is described below:

Table 10.6-43 Layout of the O_3 Cross-sections (SPA) MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR (time of creation)*	mjd	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Temperature associated to DSR**	K	4	fl	1
4	**O_3 cross-sections (SPA)**	cm^2	36004	fl	9001
5	**Errors** contains: λmin, λmax, systematic error and random error (2 sigma) applicable to the wavelength range (a maximum of eight spectral bands may be defined)	-	128	fl	8*4
6	*Spare*	-	64	uc	64
TOTAL (in bytes)		**-**	**36213**	**-**	

10.6.7.1.9 O3 Cross-sections (SPB) MDS

This MDS is made of several MDS records (one for each temperature). The layout of each MDSR is described below:

Table 10.6-44 Layout of the O_3 Cross-sections (SPB) MDS

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Temperature associated to DSR**	K	4	fl	1
4	**O3 cross-sections (SPB)**	cm^2	2000	fl	500
5	**Errors** contains: λmin, λmax, systematic error and random error (2 sigma) applicable to the wavelength range (a maximum of eight spectral bands may be defined).	-	128	fl	8*4
6	*Spare*	-	64	uc	64
TOTAL (in bytes)		**-**	**2209**	**-**	

10.6.7.1.10 Cross-sections MDS

This MDS is identical to the one for SPA described above in 10.6.7.1.8, but contains information pertaining to NO_2.

10.6.7.1.11 NO3 Cross-sections MDS

This MDS is identical to the one for SPA described above in 10.6.7.1.8, but contains information pertaining to NO_3.

10.6.7.1.12 OCLO Cross-sections MDS

This MDS is identical to the one for SPA described above in 10.6.7.1.8, but contains information pertaining to OCLO.

10.6.7.1.13 O2 Transmissions MDS

This MDS is made of several MDS records (one for each altitude). The layout of each MDSR is described below:

Table 10.6-45 Layout of the O_2 Transmissions MDSR

N	Description	Units	Byte Length	Data Type	Dim.
1	*Creation time of the DSR*	-	12	mjd	1
2	*Quality Indicator flag (set to -1 if all values in MDSR are zero, set to 0 otherwise)*	-	1	sc	1
3	**Altitude associated to DSR**	m	4	fl	1
4	**Column density**	cm^{-2}	24	fl	6
5	**O_2 transmissions**	-	64800	fl	6* 2700
6	**Systematic error**	%	24	fl	6
7	**Random error (3 sigma)**	-	24	fl	6
8	*Spare*	-	64	uc	64
TOTAL (in bytes)		**-**	**64953**	**-**	

Notes:

- *The O_2 transmissions data may be derived from a maximum of six atmosphere models.*
- *There is one systematic error and one random error which characterise the full O_2 transmission spectrum per altitude and per atmosphere model.*

10.6.7.1.14 H_2O Transmissions MDS

This MDS is identical in form to the one described above in 10.6.7.1.13, however the data pertains to H_2O transitions.

10.7 GOMOS PRODUCT SUMMARY SHEETS

The data on the following pages is extracted from the product summary information contained in the DDT data base.

GOMOS Monitoring Modes

PRODUCT ID	GOM_MM__0P
PRODUCT NAME	GOMOS Monitoring Modes
DESCRIPTION	Contains time ordered AISPs for when the sensor is operating in Linearity, Uniformity or Spatial Spread monitoring modes
APPLICATIONS	Used for calibration and validation of the instrument
DELIVERY TIME	NRT products available from PDHS within 3 hours from data take. OFL (fully consolidated) version available from the LRAC starting 2 weeks after data take.
COVERAGE THROUGHPUT	1 product/ week for Linearity monitoring and Uniformity monitoring. 1 product/month for Spatial Spread monitoring.
PRODUCT SIZE	TBD by ESA
GEOMETRICAL SAMPLING	N/A
GEOMETRIC RESOLUTION	N/A
GEOMETRIC ACCURACY	N/A
RADIOMETRIC RESOLUTION	N/A
RADIOMETRIC ACCURACY	N/A
AUXILIARY DATA	Orbit state vectors; Time correlation parameters; others TBD.
ALGORITHMS USED	None applied
NOTES	

GOMOS Level 0

PRODUCT ID	GOM_NL__0P
PRODUCT NAME	GOMOS Level 0
DESCRIPTION	This product contains annotated ISPs containing measurements of tangential atmospheric ultraviolet, visual and infrared light as a function of wavelength and altitude. It consists of a set of in-flight calibration measurements and star occultation measurements. Measurements are made by observation of stars through the atmosphere using a Cassegrain telescope and two spectrometers
APPLICATIONS	Archived product forming basis for all higher level processing
DELIVERY TIME	NRT products available from PDHS within 3 hours from data take. OFL (fully consolidated) version available from the LRAC starting 2 weeks after data take.
COVERAGE	Acquires data from up to 50 stars over full orbit.
THROUGHPUT	1 product per orbit (100 minutes);
PRODUCT SIZE	max: 300 Mbytes per orbit, worst case (50 occultations, 6 MB per occultation). Typical = 60 MB per orbit (size depends on occultation duration)
GEOMETRICAL SAMPLING	Elevation range 62 to 68 degrees typically corresponding to 15 to 100 km in altitude. Azimuth range: -10 to +90 deg (anti-flight direction). 1 occultation per product.
GEOMETRIC RESOLUTION	1.7 km vertical sampling resolution
GEOMETRIC ACCURACY	atmospheric altitude restitution accuracy ±50 m
RADIOMETRIC RESOLUTION	Spectral Resolution: Spectrometer A: 1.2 nm, 0.312 nm sampling interval Spectrometer B: 0.2 nm, 0.044 - 0.054 nm sampling interval
RADIOMETRIC ACCURACY	Relative Spectral Accuracy: Spectrometer A: 1.5 nm Spectrometer B: 0.3 nm
AUXILIARY DATA	Orbit state vectors, SBT/UTC time correlation parameters
ALGORITHMS USED	satellite positioning, time conversion
NOTES	produced systematically

GOMOS Geolocated and Calibrated Transmission Spectra

PRODUCT ID	GOM_TRA_1P
PRODUCT NAME	GOMOS Geolocated and Calibrated Transmission Spectra
DESCRIPTION	Localized calibrated transmission spectra and photometer fluxes. contains full transmission spectra, central background spectra, and

	photometers engineering data.
APPLICATIONS	This product is the main Level 1B product. It is the basis for further Level 2 processing.
DELIVERY TIME	NRT products available from PDHS within 3 hours from data take. OFL (fully consolidated) version available from the LRAC starting 2 weeks after data take.
COVERAGE	1 occultation
THROUGHPUT	1 product per occultation, up to 50 occultation per orbit
PRODUCT SIZE	3 to 23 MB/ occultation (depends on occultation duration). 1 occultation = 1 product
GEOMETRICAL SAMPLING	Elevation range 62 to 68 degrees typically corresponding to 15 to 100 km in altitude. Azimuth range: -10 to +90 deg (anti-flight direction). 1 occultation per product.
GEOMETRIC RESOLUTION	1.7 km vertical sampling resolution
GEOMETRIC ACCURACY	atmospheric altitude restitution accuracy ±50 m
RADIOMETRIC RESOLUTION	Spectral Resolution:
	Spectrometer A: 1.2 nm, 0.312 nm sampling interval
	Spectrometer B: 0.2 nm, 0.044 - 0.054 nm sampling interval
RADIOMETRIC ACCURACY	Relative Spectral Accuracy:
	Spectrometer A: 1.5 nm
	Spectrometer B: 0.3 nm
AUXILIARY DATA	Orbit state vectors; Time correlation parameters;
	SQ GADS
	Occultation data GADS
	Nominal wavelength assignment GADS
	Reference Star Spectrum GADS
	Reference Atmospheric Density Profile GADS
	Auxiliary data ADS
	Geolocation ADS
ALGORITHMS USED	source packet data extraction
	Star catalogue extraction
	Datation
	Wavelength assignment
	Geolocation
	geometric and radiometric correction and calibration
NOTES	Produced systematically from Nominal Mode Level 0 data.

GOMOS Geolocated and Calibrated Background Spectra (Limb) Product

PRODUCT ID	GOM_LIM_1P
PRODUCT NAME	GOMOS Geolocated and Calibrated Background Spectra (Limb) Product
DESCRIPTION	Localized, calibrated, upper and lower background spectra (flat-field corrected, with and without straylight).
APPLICATIONS	Used for instrument validation and calibration
DELIVERY TIME	NRT products available from PDHS within 3 hours from data take. OFL (fully consolidated) version available from the LRAC starting 2 weeks after data take.
COVERAGE	1 occultation
THROUGHPUT	1 product per occultation, up to 50 occultation per orbit
PRODUCT SIZE	2 to 15 MB/ product (depends on occultation duration). 1 occultation = 1 product.
GEOMETRICAL SAMPLING	Elevation range 62 to 68 degrees typically corresponding to 15 to 100 km in altitude. Azimuth range: -10 to +90 deg (anti-flight direction). 1 occultation per product.
GEOMETRIC RESOLUTION	1.7 km vertical sampling resolution
GEOMETRIC ACCURACY	atmospheric altitude restitution accuracy ±50 m
RADIOMETRIC RESOLUTION	Spectral Resolution: Spectrometer A: 1.2 nm, 0.312 nm sampling interval Spectrometer B: 0.2 nm, 0.044 - 0.054 nm sampling interval
RADIOMETRIC ACCURACY	Relative Spectral Accuracy: Spectrometer A: 1.5 nm Spectrometer B: 0.3 nm
AUXILIARY DATA	Orbit state vectors; Time correlation parameters; SQ GADS Occultation data GADS Nominal wavelength assignment GADS Limb ADS
ALGORITHMS USED	source packet data extraction Star catalogue extraction Datation Wavelength assignment Geolocation geometric and radiometric correction and calibration
NOTES	produced systematically from the Nominal Mode Level 0 product.

GOMOS Temperature and Atmospheric Constituents Profiles

PRODUCT ID	GOM_NL__2P
PRODUCT NAME	GOMOS Temperature and Atmospheric Constituents Profiles
DESCRIPTION	Atmospheric constituents profiles: Vertical and line density profiles of ozone, NO2, NO3, O2, H20, air, aerosols, temperature, turbulence.
APPLICATIONS	meteorology and climatology
DELIVERY TIME	NRT products available from PDHS within 3 hours from data take. OFL (fully consolidated) version available from the PAC starting 3 to 4 weeks after data take.
COVERAGE	Acquires data from up to 50 stars over full orbit.
THROUGHPUT	1 product per occultation, up to 50 occultations per orbit
PRODUCT SIZE	Up to 0.7 MB / occultation (depends on occultation duration). 1 occultation = 1 product.
GEOMETRICAL SAMPLING	Elevation range 62 to 68 degrees typically corresponding to 15 to 100 km in altitude. Azimuth range: -10 to +90 deg (anti-flight direction). 1 occultation per product.
GEOMETRIC RESOLUTION	1.7 km vertical sampling resolution
GEOMETRIC ACCURACY	atmospheric altitude restitution accuracy ±50 m
RADIOMETRIC RESOLUTION	Spectral Resolution: Spectrometer A: 1.2 nm, 0.312 nm sampling interval Spectrometer B: 0.2 nm, 0.044 - 0.054 nm sampling interval
RADIOMETRIC ACCURACY	Relative Spectral Accuracy: Spectrometer A: 1.5 nm Spectrometer B: 0.3 nm
AUXILIARY DATA	Orbit state vectors; Time correlation parameters; SQ GADS Geolocation ADS Accuracy estimation ADS
ALGORITHMS USED	Scintillation/Dilution/Chromatic refraction correction Spectral Inversion Smoothing Vertical Inversion Quality Check
NOTES	Produced systematically from Geolocated and Calibrated Transmission Spectra Level 1B product.

GOMOS Residual Extinction

PRODUCT ID	GOM_EXT_2P
PRODUCT NAME	GOMOS Residual Extinction
DESCRIPTION	Re-computed transmission spectra corrected for scintillation and dilution effects, before and after inversion.
APPLICATIONS	The primary application of this product is instrument calibration and validation and it contains information needed to build a high resolution aerosol product.
DELIVERY TIME	NRT products available from PDHS within 3 hours from data take. OFL (fully consolidated) version available from PAC 3 to 4 weeks after data take.
COVERAGE	1 occultation
THROUGHPUT	1 product per occultation, up to 50 occultations per orbit
PRODUCT SIZE	2 to 10 MB/ occultation. Depends on occultation duration. 1 occultation = 1 product.
GEOMETRICAL SAMPLING	Elevation range 62 to 68 degrees typically corresponding to 15 to 100 km in altitude. Azimuth range: -10 to +90 deg (anti-flight direction). 1 occultation per product.
GEOMETRIC RESOLUTION	1.7 km vertical sampling resolution
GEOMETRIC ACCURACY	atmospheric altitude restitution accuracy ±50 m
RADIOMETRIC RESOLUTION	Spectral Resolution: Spectrometer A: 1.2 nm, 0.312 nm sampling interval Spectrometer B: 0.2 nm, 0.044 - 0.054 nm sampling interval
RADIOMETRIC ACCURACY	Relative Spectral Accuracy: Spectrometer A: 1.5 nm Spectrometer B: 0.3 nm
AUXILIARY DATA	Orbit state vectors; Time correlation parameters; SQ GADS GADS of the nominal wavelength assignment Residual extinction ADS
ALGORITHMS USED	Scintillation/Dilution/Chromatic refraction correction Spectral Inversion Smoothing Vertical Inversion Quality Check
NOTES	Produced systematically from Level 1B Geolocated and Calibrated Transmission Spectra Product.

GOMOS Extracted Profiles for Meteo Users

PRODUCT ID	GOM_RR__2P
PRODUCT NAME	GOMOS Extracted Profiles for Meteo Users
DESCRIPTION	This product contains selected vertical profiles at reduced spatial resolution extracted from the NRT GOMOS Temperature and Atmospheric Constituents Profiles product for NRT distribution to Meteo users.
APPLICATIONS	The primary application of this product is NRT global atmospheric modelling and monitoring.
DELIVERY TIME	It is produced systematically and available within 3 hours from the PDHS
COVERAGE	1 occultation
THROUGHPUT	1 product per occultation, up to 50 occultation per orbit
PRODUCT SIZE	Less than 1 MB per product
GEOMETRICAL SAMPLING	Elevation range 62 to 68 degrees typically corresponding to 15 to 100 km in altitude. Azimuth range: -10 to +90 deg (anti-flight direction). 1 occultation per product.
GEOMETRIC RESOLUTION	1.7 km vertical sampling resolution
GEOMETRIC ACCURACY	atmospheric altitude restitution accuracy ±50 m
RADIOMETRIC RESOLUTION	Spectral Resolution: Spectrometer A: 1.2 nm, 0.312 nm sampling interval Spectrometer B: 0.2 nm, 0.044 - 0.054 nm sampling interval
RADIOMETRIC ACCURACY	Relative Spectral Accuracy: Spectrometer A: 1.5 nm Spectrometer B: 0.3 nm
AUXILIARY DATA	Orbit state vectors; Time correlation parameters; others TBD.
ALGORITHMS USED	Sub-sampling of the Level 2 profiles product.
NOTES	This product may be converted to BUFR format outside the PDS for distribution to Meteo users. It is produced systematically from the GOMOS Temperature and Atmospheric Constituents Profiles Level 2 product.

DISTRIBUTION LIST

NAME	COPY	NAME	COPY
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