Aeolus Data Innovation Science Cluster
DISC

Aeolus Level 2a Processor Input/Output Data Definition

(former AE-IF-DLR-L2A-004)

DISC-Ref.: AED-SD-DoRIT-L2A-025

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Document Change Log

Issue	Date	New pages	Modified pages (after introducing new pages)	Observations	Name
V 0.1	01.09.06		--	Draft based on former AE.TN.DLR.IODD-L2A.200106; Major revision of ADS content based on AE-TN-MFG-L2A-0001 and decisions at L1b PM 7 see AE-MN-DLR-L1B-009	Huber
V 1.0	25.10.06		All pages reformatted	First version; comments on draft by A.-G. Straume (03.10.06) and O. LeRille (03.10.06) implemented	Huber
V 1.1	03.11.06		2, 12, 13, 14, 15, 16, 22	Errors fixed found by M.-L. Denneulin and D. Huber while coding L2A output	Huber
V 1.2	04.12.06		2, 6, 8, 9, 15, 22, 26, 27	Comments made by C. Caspar at GSDR implemented	Huber
V 1.3	17.01.07		25, 26, 29	Minor errors corrected	Huber
V 1.4	12.03.07		13, 20, 21, 22	SPR ADM-L2AP-0003	Huber
V 1.5	29.06.07		2, 8, 10, 11, 12, 13, 17, 18, 22, 24	SPR ADM-L2AP-0007 – SPR ADM-L2AP-0013	Huber
V 2.0	04.12.07		1 – 5, 7, 11, 12, 26 – 29, 32 - 38	Added description of AUX_PAR_2A file	Huber
V 2.1	31.01.08		2 – 5, 7, 9	FAT comments implemented	Huber
V 2.2	02.08		23, 24	Comments by CC on FAT update	Huber
V 2.3	04.08		8, 13	Internal	Huber
V 2.4	31.01.09		27, 31	CAL SPH, Total size, CAL DSDs	Huber
V 2.5	23.03.09			AR-IPF-1, AE-IPF-10, AE-IPF-13, AE-IPF-15, AE-IPF-17, AE-IPF-18, AE-IPF-21, AE-IPF-22	Huber
V 2.6	31.01.12			Delete section on AUX_CAL; correct size table 10 ;	Huber
V 3.0	15.02.13			Major revision of all sections for new CM product format of L2A prototype V3.2 Oct 2012	Huber

V 3.01	16.03.15		1, 2, 6, 7, 10, 11, 23, 25 -28, 31	AE-IPF-196 stop time of AUX_PAR_2A; AE-IPF-78 Baseline parameter added	Huber
V3.02 Draft 3	07.08.15			AE-IPF-216 AUX_PAR description to be updated; MPH and SPH description updated, and new section Quality_Flag in AUX_PAR	Huber
V3.02	31.08.15			MPH description updated; L2A product description new	Huber
V3.03				AE-IPF-160	Huber
V3.04	17.06.16		3 – 9, 13, 14, 31, 32, 36	AE-IPF-160 issues 105, 107, 108, 109, 110, 136, 137	Huber
V3.05	29.08.17		3 to 7, 9, 11, 12, 22, 23, 33 to 36	AE.IPF-292; AE-IPF-160 issue 156, 162, 163; update of table cross references; typos	Huber
V3.06	03.11.17		3 to 6, 38 to 41	Errors identified at ESTEC during installation of L2aP V3.05; update of AUX_PAR_2A description	Huber
V3.07	12.03.18		3, 7, 21, 22, 24, 35 to 38, 41	Deletion of parameter Earth_Radius in AUX_PAR_2A; minor corrections AUX_PAR_2A size calculation; document formatting issues; improve several QC flag descriptions	Huber
V3.08	08.02.19		1, 3, 4, 6, 7, 11, 14, 34	Add parameter Gps_Utc_Time_Difference to the MPH; minor text correction	Huber
V3.09	10.10.19		3 to 7, 24, 25, 31	Added attenuated backscatter to SCA OPT MDS	Huber
V3.10	31.01.20		3 to 10, 12, 18, 19, 22, 32, 34, 36 to 41	Update AUX_PAR_2A for section Radiometric_Correction and parameter Max_Cloud_Width; Add ranges to the GEO DS; Add Kray and Kmie and flag indicating correction status to the SCA_PCD New unit for Betam_Factor Comment by S[&]T on draft version considered Minor corrections in field descriptions	Huber
V3.11	31.07.20	42 to 46	1, 4, 7, 8, 9, 10, 17, 20, 21, 23 to 28, 32,	Renamed document reference; applied new DISC template Add description for AUX_CLM_L2	Huber

			33, 35 to 38, 40 to 46	Improve parameter descriptions as suggested in DL2a_015 Added information on missing values.	
V3.12	26.02.21		4 to 6, 9, 10, 14, 15, 20, 21, 24, 25, 30 to 32, 36 to 39, 43	Added new DS Feature_Mask_ADS dL2A_019 Addition of lidar ratios in L2A product New parameters in AUX_PAR_2A for feature mask calculation and switch for denoising approach New parameters in AUX_PAR_2A for the look-up table values used in the ATB algorithm	Huber
V3.13	30.07.21		9, 11, 15, 16, 22, 23, 27 to 29, 34 to 36, 36 to 39, 42, 43, 46	New parameters in AUX_PAR_2A for AEL_PRO, denoising optimizer and cloud screening	Meringer, Huber
V3.14	14.02.22		4, 5, 9, 11, 12, 14 – 16, 18, 19, 24, 25, 29, 30, 36, 37, 41 – 45, 51	Deleted all ICA data sets and header parameters Added new parameters to AUX_PAR_2A for AEL-PRO Fix description of number of data sets reported for AMD_ADS and AMD_PCD_ADS	Huber

Table of Contents

1 Introduction and Purpose of Document

This document defines the ADM-Aeolus L2A operational processor input and output data format. It is part of the deliverables of the contract studies

- "Aeolus Level 1B/2A Processor Refinement & Pre-Launch Validation" and one of the outputs of WP 2130,
- "Aeolus Level 1B/2A Processor Extended Pre-Launch Support" and one of the outputs of WP 2200, and
- "Aeolus Level 1B/2A Processor – Implementation of Continuous Mode Operations & Extended Pre-Launch Support" and one of the outputs of WP 2200. .
- "Aeolus Level 1B/2A Processor Enhancements and Launch Extension", and one of the outputs of WP 1300.
- "Aeolus L1B/2A Processor – Further Enhancements and Launch Extension", and one of the outputs of WP 1300.
- DISC contract, and one of the outputs of WP 1000 and 2000.

Chapter 2 provides overview information on the L2A input and output data files. Chapters 3 describes in detail the L2A output product format, and chapters 4 to 7 describe the auxiliary input files.

1.1 Compliance Statement

The Aeolus Level 2a Processor Input/Output Data Definition is fully compliant with the management requirements of the DISC contract.

1.2 Applicable Documents

[AD-1] DLR (2019): DISC Project Management Plan. AED-PMP-DLR-001, V 1.2, 29/05/2019.

[AD-2] PDS-IPF ICD Generic Interface Guideline, ESA-ID-ACS-GS-0001

[AD-3] Earth Explorer Ground Segment File Format Standard, PE-TN-ESA-GS-001

[AD-4] ADM-AEOLUS ANNOTATED SOURCE PACKET FILES FORMAT DESCRIPTION TECHNICAL NOTE, XADM-GSEG-EOPG-TN-04-0024

[AD-5] ADM-Aeolus PDGS AS-APF Interface Control Document, XADM-GSEG-EOPG-IC-14-0007

1.3 Reference Documents

[RD-1] ADM-Aeolus Level-2B/2C Processor Input/Output Data Definitions Interface Control Document, AE-IF-ECMWF-L2BP-001

[RD-2] L2A IODD, AE-IF-MFG-L2A-004

[RD-3] Selection of L2B parameters, AE-TN-MFG-L2P-0021

[RD-4] L1B Input/Output Data Definition Interface Control Document, AED-SD-DoRIT-L1B-006

[RD-5] Generation/Update of L2 Calibration Data at ACMF, AE-TN-MFG-L2A-CAL-002

[RD-6] L2A Algorithm Theoretical Basis Document, AED-TN-CNRM-L2A-030

[RD-7] Aeolus Level 2a Processor Software User Manual, AED-SD-DoRIT-L2A-027

[RD-8] Aeolus Level 2a Processor External Interface Control Document, AED-SD-DoRIT-L2A-021

[RD-9] Generation and Update of AUX_CSR, AED-TN-MFG-L2P-CAL-003

[RD-10] Generation of AUX_CAL, Detailed Processing Model, Input/Output data definition, AE-TN-MFG-L2P-CAL-004

[RD-11] Software and Auxiliary delivery ICD, AED-IC-SER-GEN-003

1.4 Acronyms & Abbreviations

See [AD-1] for a complete list of acronyms and abbreviations.

2 Overview L2A Input/Output Data Files

2.1 Format Definition Relation

The following table gives an overview over the format version of the different product types, where

- **File Type** denotes the specific sub-string of the product name that identifies the product.
- **Format Version** denotes the product format version that is also used to identify the proper xmlns version.
- **REF_DOC** denotes the document reference and the version of the IODD that introduces that specific format version of a file. The value displayed in this column will be provided in the corresponding REF_Doc fields of the binary .DBL files, the XML .HDR files, and the XML .EEF files.
- **Modified** is a field used to specify if a certain product has been modified with the current document version
- **Processor** denotes the software version at which the specific format version is introduced

#	File Type	Format Version	REF_DOC	Modified	Processor
1	AUX_PAR_2A	03.14	SD-DoRIT-L2A-025 03.14	Y	03.14
2	ALD_U_N_2A	03.14	SD-DoRIT-L2A-025 03.14	Y	03.14
3	AUX_CLM_L2	03.11	SD-DoRIT-L2A-025 v3.11	N	--

The AUX_CLM_L2 file description has been shifted from the L2B IODD to the L2A IODD with version 3.11; thus, it has been decided to set the Format Version to 03.11 even though the file format has not changed.

2.2 Relationship of Input/Output Data Definition Files

Table 2-1 summarises the Input/Output Data Definition Files used by the L2A processor. The column s/d classifies if an input file is static (s) or dynamic (d); the classification s/d is consistent with information provided in [RD-11].

Table 2-1 List of Input/Output Data Definition Files

#	File Type Identifier	File Type	Description	Created By	Used By	s/d
1		**Level 1B Product File**				
2	ALD_U_N_1B	Level 1B Product File	[RD-4]	Level 1B Processor	Level 2A Processor PDS	d
3		**Level 2A Product**				
4	ALD_U_N_2A	Level 2A Atmospheric Optical Properties Product	Section 3	Level 2A Processor	PDS	
5		**Input Auxiliary Files**				
6	AUX_PAR_2A	Level 2A Processing Parameters	Section 4	L1bP HMI component or external tool	Level 2A Processor	s
7	AUX_MET_12	Auxiliary Meteorological Data	[RD-1]	External tool	Level 2A Processor	d
8	AUX_CAL_L2	Calibration Coefficients	[RD-10]	Calibration Software	Level 2A Processor	s
9	AUX_CLM_L2	Aerosol Extinction-To-Backscatter Ratio	Section 5	External tool	Level 2A Processor	s

3 L2A Atmospheric Optical Properties Product

The L2A output products are profiles of particle layer local optical depths, profiles of particle and molecular backscatter and extinction coefficients, profiles of backscatter-to-extinction ratios, lidar ratios, profiles of scattering ratios, and scene classification of the group products into the following categories: water cloud, ice cloud, and aerosol “cloud”/layer. Profiles of molecular and particle backscatter and extinction coefficients, local optical depths, backscatter-to-extinction ratios and scattering ratios are provided on two resolution scales; on observation scale (horizontal accumulation of measurements over one Basic Repeat Cycle (BRC) corresponding to ~87km) and on group scale (horizontal accumulation of measurements on the smallest possible scale between 3 and 87 km) The idea is to retrieve profiles with the finest possible resolution in the group scale product, but the averaging of several measurements may be necessary to reach a satisfactory signal quality.

In addition to profiles based on the original Rayleigh bins, also profiles of particle backscatter and extinction coefficients, local optical depths, backscatter-to-extinction ratios for middle bins are provided. The concept of middle bins is introduced in the ATBD, see [RD-6]. In short, middle bins are bins made from 2 halves of adjacent original Rayleigh bins.

The Aeolus Level 2A data products are generated using the Level 1B product as input to the Level 2A processing step. Each Level 2A atmospheric optical properties product can contain a variable amount of data. On average they contain data from one orbit, i.e. about 470 observations, but may contain up to 7 orbits of data (due to on-board storage of downlink data).

3.1 Product Structure

The Level 2A product structure corresponds to the product structure described in [AD-3].

3.2 File Name

The file naming conventions to be applied for Aeolus data files and products are in line with the Earth Explorer File Format Standard [AD-3]. The general Aeolus file name structure is:

AE_CCCC_TTTTTTTTTT_<instance ID>.EEE

where

‘AE’ denotes the Aeolus mission

‘CCCC’ denotes the file class [four uppercase letters/digits]. In [AD-3] and [AD-5] settings of the file class are specified to be one of:

- ‘OPER’ for routine operations
- ‘OSVA’ for processing of operational data acquired at Svalbard
- ‘RPRO’ for reprocessing
- ‘OFFL’ for backlog
- ‘TEST’ for internal tests

‘TTTTTTTTTT’ is the file type identifier [total of ten uppercase letters / digits / underscores]

‘EEE’ is the file extension taking 3 possible values:

- ‘HDR’ in case of a header file
- ‘DBL’ in case of a data block file

‘TTTTTTTTTT’ = ALD_<u/c flag>_N_<product ID>

‘ALD’ denotes a data product from the Aladin instrument

<u/c flag> = 'U' for unconsolidated, C for consolidated, where consolidated includes all files that have been formed by merging the contents of two or more separate downlink data files into one time-contiguous data set

'N' denotes nominal instrument operation.

<product ID> = "2A" for a Level 2A product

<instance ID> = yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvv

with yyyymmddThhmmsszzz: start time of sensing (date/time string with precision to 1 ms – see Table 3-4)

uuuuuuuuu: duration/sensing period (derived from start and stop time of sensing – see Table 3-4, unit: ms)

oooooo: start absolute orbit number (see Table 3-4)

vvvv: file version number (see file version in Table 3-1)

The extension `EEE` is `HDR` for the header and `DBL` for the data block. That is, the Level-2A product consists of two files:

- A header containing a Fixed Header, the MPH, and the SPH with DSDs. The header is in XML format and has extension EEE='HDR'.
- A data-block containing a copy of MPH and SPH in KVT format followed by the Data Sets in binary format. The data block has the file extension EEE='DBL'.

3.3 File Structure

The Header File (extension HDR) contains a Fixed Header, a Main Product Header, and a Specific Product Header in XML format as described in [AD-3]. FH and MPH are common to all Aeolus products. Sizes in XML format are variable. Thus, throughout this document, sizes of parameters and files in XML format (i.e. HDR and EEF files) are indicative only.

The data block file (extension DBL) recalls the MPH and the SPH in KVT format, followed by the binary data. Sizes in KVT format are fixed, but the tag names used throughout this document for the FH, MPH and SPH refer to XML format. For KVT format the same tag names written in upper case letters are used.

In addition to binary formats used in the L1B product, the L2A product uses also:

Format	Description	Size (bytes)	Example
FP32	Single precision floating point (See Document [AD-3])	4	[-3.40282347E+38, 3.40282347E+38] [-1.17549435E-38, 1.17549435E-38]

3.4 File Size Calculation Assumptions

For the estimation of the file size some parameters that are **not fixed** in real data measurement are assumed to have a certain value:

- number of measurements N_MAX, here assumed to be 30, but variable in reality; it may even change within one product.
- number of groups per BRC, here assumed to be 6, but variable in reality

3.5 Fixed Header

The structure of the Fixed Header is identical for all Earth-Explorer missions.

Table 3-1 L2A Fixed Header Content Description

Tag Name	Content Description	Unit	Type	Size (XML)		
Fixed_Header	Root Tag		Structure	29		
File_Name	Logical file name without the extension		String	11	62	13
File_Description	One line description of the file		String	18	32	20
Notes	Multi-lines free text		String	7	32	9
Mission	String representing the mission name ('Aeolus' for the ADM-Aeolus mission). Note that, in the File_Name, the Mission ID is a two-character string ('AE' for the ADM-Aeolus mission).		String	9	6	11
File_Class	OPER or TEST (file type as indicated in the file name)		String	12	4	14
File_Type	The part of the file name that gives the file type. For L2A products, the only file type is ALD_U_N_2A.		String	11	10	13
Validity_Period	See Table 3-2 for structure description		Structure	18	112	19
File_Version	The vvvv part of the file name (see section 3.2)		Integer	14	4	16
Source	See Table 3-3 for structure description		Structure	9	172	10
Total size for XML FH in bytes:				**697**		

Table 3-2 L2A Fixed Header Validity_Period Content Description

Tag Name	Content Description	Unit	Type	Size (XML)		
Validity_Start	The validity of a file is managed by the PDGS environment itself, see [AD-4]. Omitting the micro seconds, Validity_Start time equals Sensing_Start of Table 3-4. To indicate the beginning of the mission, the special value: 'UTC=0000-00-00T00:00:00' can be used.	UTC	DateTime	16	23	18
Validity Stop	The validity of a file is managed by the PDGS environment itself, see [AD-4]. Omitting the micro seconds, Validity_Stop time equals Sensing_Stop of Table 3-4. To indicate the end of the mission, the special value: 'UTC=9999-12-31T23:59:59' can be used.	UTC	DateTime	15	23	17
Total size in bytes				**112**		

Table 3-3 L2A Fixed Header Source content description

Tag Name	Content Description	Unit	Type	Size (XML)		
System	Name of facility in charge of running the L2A processor.		String	8	19	10

Creator	L2A_ProcMain (official name of L2A processor).		String	9	12	11
Creator_Version	Version of L2AP used for the generation of the present product file.		String	17	12	19
Creation_Date	Date/time of creation.	UTC	DateTime	15	23	17
Total size in bytes:					**172**	

3.6 Main Product Header

The Main Product Header is identical in all Aeolus products.

Table 3-4 L2A Main Product Header

Tag Name	Content Description	Unit	Type	Size (KVT)			Size (XML)		
Main_Product_Header	Root tag for XML format only.		Structure	0	0	0		43	
Product	Logical file name, extension i.e., file name excluding the		String	9	62	2	9	62	11
Proc_Stage	Processing stage flag: 'N' for nominal process-ing (quasi-or close to real-time), 'T' for test product, 'R' for reprocessed.		Enum	11	1	1	12	1	14
Ref_Doc	Reference document describing the product		String	9	23	2	9	23	11
Spare_1			Spare	40	0	1	10	0	11
Acquisition_Station	Acquisition station ID		String	21	20	2	21	20	23
Proc_Center	Processing centre ID		String	13	6	2	13	6	15
Proc_Time	Time of processing	UTC	DateTime	11	27	2	11	23	13
Software_Ver	Software version number of processing soft-ware. Format: name of processor (up to 10 characters)/version number (4 characters)		String	14	14	2	14	14	16
Baseline	Baseline identifier (as provided by the Job Order File)		String	10	29	2	10	29	11
Sensing_Start	Start time of sensing	UTC	DateTime	15	27	2	15	23	17
Sensing_Stop	Stop time of sensing	UTC	DateTime	14	27	2	14	23	16
Spare_3			Spare	40	0	1	10	0	11
Phase	Phase number. If not used set to 'X', copied from L1B input product header.		Enum	6	1	1	7	1	9
Cycle	Cycle number, copied from L1B input product header.		IntAuc	6	4	1	7	4	9
Rel_Orbit	Start relative orbit number, copied from L1B input product header.		IntAs	10	6	1	11	6	13
Abs_Orbit	Start absolute orbit number, copied from L1B input product header.		IntAs	10	6	1	11	6	13
State_Vector_Time	Time of state vector, copied from L1B input product header.	UTC	DateTime	19	27	2	19	23	21
Delta_UT1	Delta_UT1 = UT1-UTC, copied from L1B input product header.	s	FAdo06	10	8	4	11	8	13
X_Position	X position in Earth-fixed reference, copied from L1B input product header.	m	FAdo73	11	12	4	12	12	14
Y_Position	Y position in Earth-fixed reference, copied from L1B input product header.	m	FAdo73	11	12	4	12	12	14
Z_Position	Z position in Earth-fixed reference, copied from L1B input product header.	m	FAdo73	11	12	4	12	12	14
X_Velocity	X velocity in Earth-fixed reference, copied from L1B input product header.	m/s	FAdo46	11	12	6	12	12	14
Y_Velocity	Y velocity in Earth-fixed reference, copied from L1B input product header.	m/s	FAdo46	11	12	6	12	12	14
Z_Velocity	Z velocity in Earth-fixed reference	m/s	FAdo46	11	12	6	12	12	14
Vector_Source	Not used by ADM, set to fixed string 'GP'.		String	15	2	2	15	2	17

Spare_4			Spare	40	0	1	10	0	11
Utc_Sbt_Time	Time corresponding to SBT below (not used by ADM-Aeolus), copied from L1B input product header.	UTC	DateTime	14	27	2	14	23	16
Sat_Binary_Time	Satellite Binary Time (not used by ADM-Aeolus), copied from L1B input product header.		IntAul	16	11	1	17	11	19
Clock_Step	Clock step size (not used by ADM-Aeolus), copied from L1B input product header.	ps	IntAul	11	11	5	12	11	14
Spare_5			Spare	32	0	1	10	0	11
Leap_Utc	Time of occurrence of the next leap second	UTC	DateTime	10	27	2	10	23	12
Gps_Utc_Time_Difference	Difference between GPS and UTC before time of occurrence of the next leap second		IntAc	24	4	1	25	4	27
Leap_Sign	Leap second sign (+001 if positive leap second, -001 if negative)		IntAc	10	4	1		11	
Leap_Err	Leap second error. '1' if leap second error occurs during processing segment, '0' otherwise		Boolean	9	1	1	10	1	12
Spare_6			Spare	11	0	1	10	0	11
Product_Err	'1' or '0'. If '1', errors have been reported in the product. User should then refer to the SPH or Quality ADS of the product for details of the error condition. '0' otherwise.		Boolean	12	1	1	13	1	15
Tot_Size	Total size of product (#bytes DSR+SPH+MPH)	bytes	IntAd	9	21	8	10	21	12
Sph_Size	Length of SPH (#bytes in SPH)	bytes	IntAl	9	11	8	10	11	12
Num_Dsd	Number of DSDs		IntAl	8	11	1	9	11	11
Dsd_Size	Length of each DSDs (#bytes for each DSD, all DSDs shall have the same length	bytes	IntAl	9	11	8	10	11	12
Num_Data_Sets	Number of DSs attached (not all DSDs have a DS attached)		IntAl	14	11	1	15	11	17
Spare_7			Spare	40	0	1	10	0	11
Total size in bytes				**1247**			**1606**		

3.7 Specific Product Header

The specific product header (SPH) has a structure specific to L2A products. It is detailed in Table 3-5 below. The SPH ends with the list of Data Set Descriptors (DSDs).

Note: The parameter Num_Prof_ICA has been deleted from the SPH; deletion is not marked as a change.

Table 3-5 L2A Specific Product Header

Name	Description / Comment	Unit	Type	Size (KVT)			Size (XML)		
Specific_Product_Header	Root tag for XML format only. Set to AEOLUS_L2A_SPECIFIC_HEADER		Structure	0	0	0	51		
Sph_Descriptor	Specific Product Header descriptor: ASCII string describing the product		String	16	28	2	16	28	18
Spare_1			Spare	40	0	1	10	0	11
Intersect_Start_Lat	Latitude of the intersection of WGS84 DEM and the satellite line-of-sight for the first measurement (first measurement centroid time of the first BRC)	10-6degN	IntAl	20	11	11	21	9	23
Intersect_Start_Long	Longitude of the intersection of WGS84 DEM and the satellite line-of-sight for the first measurement (first measurement centroid time of the first BRC)	10-6degE	IntAl	21	11	11	22	10	24

Intersect_Stop _Lat	Latitude of the intersection of WGS84 DEM and the satellite line-of-sight for the last measurement (last measurement centroid time of the last BRC)	10-6degN	IntAl	19	11	11	20	9	22
Intersect_Stop _Long	Longitude of the intersection of WGS84 DEM and the satellite line-of-sight for the last measurement (last measurement centroid time of the last BRC)	10-6degE	IntAl	20	11	11	21	10	23
Sat_Track	Sub-satellite track heading at the sensing start time in the MPH	deg	FAdo36	10	15	6	11	11	13
Spare_2			Spare	40	0	1	10	0	11
Num_Brc	Number of L1B input BRCs.		IntAl	8	11	1	10	11	11
Num_Meas_Max_Brc	Maximum number of measurements per BRC of the L1B input data.		IntAl	17	11	1	19	11	20
Num_Bins_Per_Meas	Number height bins without background bin.		IntAl	18	11	1	20	11	21
Num_Prof_Sca	Number of SCA BRC level profiles reported in this product.		IntAl	13	11	1	15	11	16
Num_Prof_Mca	Number of MCA BRC level profiles reported in this product.		IntAl	13	11	1	15	11	16
Num_Group_Tot	Number of group profiles reported in this product.		IntAl	14	11	1	16	11	17
Denoising_Optimizer_Switch_On	Setting of switch for denoising approach that was used for processing.		IntAl	30	10	1	32	11	33
List_of_Dsds	See **Table 6** for a description.			6336			7854		
Total size for KVT and XML in bytes				**6859**			**8596**		

3.8 Data Set Descriptors

The Data Sets listed in Table 3-6 appear in Aeolus Level 2A products, each described by a DSD in the SPH, see [RD-4] for format of DSD structure. The “Data Set Type” is “A” for Annotation Data Sets, “G” for Global Annotation Data Set’, “M” for Measurement Data Sets and “R” for a Referenced Data Set, that is not attached to this product.

Note: The ICA_PCD and ICA_OPT data sets have been deleted from the list of all data sets; deletion is not marked as a change.

Table 3-6 L2A Data Set Descriptors

Num.	Data Set Descriptor Name	Content Description	Type	Update Frequency
1	Geolocation_ADS	DSD for Geolocation & AOCS data (attached). See Table 3.7 for a description.	A	1 DSR per BRC
2	Meas_PCD_ADS	DSD for L1B, CAL and CLM input screening quality control. See Table 3.10 for a description.	A	1 DSR per BRC
3	SCA_PCD_ADS	DSD for PCD of SCA products.	A	1 DSR per SCA profile
4	SCA_MLE_PCD_ADS	DSD for PCD of SCA-MLE products.	A	1 DSR per SCA-MLE profile
5	AEL_PRO_PCD_ADS	DSD for PCD of AEL-PRO products.	A	1 DSR per AEL-PRO profile
6	MCA_PCD_ADS	DSD for PCD of MCA products.	A	1 DSR per MCA profile
7	AMD_PCD_ADS	DSD for PCD of AMD input screening.	A	1 DSR per BRC.
8	Group_PCD_ADS	DSD for PCD of the processing of all algorithms.	A	1 DSR per group
9	SCA_Optical_Properties_MDS	DSD for SCA products.	M	1 DSR per SCA profile
10	SCA_MLE_MDS	DSD for SCA-MLE products.	M	1 DSR per SCA-MLE profile

11	AEL_PRO_Opt_Properties_MDS	DSD for AEL-PRO products	M	1 DSR per AEL-PRO Profile
12	MCA_Optical_Properties_MDS	DSD for MCA products.	M	1 DSR per MCA profile
13	AMD_ADS	DSD for Atmospheric, molecular data computed from MET files.	A	1 DSR per BRC
14	Group_Optical_Properties_MDS	DSD for group level products	M	1 DSR per group
15	Scene_Classification_ADS	DSD for Scene classification data	M	1 DSR per group
16	Feature_Mask_ADS	DSD for feature mask data	A	1 DSR per BRC
17	MSP_ATB_ADS	DSD for attenuated backscatter signals derived from MSP data	A	1 DSR per AEL-PRO Profile
18	Level_2A_Proc_Params	DSD for L2A processing parameters (reference to auxiliary file)	R	No Ds
19	Aeolus_Level_1B_Product	DSD for the L1B input file (reference to)	R	No Ds
20	Aux_Met_Product	DSD for Meteorological Data (reference to auxiliary file).	R	No Ds
21	Cal_Product	DSD for calibration coefficients (reference to auxiliary file).	R	No Ds
22	Clim_Product	DSD for the aerosol backscatter to extinction ratio (reference to auxiliary file)	R	No Ds

3.9 Geolocation Annotation Data Set

The size of the Geolocation Annotation Data Set depends on the maximum number of measurements found in the L1B input BRCs. Sizes are calculated here for 30 measurements.

Table 3-7 Geolocation_ADS

Name	Description / Comment	Unit	Type	Size (binary)
Start_of_Obs_Time	Start date and time of Observation (or BRC)	UTC	DateTime	12
Num_Meas_Eff	Effective number of measurements in the BRC.		IntAuc	1
List_of_Measurement_Geolocations	List of measurement geolocation structures. See Table 3-8 for Measurement_Geolocation structure description		List of Num_Meas_Max_Brc structures	30840
Geoid_Separation	Height of geoid above WGS84 ellipsoid. It is assumed this difference is valid for the whole observation.	m	FAdoxy	8
Total size in bytes				**30861**

Table 3-8 List_of_Measurement_Geolocation Content Description

Name	Description / Comment	Unit	Type	Size (binary)
Centroid_Time	Measurement centroid time from L1B	UTC	DateTime	12
Mie_Geolocation	List of geolocation parameters of the 24 Mie height bins of the profile. See Table 3-9 for a description.		Structure	400
Rayleigh_Geolocation	List of geolocation parameters of the 24 Mie height bins of the profile. See Table 3-10 for a description.		Structure	600
Longitude_of_DEM_Intersection	Longitude of the intersection of the DEM and the line-of-sight	10-6degE	IntAl	4
Latitude_of_DEM_Intersection	Latitude of the intersection of the DEM and the line-of-sight	10-6degN	IntAl	4
Altitude_of_DEM_Intersection	Altitude relative to the geoid of the intersection of the DEM and the line-of-sight	m	Fadoxy	8
Total size in bytes				**1028**

Table 3-9 Mie_Geolocation Content Description

Name	Description / Comment	Unit	Type	Size (binary)
List_of_Geolocation_of_Height_Bins	List of Geolocation Height Bin structures. This list contains 25 values. The first item contains the geolocation of the upper edge of the top-most bin (= defined as lower edge of bin 0). The remaining 24 items contain the geolocation of the lower edge of each height bin. (bin 1~24). See Table 3-11 for structure description.		List of 25 Structures	400
Total size in bytes				**400**

Table 3-10 Rayleigh_Geolocation Content Description

Name	Description / Comment	Unit	Type	Size (binary)
List_of_Geolocation_of_Height_Bins	List of Geolocation Height Bin structures. This list contains 25 values. The first item contains the geolocation of the upper edge of the top-most bin (= defined as lower edge of bin 0). The remaining 24 items contain the geolocation of the lower edge of each height bin. (bin 1~24). See Table 3-11 for structure description.		List of 25 Structures	400
List_of_Range_of_Height_Bins	List of Range Height Bin structures. This list contains 25 values. The first item contains the range of the upper edge of the top-most bin (= defined as lower edge of bin 0). The remaining 24 items contain the range of the lower edge of each height bin. (bin 1~24). See Table 3-12 for structure description.		List of 25 Structures	200
Total size in bytes				**600**

Table 3-11 Geolocation_of_Height_Bin Content Description

Name	Description / Comment	Unit	Type	Size (binary)
Longitude_of_Height_Bin	Latitude of the start point of the profile height bin	10-6degN	IntAl	4
Latitude_of_Height_Bin	Longitude of the start point of the profile height bin.	10-6degE	IntAl	4
Altitude_of_Height_Bin	Bottom altitude of the height bin. The altitude is reference to a geoid.	m	Fadoxy	8
Total size in bytes				**16**

Table 3-12 Range_of_Height_Bin Content Description

Name	Description / Comment	Unit	Type	Size (binary)
Range_of_Height_Bin	Range of the start point of the profile height bin	m	Fadoxy	8
Total size in bytes				**8**

3.10 L1B Measurement Product Confidence Data

Table 3-13 Meas_PCD_ADS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_of_Obs_Time	Start date and time of Observation (or BRC).	UTC	DateTime	12
L1B_Input_Screening	Structure describing any problems found during reading of the L1B datafile (see Table 3-14)		structure	247
L1B_CAL_Sceening	Structure describing any problem found during reading of the calibration datafile (see Table 3-17)		structure	6
L2A_Processing_QC	Structure describing the processing of BRC level algo-rithms (see Table 3-18)		structure	796
Total size in bytes				**1061**

Table 3-14 L1B_Input_Screening Content Description

Name	Description / Comment	Unit	Type	Binary
L1B_Obs_Screening	A code describing a problem which prevent using this whole BRC TBD		IntAuc	1
L1B_Obs_Screening_ Flags1 L1B_Obs_Screening_ Flags2 L1B_Obs_Screening_ Flags3 L1B_Obs_Screening_ Flags4 L1B_Obs_Screening_ Flags5	5 bytes each holding up to 8 flags, so in total 40 flags to store individual problems detected in the L1B_Obs screening (exact definition to be defined later) Bit 1 in byte 1 : TBD Bit 2 in byte 1: TBD … Bit 3 in byte 4 : TBD … Bit 8 in byte 5 : TBD		5*IntAuc	5
List_of_L1B_Mie_ Meas_Screening	List of N_Meas structures describing the problems found for each Mie measurement (see Table 3-15)		list of N_Meas structures	120
List_of_L1B_Rayleigh_ Meas_Screening	List of N_Meas structures describing the problems found for each Rayleigh measurement (see Table 3-16)		list of N_Meas structures	120
Spare_1				1
Total size in bytes				**247**

Table 3-15 L1B_Mie_Meas_Screening Content Description

Name	Description / Comment	Unit	Type	Binary
L1B_Mie_Meas_QC	A code describing a problem which prevent using this Mie measurement TBD		IntAus	2
L1B_Mie_Meas_QC_ Flags	Flags describing problems which prevent using this Mie Measurement: Bit 1 : TBD Bit 2 : TBD …		IntAuc	1

	Bit 8 : TBD			
Spare_1				1
Total size in bytes				**4**

Table 3-16 L1B_Rayleigh_Meas_Screening Content Description

Name	Description / Comment	Unit	Type	Binary
L1B_Rayleigh_Meas_QC	A code describing a problem which prevent using this Rayleigh measurement TBD		IntAus	2
L1B_Rayleigh_Meas_QC_Flags	Flags describing problems which prevent using this Rayleigh measurement: Bit 1 : TBD Bit 2 : TBD … Bit 8 : TBD		IntAuc	1
Spare_1				1
Total size in bytes				**4**

Table 3-17 L1B_CAL_Screening Content Description

Name	Description / Comment	Unit	Type	Binary
CAL_Valid	A flag indicating the calibration file was found correct.		IntAuc	1
Spare_1				5
Total size in bytes				**6**

Table 3-18 L2A_Processing_QC Content Description

Name	Description / Comment	Unit	Type	Binary
SCA_Applied	1 if the SCA is applied at BRC level; 0 else.		IntAuc	1
MCA_Applied	1 if the MCA is applied at BRC level; 0 else.		IntAuc	1
Spare_1				20
List_of_Feature_Finder_Indicators	List of Feature Finder algrithm module results. See Table 3-19 for structure description		Structure	774
Total size in bytes				**796**

Table 3-19 Feature_Finder_Indicator Content Description

Name	Description / Comment	Unit	Type	Binary
List_of_Layer_Informations	Feature Finder output for 24 layers. See Table 3-20 for structure definition.		List of 24 structures	744
List_of_Lowest_Computable_Bins	See Table 3-22 for structure definition.		Structure	30
Total size in bytes				**774**

Table 3-20 Layer_Information Content Description

Name	Description / Comment	Unit	Type	Binary
Bin_Loaded	Set to 1 if bin was loaded for group detection and groups have been discovered. Set 0 if bin was loaded for group detection, but no group detected. Set to -1 if bin was not loaded for group detection.		IntAuc	1
List_of_Seeds	Structure holding information on layer seeds (see Table 3-21).		Structure	30
Total size in bytes				**31**

Table 3-21 Seed Content Description

Name	Description / Comment	Unit	Type	Binary
Seed	Set to 1 if the measurement was set as seed for the group detection, set to 0 if measruement was no seed.		IntAuc	1
Total size in bytes				**1**

Table 3-22 Lowest_Computable_Bin Content Description

Name	Description / Comment	Unit	Type	Binary
Lowest_Computable_Bin	Lowest (in atmosphere) bin that was used by the Feature Finder to detect groups for a maximum of 30 measurements.		IntAuc	1
Total size in bytes				**1**

3.11 SCA Product Confidence Annotation Data Set

This ADS is only written if the SCA was applied to the input L1B BRC level data. So, the number of reported SCA PCD ADS is less or equal to the number of input L1B BRCs.

Table 3-23 SCA_PCD_ADS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the SCA profile covered by the present DSR. This is the centroid time of the first measurement of the profile.	UTC	DateTime	12
First_Matching_Bin	Index of the first matching bin		IntAuc	1
Bin_1_Clear	SCA QC flag about processed data: 1 if the first matching bin is clear; 0 else.		IntAuc	1
List_of_Profile_PCD_Bins	Structure containing variances of SCA BRC-level products bin per bin in Rayleigh scale. See Table 3.21 for structure definition.		List of 24 structures	1392
List_of_Profile_PCD_Middle_Bins	Structure containing variances of SCA BRC-level products in bins made from 2 halves of adjacent original Rayleigh bins. See Table 3.22 for structure definition.		List of 23 structures	966
Radiometric_Correction_Performed	Set to '0', '1', or '2': '0' the default Kray and Kmie values of the AUX_CAL file have been used '1' the per orbit corrected in particle free conditions Kray and Kmie values have been calculated and used '2' the per observation fitted Kray and Kmie values have been calculated and used.		IntAuc	1

Kray	Radiometric correction factor for the Rayleigh channel (calculated as indicated by the setting of field Radiometric_Correction_Performed)		Fadoxy	8
Kmie	Radiometric correction factor for the Mie channel (calculated as indicated by the setting of field Radiometric_Correction_Performed)		Fadoxy	8
Total size in bytes				**2389**

Table 3-24 Profile_PCD_Bin Content Description

Name	Description / Comment	Unit	Type	Binary
Extinction_Variance	Variance of the particle extinction coefficient retrieved by the SCA in this bin. Missing value: -1.	m^{-2}	FAdoxy	8
Backscatter_Variance	Variance of the particle backscatter coefficient retrieved by the SCA in this bin. Missing value: -1.	$m^{-2} * sr^{-2}$	FAdoxy	8
LR_Variance	Variance of the particle lidar ratio retrieved by the SCA in this bin. Missing value: -1.		FAdoxy	8
BER_Variance	Variance of the particle backscatter-to-extinction ratio retrieved by the SCA in this bin. Missing value: -1.		FAdoxy	8
Rayleigh_Heterogeneity_Index	Index that characterizes the variability of the Rayleigh useful signal within one BRC. It is defined as the standard deviation of the Rayleigh useful signal within a BRC with respect to the Poisson noise.		FAdoxy	8
Mie_Heterogeneity_Index	Index that characterizes the variability of the Mie useful signal within one BRC. It is defined as the standard deviation of the Mie useful signal within a BRC with respect to the Poisson noise.		FAdoxy	8
LOD_Variance	Variance of the LOD retrieved by the SCA in this bin. Missing value: -1.		FAdoxy	8
Processing_QC_Flag	QC information about processing Bit packed quality field Bit 1: Extinction; data valid 1, otherwise 0 Bit 2: Backscatter; data valid 1, otherwise 0 Bit 3: Mie SNR; data valid 1, otherwise 0 Bit 4: Rayleigh SNR; data valid 1, otherwise 0 Bit 5: Extinction error bar; data valid 1, otherwise 0 Bit 6: Backscatter error bar; data valid 1, otherwise 0 Bit 7: cumulative LOD; data valid 1, otherwise 0 Bit 8: Spare		IntAuc	1
Cloud_Mask	Flag indicating the cloud contamination of each height bin (i.e. derived backscatter from AMD exceeding a defined threshold). Set to 1 for cloud contaminated bin, otherwise 0.		IntAuc	1
Total size in bytes				**58**

Table 3-25 Profile_PCD_Middle_Bin Content Description

Name	Description / Comment	Unit	Type	Binary
Mid_Extinction_Variance	Variance of the particle extinction coefficient retrieved by the SCA in this bin. Missing value: -1.	m^{-2}	FAdoxy	8
Mid_Backscatter_Variance	Variance of the particle backscatter coefficient retrieved by the SCA in this bin. Missing value: -1.	$m^{-2} * sr^{-2}$	FAdoxy	8
Mid_LOD_Variance	Variance of the LOD retrieved by the SCA in this bin. Missing value: -1.		FAdoxy	8
Mid_BER_Variance	Variance of the backscatter-to-extinction ratio. Missing value: -1.	sr^{-2}	FAdoxy	8
Mid_LR_Variance	Variance of the extinction-to-backscatter ratio. Missing value: -1.	sr^{2}	FAdoxy	8

Mid_Processing_QC_Flag	QC information about processing Bit packed quality field Bit 1: Extinction; data valid 1, otherwise 0 Bit 2: Backscatter; data valid 1, otherwise 0 Bit 3: BER; data valid 1, otherwise 0 Bit 4: Mie SNR; data valid 1, otherwise 0 Bit 5: Rayleigh SNR; data valid 1, otherwise 0 Bit 6: Extinction error bar; data valid 1, otherwise 0 Bit 7: Backscatter error bar; data valid 1, otherwise 0 Bit 8: Cumulative LOD; data valid 1, otherwise 0		IntAuc	1
Mid_Cloud_Mask	Flag indicating the cloud contamination of each height bin (i.e. derived backscatter from AMD exceeding a defined threshold). Set to 1 for cloud contaminated bin, otherwise 0.		IntAuc	1
Total size in bytes				**42**

3.12 SCA MLE Product Confidence Annotation Data Set

This ADS is only written if the SCA-MLE was applied to the input L1B BRC level data. So, the number of reported SCA MLE PCD ADS is less or equal to the number of input L1B BRCs.

Note: MLE results are not yet provided in this new data set. The data set is filled with zeros.

Table 3-26 SCA_MLE_PCD_ADS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the SCA-MLE profile covered by the present DSR. This is the centroid time of the first measurement of the profile.	UTC	DateTime	12
Overall_Quality	Flag set to 1 in case Feature Mask of this BRC is considered to be of good quality, otherwise 0.		IntAuc	1
List_of_SCA_MLE_Profile_PCD_Bins	Structure containing variances of SCA-MLE BRC-level products bin per bin in Rayleigh scale. See Table 3-27 for structure definition.		List of 24 structures	1368
Covariance_Matrix	Covariance information (i.e. variance / covariance square matrix given for the 49 dimensional space per observation used for physical regularization of the signals)		49 * 49 Fadoxy	19208
Total size in bytes				**20589**

Table 3-27 Profile_PCD_Bin Content Description

Name	Description / Comment	Unit	Type	Binary
Extinction_Variance	Variance of the particle extinction coefficient retrieved by the SCA-MLE in this bin. Missing value: -1.	m^{-2}	FAdoxy	8
Backscatter_Variance	Variance of the particle backscatter coefficient retrieved by the SCA-MLE in this bin. Missing value: -1.	$m^{-2} * sr^{-2}$	FAdoxy	8
LR_Variance	Variance of the particle lidar ratio retrieved by the SCA-MLE in this bin. Missing value: -1.		FAdoxy	8
BER_Variance	Variance of the particle lidar ratio retrieved by the SCA-MLE in this bin. Missing value: -1.		FAdoxy	8
SR_Variance	Variance of the particle scattering ratio retrieved by the SCA-MLE in this bin. Missing value: -1.		FAdoxy	8
LOD_Variance	Variance of the LOD retrieved by the SCA-MLE in this bin. Missing value: -1.		FAdoxy	8
SLOD_Variance	Variance of the slant LOD retrieved by the SCA-MLE in this bin. Missing value: -1.		FAdoxy	8
Cloud_Mask	Flag indicating the cloud contamination of each height bin (i.e. derived backscatter from AMD exceeding a defined threshold). Set to 1 for cloud contaminated bin, otherwise 0.			1

Total size in bytes	57

3.13 AEL-PRO Product Confidence Annotation Data Set

This ADS is only written if the AEL-PRO was applied to the input L1B BRC level data. So, the number of reported AEL-PRO PCD ADS is less or equal to the number of input L1B BRCs.

Note: Overall_Quality flag for AEL-PRO data is copied from the FM ADS, as FM data is input to the AEL-PRO algorithm. In addition, the AEL-PRO algorithm is still in experimental status.

Table 3-28 AEL_PRO_PCD_ADS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the AEL-PRO profile covered by the present DSR. This is the centroid time of the first measurement of the profile.	UTC	DateTime	12
Overall_Quality	Currently the FM_ADS Overall_Quality flag setting is copied; the FM results are input to the AEL-PRO. More sophisticated setting will be added in the next version. Flag set to 1 in case AEL-PRO data of this BRC is considered to be of good quality, otherwise 0.		IntAuc	1
Starting_Cost_Function_Value_Pass1	Value of the OE cost function corresponding to the initial guess for the low-resolution pass. Parameter currently not used.			8
Ending_Cost_Function_Value_Pass1	Value of the OE cost function corresponding to the converged minimum found for the low-resolution pass			8
List_of_Measurement_AEL_PRO_PCD	Structure containing AEL-PRO PCD information for the measurements of the BRC in the Mie bins, see Table 3-29 for structure description.		List of nmeas structures	17760
Total size in bytes				**17789**

Table 3-29 Measurement_AEL_PRO_PCD Content Description

Name	Description / Comment	Unit	Type	Binary
Starting_Cost_Function_Value_Pass2	Value of the OE cost function corresponding to the initial guess for the high-resolution pass Parameter currently not used.			8
Ending_Cost_Function_Value_Pass2	Value of the OE cost function corresponding to the converged minimum found for the high-resolution pass			8
List_of_Height_Bin_AEL_PRO_PCDs	Structure containing AEL-PRO PCD information for the Mie bins, see Table 3-30 for structure description.		List of 24 structures	576
Total size in bytes				**592**

Table 3-30 Height_Bin_AEL_PRO_Optical_Property Content Description

Name	Description / Comment	Unit	Type	Binary
Error_Extinction	Particle extinction error of the height bin. Missing value: -1e+06.	$10^{-6} * m^{-1}$	FAdoxy	8
Error_LR	Particle lidar ratio error. Missing value: -1.	sr	FAdoxy	8
Error_Particle_Effective_Area_Radius	Error on particle effective area radius		FAdoxy	8
Total size in bytes				**24**

3.14 MCA Product Confidence Annotation Data Set

This ADS is only written if the MCA was applied to the input L1B BRC level data. So, the number of reported MCA PCD ADS is less or equal to the number of input L1B BRCs.

Table 3-31 MCA_PCD_ADS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the MCA profile covered by the present DSR. This is the centroid time of the first measurement of the profile.	UTC	DateTime	12
List_of_MCA_Processing_QC_Flag_Bins	Structure containing QC information about processing. See Table 3-32 for structure definition.		List of 24 structures	24
Total size in bytes				**36**

Table 3-32 MCA_Processing_QC_Flag_Bin Content Description

Name	Description / Comment	Unit	Type	Binary
MCA_Processing_QC_Flag_Bin	Last Mie bin that has been processed.		IntAuc	1
Total size in bytes				**1**

3.15 AMD Product Confidence Annotation Data Set

The Product Confidence Data Set for the synthetic signal calculated from the meteorological input data. This ADS is only written if the synthetic signal calculation algorithm was applied to the input L1B BRC level data. So, the number of reported AMD PCD ADS is less or equal to the number of input L1B BRCs.

Note: The following data names in Table 3-33 and Table 3-34 are related to L2B_*. This is historically grown. However, the meteorological files are not generated by the L2B processor, but by the L2MetPF. Both have been developed with ECMWF.

Table 3-33 AMD_PCD_ADS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the BRC covered by the present DSR.	UTC	DateTime	12
L2B_AMD_Screening_QC	A code describing a problem which prevent using this L2B AMD file, currently set to 0.		IntAuc	1
L2B_AMD_Screening_QC_Flags	Flags describing problems which prevent using this L2B AMD file, currently set to 0.		IntAuc	1

L2B_AMD_ Collocations	List of Max_Num_Meas_Brc structures describing the problems found while collocating each measurement, see Table 3-34.		structure	90
Total size in bytes				**104**

Table 3-34 L2B_AMD_Collocations Content Description

Name	Description / Comment	Unit	Type	Binary
L2B_AMD_Collocation_QC	A code describing what problem occurred during the collocation of this measurement with the AUX NWP data, currently set to zero.		IntAuc	1
L2B_AMD_Collocation_QC_Flags	Flags describing what problems occurred during the collocation of this measurement with the AUX NWP data, currently set to 0.		IntAuc	1
Spare_1				1
Total size in bytes				**3**

3.16 Group Product Confidence Annotation Data Set

This Product Confidence Data Set shall be reported for all groups identified in all the input L1B BRCs. Thus, the number of data sets reported exceeds the number of input L1B BRCs.

Table 3-35 Group_PCD_ADS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the group profile covered by the present DSR. This is the centroid time of the first measurement of the profile.	UTC	DateTime	12
Brc_Start	Brc of the first measurement of the group.		IntAus	2
Measurement_Start	First measurement of the group.		IntAuc	1
Brc_End	Brc of the last measurement of the group.		IntAus	2
Measurement_End	Last measurement of the group.		IntAuc	1
Height_Bin_Index	Index of the height level of the group in Rayleigh scale.		IntAuc	1
Spare			IntAuc	1
Particle_Extinction_Variance	Variance of the particle extinction coefficient. Missing value: -1.	m^{-2}	Fadoxy	8
Particle_Backscatter_Variance	Variance of the particle backscatter coefficient. Missing value: -1.	$m^{-2} * sr^{2}$	Fadoxy	8
Particle_LOD_Variance	Variance of the particle local optical depth. Missing value: -1.		Fadoxy	8
QC_Flag	Bit packed quality field Bit 1: Extinction; data valid 1, otherwise 0 Bit 2: Backscatter; data valid 1, otherwise 0 Bit 3: Mie SNR; data valid 1, otherwise 0 Bit 4: Rayleigh SNR; data valid 1, otherwise 0 Bit 5: Extinction error bar; data valid 1, otherwise 0 Bit 6: Backscatter error bar; data valid 1, otherwise 0 Bit 7: Cumulative LOD; data valid 1, otherwise 0 Bit 8: Spare		IntAuc	1

Mid_Particle_Extinction_Variance_Top	Variance of the particle extinction coefficient in this height top middle bin. Missing value: -1.	m^{-2}	Fadoxy	8
Mid_Particle_Backscatter_Variance_Top	Variance of the particle backscatter coefficient in this height top middle bin. Missing value: -1.	$m^{-2} * sr^{-2}$	Fadoxy	8
Mid_Particle_LOD_Variance_Top	Variance of the particle local optical depth in this height top middle bin. Missing value: -1.		Fadoxy	8
Mid_Particle_BER_Variance_Top	Variance of the BER in this height top middle bin. Missing value: -1.	sr^{-2}	Fadoxy	8
Mid_Particle_Extinction_Variance_Bot	Variance of the particle extinction coefficient in this height top middle bin. Missing value: -1.	m^{-2}	Fadoxy	8
Mid_Particle_Backscatter_Variance_Bot	Variance of the particle backscatter coefficient in this height top middle bin. Missing value: -1.	$m^{-2} * sr^{-2}$	Fadoxy	8
Mid_Particle_LOD_Variance_Bot	Variance of the particle local optical depth in this height top middle bin. Missing value: -1.		Fadoxy	8
Mid_Particle_BER_Variance_Bot	Variance of the BER in this height top middle bin. Missing value: -1.	sr^{-2}	Fadoxy	8
Total size in bytes				**109**

3.17 SCA Optical Properties Measurement Data Set

This ADS is only written if the SCA was applied to the input L1B BRC level data. So, the number of reported SCA PCD ADS is less or equal to the number of input L1B BRCs.

Table 3-36 SCA_Optical_Properties_MDS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the SCA profile covered by the present DSR. This is the centroid time of the first measurement of the profile.	UTC	DateTime	12
List_of_SCA_Optical_Properties	Structure containing SCA products for the BRC in the Rayleigh height levels, see Table 3-37 for structure description.		List of 24 structures	960
List_of_Geolocation_Middle_Bins	Horizontal averaged coordinates of the boundaries of the middle bins over the BRC. Middle bins are made of 2 halves of adjacent Rayleigh bins. See Table 3-38 for structure description.		List of 24 structures	384
List_of_SCA_Optical_Properties_Middle_Bins	Structure containing SCA BRC-level products in bins made from 2 halves of adjacent original Rayleigh bins, see Table 3-39 for structure description.		List of 23 structures	920
List_of_Cross_Talk_Corrected_Signals	Structure containing containing cross-talk corrected attenuated molecular and particulate backscatter on Rayleigh height bins, see Table 3-40 for structure description. Missing values are indicated by -1.		List of 30 * 24 structures	11520
Total size in bytes				**13796**

Table 3-37 SCA_Optical_Property Content Description

Name	Description / Comment	Unit	Type	Binary
Extinction	Particle extinction coefficient of the height bin. Missing value: -1e+06.	$10^{-6} * m^{-1}$	FAdoxy	8
Backscatter	Particle backscatter coefficient of the height bin. Missing value: -1e+06.	$10^{-6} * m^{-1} * sr^{-1}$	FAdoxy	8

LOD	Particle LOD of the height bin. Missing value: -1.		FAdoxy	8
SR	Scattering ratio of the height bin. Missing value: -1.		FAdoxy	8
LR	Particle extinction-to-backscatter ratio. Missing value: -1.	sr	FAdoxy	8
Total size in bytes				**40**

Table 3-38 Geolocation_Middle_Bin Content Description

Name	Description / Comment	Unit	Type	Size (binary)
Longitude_of_Middle_Bin	Latitude of the start point of the profile middle bin	10-6degN	IntAl	4
Latitude_of_Middle_Bin	Longitude of the start point of the profile middle bin.	10-6degE	IntAl	4
Altitude_of_Middle_Bin	Bottom altitude of the middle bin.	m	Fadoxy	8
Total size in bytes				**16**

Table 3-39 SCA_Optical_Property_Middle_Bin Content Description

Name	Description / Comment	Unit	Type	Binary
Mid_Extinction	Particle extinction coefficient of the middle bin. Missing value: -1e+06.	$10^{-6} * m^{-1}$	FAdoxy	8
Mid_Backscatter	Particle backscatter coefficient of the middle bin. Missing value: -1e+06.	$10^{-6} * m^{-1} * sr^{-1}$	FAdoxy	8
Mid_LOD	Particle LOD of the middle bin. Missing value: -1.		FAdoxy	8
Mid_BER	Particle backscatter-to-extinction ratio of the middle bin. Missing value: -1.	sr-1	FAdoxy	8
Mid_LR	Particle extinction-to-backscatter ratio of the middle bin. Missing value: -1.	sr	FAdoxy	8
Total size in bytes				**40**

Table 3-40 Attenuated_Backscatter_Values Content Description

Name	Description / Comment	Unit	Type	Binary
Attenuated_Molecular_Backscatter	Attenuated molecular backscatter on Rayleigh height bin. Missing value: 0.	$sr^{-1} * m^{-1}$	FAdoxy	8
Attenuated_Particulate_Backscatter	Attenuated particulate backscatter on Rayleigh height bin. Missing value: 0.	$sr^{-1} * m^{-1}$	FAdoxy	8
Total size in bytes				**16**

3.18 SCA-MLE Optical Properties Measurement Data Set

This MDS is only written if the SCA-MLE was applied to the input L1B BRC level data. So, the number of reported SCA-MLE MDS is less or equal to the number of input L1B BRCs.

Note: First results are provided, but the MLE algorithm is still in experimental status.

Table 3-41 SCA_MLE_Optical_Properties_MDS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the SCA-MLE profile covered by the present DSR. This is the centroid time of the first measurement of the profile.	UTC	DateTime	12
SLOD_psat	SCA_MLE SLOD above the first bin along the line of sight		Fadoxy	8

List_of_SCA_MLE_Optical_Properties	Structure containing SCA-MLE products for the BRC in the Rayleigh height levels, see Table 3-42 for structure description.		List of 24 structures	1344
Total size in bytes				**1364**

Table 3-42 SCA_MLE_Optical_Property Content Description

Name	Description / Comment	Unit	Type	Binary
Extinction	Particle extinction coefficient of the height bin. Missing value: -1e+06.	$10^{-6} * m^{-1}$	FAdoxy	8
Backscatter	Particle backscatter coefficient of the height bin. Missing value: -1e+06.	$10^{-6} * m^{-1} * sr^{-1}$	FAdoxy	8
LR	Particle lidar ratio. Missing value: -1.	sr	FAdoxy	8
BER	Particle backscatter-to-extinction ratio. Missing value: -1.	$(sr)^{-1}$	FAdoxy	8
SR	Scattering ratio of the height bin. Missing value: -1.		FAdoxy	8
LOD	Particle LOD of the height bin. Missing value: -1.		FAdoxy	8
SLOD	Particle SLOD of the height bin. Missing value: -1.		FAdoxy	8
Total size in bytes				**56**

3.19 AEL-PRO Optical Properties Measurement Data Set

This MDS is only written if the AEL-PRO was applied to the input L1B BRC level data. So, the number of reported AEL-PRO OPT MDS is less or equal to the number of input L1B BRCs.

Note: Overall_Quality flag for AEL-PRO data in the AEL_PRO product confidence data set is copied from the FM ADS, as FM data is input to the AEL-PRO algorithm. In addition to the AEL-FM algorithm, also the AEL-PRO algorithm is still in experimental status.

Table 3-43 AEL_PRO_Optical_Properties_MDS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the AEL-PRO profile covered by the present DSR. This is the centroid time of the first measurement of the profile.	UTC	DateTime	12
List_of_Measurement_AEL_PRO_Optical_Properties	Structure containing AEL-PRO products for the measurements of the BRC in the Mie bins, see Table 3-44 for structure description.		List of nmeas structures	18480
Total size in bytes				**18492**

Table 3-44 Measurement_AEL_PRO_Optical_Property Content Description

Name	Description / Comment	Unit	Type	Binary
Tropopause_Altitude	Tropopause altitude estimates using the CALIPSO method	m	FAdoxy	8
Retrieved_Lidar_Calibration_Constant	Estimated Lidar calibration constant Parameter currently not used.	ACCD_counts m^2sr	FAdoxy	8
List_of_Height_Bin_AEL_PRO_Optical_Properties	Structure containing AEL-PRO products for the Mie bins, see Table 3-45 for structure description.		List of 24 structures	600
Total size in bytes				**616**

Table 3-45 Height_Bin_AEL_PRO_Optical_Property Content Description

Name	Description / Comment	Unit	Type	Binary
Extinction	Particle extinction coefficient of the height bin. Missing value: -1e+06.	$10^{-6} * m^{-1}$	FAdoxy	8
LR	Particle lidar ratio. Missing value: -1.	sr	FAdoxy	8
Particle_Effective_Area_Radius	Particle effective area radius: Missing value: -1	microns	FAdoxy	8
Classification	Possible settings: 1: Water cloud 2: Ice cloud 3: Aerosol 0: Clear sky -3: Surface -2: Attenuated		IntAc	1
				25

3.20 MCA Optical Properties Measurement Data Set

This ADS is only written if the MCA was applied to the input L1B BRC level data. So, the number of reported MCA PCD ADS is less or equal to the number of input L1B BRCs.

Table 3-46 MCA_Optical_Properties_MDS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the MCA profile covered by the present DSR. This is the centroid time of the first measurement of the profile.	UTC	DateTime	12
List_of_MCA_Optical_Properties	Structure containing MCA products for the BRC in the Rayleigh height levels, see Table 3-47 for structure description.		List of 24 structures	576
Total size in bytes				**588**

Table 3-47 MCA_Optical_Property Content Description

Name	Description / Comment	Unit	Type	Binary
ClimBER	Particle backscatter-to-extinction ratio extracted from the climatology	sr^{-1}	FAdoxy	8
Extinction	Particle extinction of the bin. Missing value: -1e+06.	$10^{-6} * m^{-1}$	FAdoxy	8
LOD	Particle LOD of the bin. Missing value: -1.		FAdoxy	8
Total size in bytes				**24**

3.21 Auxiliary Meteorological Data Measurement Data Set

The Measurement Data Set for the synthetic signal calculated from the meteorological input data. This ADS is only written if the synthetic signal calculation algorithm was applied to the input L1B BRC level data. So, the number of reported AMD ADS is less or equal to the number of input L1B BRCs.

Table 3-48 AMD_ADS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the BRC covered by the present DSR.	UTC	DateTime	12

List_of_AMD_Properties	List of structure containing molecular atmospheric data, see Table 3-49 for structure definition.		List of 24 structures	1824
Total size in bytes				**1836**

Table 3-49 AMD_Property Content Description

Name	Description / Comment	Unit	Type	Binary
Pressure_FP	NWP pressure in current Rayleigh bin.	Pa	IntAl	4
Temperature_FP	NWP temperature in current Rayleigh bin.	10^{-2}*K	IntAus	2
FrequencyShift_FP	Doppler frequency shift in current Rayleigh bin derived from NWP wind velocity estimation.	10^{6}*Hz	FAdoxy	8
RelativeHumidity_FP	NWP relative humidity in current Rayleigh bin.		FAdoxy	8
MolecularLOD_FP	NWP-derived molecular local optical depth in current Rayleigh bin.		FAdoxy	8
MolecularBackscatter_FP	NWP-derived molecular backscatter coefficient in current Rayleigh bin.	10^{-6} * m^{-1} * sr^{-1}	FAdoxy	8
Pressure_Fiz	NWP pressure in current Mie bin.	Pa	IntAl	4
Temperature_Fiz	NWP temperature in current Mie bin.	10^{-2}*K	IntAus	2
FrequencyShift_Fiz	Doppler frequency shift in current Mie bin derived from NWP wind velocity estimation.	10^{6}*Hz	FAdoxy	8
RelativeHumidity_Fiz	NWP relative humidity in current Mie bin.		FAdoxy	8
MolecularLOD_Fiz	NWP-derived molecular local optical depth in current Mie bin.		FAdoxy	8
MolecularBackscatter_Fiz	NWP-derived molecular backscatter coefficient in current Mie bin.	10^{-6} * m^{-1} * sr^{-1}	FAdoxy	8
Total size in bytes				**76**

3.22 Group Optical Properties Measurement Data Set

This Measurement Data Set shall be reported for all groups identified in all the input L1B BRCs. Thus, the number of data sets reported exceeds the number of input L1B BRCs.

Table 3-50 Group_Optical_Properties_MDS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the group profile covered by the present DSR. This is the centroid time of the first measurement of the group.	UTC	DateTime	12
Height_Bin_Index	Index of the height level of the group in Rayleigh scale.		IntAuc	1
Group_Optical_Property	Structure containing particle products in the group's height level, see Table 3-51 for structure description.		Structure	32
Group_Geolocation_Middle_Bins	Horizontal averaged coordinates of the boundaries of the middle bins over the group. See Table 3-52 for structure description.		Structure	48
Group_Optical_Property_Middle_Bins	Structure containing the averages values for the group. See Table 3-53 for structure description.		Structure	64
Total size in bytes				**157**

Table 3-51 Group_Optical_Property Content Description

Name	Description / Comment	Unit	Type	Binary
Group_Extinction	Particle extinction coefficient of the height bin. Missing value: -1e+06.	$10^{-6} * m^{-1}$	FAdoxy	8
Group_Backscatter	Particle backscatter coefficient of the height bin. Missing value: -1e+06.	$10^{-6} * m^{-1} * sr^{-1}$	FAdoxy	8
Group_LOD	Particle LOD of the height bin. Missing value: -1.		FAdoxy	8
Group_SR	Scattering ratio of the height bin. Missing value: -1.		FAdoxy	8
Total size in bytes				**32**

Table 3-52 Group_Geolocation_Middle_Bins Content Description

Name	Description / Comment	Unit	Type	Size (binary)
Start_Longitude_of_Group	Latitude of the start point of the two group middle bins.	10-6degN	IntAl	4
Start_Latitude_of_Group	Longitude of the start point of the two group middle bins.	10-6degE	IntAl	4
Start_Altitude_of_Group	Altitude of the start point of the two middle bins.	m	Fadoxy	8
Mid_Longitude_of_Group	Latitude of the mid point of the two group middle bins.	10-6degN	IntAl	4
Mid_Latitude_of_Group	Longitude of the mid point of the two group middle bins.	10-6degE	IntAl	4
Mid_Altitude_of_Group	Altitude of the mid point of the two middle bins.	m	Fadoxy	8
Stop_Longitude_of_Group	Latitude of the stop point of the two group middle bins.	10-6degN	IntAl	4
Stop_Latitude_of_Group	Longitude of the stop point of the two group middle bins.	10-6degE	IntAl	4
Stop_Altitude_of_Group	Altitude of the stop point of the two middle bins.	m	Fadoxy	8
Total size in bytes				**48**

Table 3-53 Group_Optical_Property_Middle_Bins Content Description

Name	Description / Comment	Unit	Type	Binary
Mid_Extinction_Top	Particle extinction coefficient of the top middle bin. Missing value: -1e+06.	$10^{-6} * m^{-1}$	FAdoxy	8
Mid_Backscatter_Top	Particle backscatter coefficient of the top middle bin. Missing value: -1e+06.	$10^{-6} * m^{-1} * sr^{-1}$	FAdoxy	8
Mid_LOD_Top	Particle LOD of the top middle bin. Missing value: -1.		FAdoxy	8
Mid_BER_Top	Backscatter-to-extinction ratio of the top middle bin. Missing value: -1.	sr-1	FAdoxy	8
Mid_Extinction_Bot	Particle extinction coefficient of the bottom middle bin. Missing value: -1e+06.	$10^{-6} * m^{-1}$	FAdoxy	8
Mid_Backscatter_Bot	Particle backscatter coefficient of the bottom middle bin. Missing value: -1e+06.	$10^{-6} * m^{-1} * sr^{-1}$	FAdoxy	8
Mid_LOD_Bot	Particle LOD of the bottom middle bin. Missing value: -1.		FAdoxy	8
Mid_BER_Bot	Backscatter-to-extinction ratio of the bottom middle bin. Missing value: -1.	sr-1	FAdoxy	8
Total size in bytes				**64**

3.23 Scene Classification Measurement Data Set

This Measurement Data Set shall be reported for all groups identified in all the input L1B BRCs. Thus, the number of data sets reported exceeds the number of input L1B BRCs.

Table 3-54 Scene_Classification_ADS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the group profile covered by the present DSR. This is the centroid time of the first measurement of the group.	UTC	DateTime	12
Height_Bin_Index	Index of the height level of the group in Rayleigh scale.		IntAuc	1
Aladin_Cloud_Flag	Flag testifying for various pieces of information inferred from instrumental data and from NWP relative humidity. 4 flags are included in this one: TopClBER: 1 if the BER of the upper middle bin is lesser than a given threshold under which a cloud is assumed. 0 else. DownClBER: 1 if the BER of the lower middle bin is lesser than the threshold. 0 else. ClSR: 1 if the scattering ratio in the bin is greater than a given threshold above which a cloud is assumed. 0 else. ClRH: 1 if the relative humidity is greater than a given threshold. 0 else. It is built as: TopClBER+2*DownClBER+4*ClSR+8*ClRH. Interpretation of single bits: 0: no cloud. 1: the BER says there is a cloud in the upper middle bin, but not in the lower one. Nor the SR and the RH foresee a cloud. 2: the BER says there is a cloud in the lower middle bin, but not in the upper one. Nor the SR and the RH foresee a cloud. 3: the BER says there is a cloud in both middle bins. Nor the SR and the RH foresee a cloud. 4: only the SR says there is a cloud. 5: SR & upper BER find a cloud. 6: SR & lower BER find a cloud. 7: SR & both BERs find a cloud. 8: only the RH from NWP finds a cloud in at least a part of the bin.. 9: RH & upper BER find a cloud. 10: RH & lower BER find a cloud. 11: RH & both BERs find a cloud. 12: RH & SR find a cloud. 13 RH & SR & upper BER find a cloud. 14: RH & SR & lower BER find a cloud. 15: all flags say there is a cloud.		IntAuc	1

NWP_Cloud_Flag	Flag testifying for various pieces of information about the cloud composition inferred from NWP data. ClContent is based on clwc & ciwc analysis and ClTp on the temperature analysis, in case the lidar detects a cloud unforeseen by the model. - ClContent: 0 if no cloud is forecasted; 1 if there is only a liquid phase; 2 if there is a mixed liquid+solid phase (i.e. clwc and ciwc are, each taken separately, >0 in at least one region of the group); 3 if there is only a solid phase. - ClTp: 1 if there is only a liquid phase (T>273.15K); 2 if there is a probability of a mixed liquid+solid phase (233.15K<T<273.15K); 3 if there is only a solid phase (T<273.15K). It is built as: ClTp + 3*ClContent. 1: no cloud forecasted but if one is detected, it will be in liquid phase. 2: no cloud forecasted but if one is detected, it may be in mixed phase. 3: no cloud forecasted but if one is detected, it will be in solid phase. 4: liquid cloud forecasted. 5: liquid cloud forecasted but if one is detected, it may be in mixed phase. 6: liquid cloud forecasted but if one is detected, it may be in solid phase (very unlikely). 7: mixed phase cloud forecasted but if one is detected, it will be in liquid phase (very unlikely). 8: mixed phase cloud forecasted. 9: mixed phase cloud forecasted but if one is detected, it will be in solid phase(very unlikely). 10: solid phase cloud forecasted but if one is detected, it will be in liquid phase (very unlikely). 11: solid phase cloud forecasted but if one is detected, it may be in mixed phase. 12: solid cloud forecasted.		IntAuc	1
L2A_Group_Class_Reliability	Coefficient characterising the reliability of the classification.		FAdoxy	8
Spare_1				1
Total size in bytes				**24**

3.24 Feature Mask Annotation Data Set

This Annotation Data Set shall be reported for all valid input L1B BRCs. So, the number of reported FM ADS is less or equal to the number of input L1B BRCs.

Note: Overall_Quality flag for Feature Mask data is set to 0 as long as the algorithm is still in experimental status.

Table 3-55 Feature_Mask_ADS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the feature mask data covered by the present DSR. This is the centroid time of the first measurement of the profile.	UTC	DateTime	12
Overall_Quality	Flag set to 1 in case Feature Mask of this BRC is considered to be of good quality, otherwise 0. Currently set fixed to 0 as long as algorithm is in experimental status.		IntAuc	1
List_of_Feature_Mask_Indices	Structure containing containing feature index for all lidar bins of each measurement of the BRC. See Table 3-56 for structure definition.		List of 30 * 24 structures	720
Total size in bytes				**733**

Table 3-56 Feature_Mask_Index Content Description

Name	Description / Comment	Unit	Type	Binary
Feature_Mask_Index	Index for specific height bin in specific measurement. For L2A products generated with the L2A prototype, all indices are set to -2, as the Feature Mask is not retrieved by the prototype. Possible settings: -3 (sub-)surface data -2 no retrievals -1 Fully Rayleigh attenuated 0 clear sky 1 most likely molecular 2 very likely molecular 3 more likely molecular 4 likely only molecules 5 expected low altitude aerosol (not retrieved) 6 likely clouds or aerosols 7 more likely clouds or aerosols 8 very likely clouds or aerosols 9 most likely clouds 10 Clouds present		IntAc	1
Total size in bytes				**1**

3.25 Mie Spectrometer Attenuated Backscatter Annotation Data Set

This Annotation Data Set shall be reported for all input L1B BRCs that have been processed with the AEL-PRO. So, the number of reported MSP-ATB ADS is less or equal to the number of input L1B BRCs.

Table 3-57 MSP_ATB_ADS Content Description

Name	Description / Comment	Unit	Type	Binary
Start_Time	Start date and time of the MSP_ATB profile covered by the present DSR. This is the centroid time of the first measurement of the profile.	UTC	DateTime	12
List_of_Effective_Msp_Spectral_Responses	List of effective MSP spectral responses, see Table 3-58 for structure description.		List of 16 structures	64
Number_of_Detected_Missed_Hot_Pixels	Number of detected suspect hot-pixels per observation interval summed over all heights and useful pixels. Parameter currently not used.		IntAul	4
List_of_Height_Bin_Emsr_Data_Used_Masks	Structure containing the EMSR mask for the Mie bins, see Table 3-59 for structure description.		List of 24 structures	24
List_of_Measurement_MSP_ATB_Properties	Structure containing MSP_ATB products for the measurements of the BRC in the Mie bins, see Table 3-60 for structure description.		List of nmeas structures	11520
Total size in bytes				**11624**

Table 3-58 Effective_Msp_Spectral_Response Content Description

Name	Description / Comment	Unit	Type	Binary
Effective_Msp_Spectral_Response	Effective MSP spectral response function for a column of the MSP estimated using clear sky MSP spectra.		FP32	4
Total size in bytes				**4**

Table 3-59 Height_Bin_Emsr_Data_Used_Mask Content Description

Name	Description / Comment	Unit	Type	Binary
Emsr_Data_Used_Mask	Mask: 1==> This observation-height interval was used in the EMSR determination.		IntAuc	1
Total size in bytes				**1**

Table 3-60 Measurement_MSP_ATB_Property Content Description

Name	Description / Comment	Unit	Type	Binary
List_of_Height_Bin_MSP_ATB_Properties	Structure containing MSP_ATB properties for the Mie bins, see Table 3-61 for structure description.		List of 24 structures	384
Total size in bytes				**384**

Table 3-61 Height_Bin_AEL_PRO_Optical_Property Content Description

Name	Description / Comment	Unit	Type	Binary
Attenuated_Mie_Backscatter_Msp	Attenuated particulate backscatter derived using the MSP data only.	1/m/sr	FP32	4
Err_Attenuated_Mie_Backscatter_Msp	Estimated 1-sigma error in Attenuated_Mie_Backscatter_Msp.	1/m/sr	FP32	4
Attenuated_Rayleigh_Backscatter_Msp	Attenuated particulate backscatter derived using the MSP data only.	1/m/sr	FP32	4
Err_Attenuated_Rayleigh_Backscatter_Msp	Estimated 1-sigma error in Attenuated_Rayleigh_Backscatter_Msp.	1/m/sr	FP32	4
Total size in bytes				**16**

3.26 Size

Table 3-62 summarizes the typical product size for Aeolus Level 2A products. The size of the product will not necessarily be fixed, so the sizes given are only rough approximations. This assumes an orbit contains ~450 observations, N_Max = 30 measurements, and 6 groups per BRC are found.

The upper bound of the number of L1B input BRCs is used to estimate the sizes for the SCA and MCA profile data reported on L1B input BRC level.

Note: ICA data sets have been deleted from the size estimation table; deletion is not marked as change.

Table 3-62 L2A file size estimation

	Section	Format	Size per orbit in bytes
Header File	FH	XML	~ 650
	MPH	XML	~ 1800
	SPH	XML	~ 7854
Total size in bytes for HDR file			**~ 10300**

Data Block	MPH	KVT	1247	
	SPH	KVT	6859	
	Geolocation_ADS	Binary	13887450	
	Meas_PCD_ADS	Binary	477450	
	SCA_PCD_ADS	Binary	1075050	
	SCA_MLE_PCD_ADS	Binary	9265050	
	AEL_PRO_PCD_ADS	Binary	8005050	
	MCA_PCD_ADS	Binary	16200	
	AMD_PCD_ADS	Binary	46800	
	Group_PCD_ADS	Binary	294300	
	SCA_Optical_Properties_MDS	Binary	6208200	
	SCA_MLE_MDS	Binary	613800	
	AEL_PRO_MDS	Binary	8321400	
	MCA_Optical_Properties_MDS	Binary	264600	
	AMD_ADS	Binary	826200	
	Group_OPT_MDS	Binary	423900	
	SCL_ADS	Binary	64800	
	Feature_Mask_ADS	Binary	329850	
	MPS_ATB_ADS	Binary	5230800	
Total size in bytes for DBL file			**55359006**	**~ 55.5 MB**

4 L2A Processing Parameters

The L2A Processing Parameters file is a file in XML format. All size values given in the following tables are estimated lower bound sizes.

4.1 Product Structure

The Level 2A product structure corresponds to the product structure described in [AD-3].

4.2 File Name

The Level 2A Processing Parameters auxiliary file name has the format defined in section 3.2:

AE_CCCC_AUX_PAR_2A_yyyymmddThhmmss_99991231T235959_vvvv.EEF

The date/times represent the start and stop of the validity period. This validity period will generally extend over a long period of time. The product file has an extension .EEF to designate a single file in XML format.

4.3 File Structure

The Level 2A Processing Parameters product is contained in one product file containing Fixed Header and Main Product Header as defined in sections 3.5 and 3.6 respectively, as well as a Specific Product Header and a Data Set as described in following subsections. All headers and data sets are in XML format.

4.4 FH

See also section 3.5.

Table 4-1 Fixed Header of AUX_PAR_2A file

Tag Name	Content Description	Unit	Type	
Fixed_Header	Root tag		String	29
File_Name	Logical file name without the extension		String	83
File_Description	One line description of the file		String	72
Notes	Multi-lines free text		String	50
Mission	String representing the mission name ('Aeolus' for the ADM-Aeolus mission). Note that, in the File_Name, the Mission ID is a two character string ('AE' for the ADM-Aeolus mission)		String	43
File_Class	This order type is a 4 character string. Currently the order types "TEST", "OPER", "RPRO" and "OFFL" are defined. The list of order types may be expanded or modified depending on operational needs.		String	49
File_Type	The part of the file name that gives the file class. Here, AUX_PAR_2A.		String	33
Validity_Period	See Table 4-2 for structure description		Structure	145
File_Version	The vvvv part of the file name (see §5.1).Set to 0001.		Integer	33
Source	See Table 4-3 for structure description		Structure	171
Total size for XML FH in bytes:				**708**

Table 4-2 Validity_Period Content Description

Tag Name	Content Description	Unit	Type	
Validity_Start	The validity of a file is managed by the PDGS environment itself, see [AD-4]. Omitting the micro seconds, Validity_Start time equals Sensing_Start of Table 4-4.	UTC	DateTime	56

Validity_Stop	The validity of a file is managed by the PDGS environment itself, see [AD-4]. Omitting the micro seconds,Validity_Stop time equals Sensing_Stop of Table 4-4. To indicate the end of the mission, the special value: 'UTC=9999-12-31T23:59:59' can be used.	UTC	DateTime	54
Total size for XML FH in bytes:				**110**

Table 4-3 Source Content Description

Tag Name	Content Description	Unit	Type	
System	Set to "Manual".		String	21
Creator	Set to "Manual".		String	29
Creator_Version	Set to "01.00"		String	40
Creation_Date	Date/time of creation.	UTC	DateTime	64
Total size for XML FH in bytes:				**154**

4.5 MPH

See also section 3.6.

Table 4-4 Main Product Header of AUX_PAR_2A file

Tag Name	Content Description	Unit	Type	
Main_Product_ Header	Root tag for XML format only		Structure	43
Product	Logical file name, i.e. the file name excluding the extension		String	73
Proc_Stage	Processing stage flag: 'N' for nominal process-ing (quasi-or close to real-time), 'T' for test product, 'R' for reprocessed.		Enum	27
Ref_Doc	Reference document describing the product		String	10
Spare_1			Spare	10
Acquisition_Station	Acquisition station ID		String	49
Proc_Center	Processing center ID		String	32
Proc_Time	Set to Creation_Date	UTC	DateTime	53
Software_Ver	Software version number of processing software. Format: name of processing software(up to 10 characters)/version number (4 characters)		String	21
Baseline	Baseline identifier (as provided by the Job Order File)		String	51
Spare_2			Spare	10
Sensing_Start	Set to Validity_Start thereby omitting the micro sec-onds part.	UTC	DateTime	61
Sensing_Stop	Set to Validity_Stop thereby omitting the micro sec-onds part.	UTC	DateTime	59
Spare_3			Spare	10
Phase	Phase number. If not used set to 'X'		Enum	16
Cycle	Cycle number		IntAuc	19
Rel_Orbit	Start relative orbit number		IntAs	29
Abs_Orbit	Start absolute orbit number		IntAs	29
State_Vector_Time	Time of state vector	UTC	DateTime	69
Delta_UT1	Delta_UT1 = UT1-UTC	s	FAdo06	40
X_Position	X position in Earth-fixed reference	m	FAdo73	32
Y_Position	Y position in Earth-fixed reference	m	FAdo73	32
Z_Position	Z position in Earth-fixed reference	m	FAdo73	32

X_Velocity	X velocity in Earth-fixed reference	m/s	FAdo46	34
Y_Velocity	Y velocity in Earth-fixed reference	m/s	FAdo46	34
Z_Velocity	Z velocity in Earth-fixed reference	m/s	FAdo46	34
Vector_Source	Source of orbit vectors (not used by ADM-Aeolus), set to "GP".		String	33
Spare_4			Spare	10
Utc_Sbt_Time	Time corresponding to SBT below (not used by ADM-Aeolus)	UTC	DateTime	59
Sat_Binary_Time	Satellite Binary Time (not used by ADM-Aeolus)		IntAul	46
Clock_Step	Clock step size (not used by ADM-Aeolus)	ps	IntAul	46
Spare_5			Spare	10
Leap_Utc	Time of occurrence of the leap second	UTC	DateTime	51
Gps_Utc_Time_Difference	Difference between GPS and UTC before time of occurrence of the next leap second		IntAc	55
Leap_Sign	Leap second sign (+001 if positive leap second, -001 if negative)		IntAc	27
Leap_Err	Leap second error. '1' if leap second error occurs during processing segment, '0' otherwise		Boolean	25
Spare_6			Spare	10
Product_Err	Set to "FALSE".		Boolean	32
Tot_Size	Set to "-1".	bytes	IntAd	37
Sph_Size	Set to "-1".	bytes	IntAl	37
Num_Dsd	Set to "1".		IntAl	21
Dsd_Size	Set to "-1".	bytes	IntAl	38
Num_Data_Sets	Set to "1".		IntAl	33
Spare_7			Spare	10
Total size for XML MPH in bytes				**1489**

4.6 SPH

Table 4-5 Specific Product Header of the AUX_PAR_2A file

Name	Description / Comment	Unit	Type	
Specific_Product_Header	Root tag for XML format only.		Structure	45
Sph_Descriptor	Set to "AUX_PAR_2A_SPECIFIC_HEADER".		String	59
List_of_Dsds	List of data set descriptors. See Table 4-6 for structure definition		List of 1 Structure	296
Total size for XML SPH in bytes				**400**

Table 4-6 AUX_PAR_2A List_of_Dsds Content Description

Name	Description / Comment	Unit	Type	XML
Dsd	Data set descriptor. See Table 4-7 for structure description.		Structure	267
Total size in bytes				**267**

Table 4-7 Dsd Content Description

Name	Description / Comment	Unit	Type	
Ds_Name	Set to "Level_2A_Proc_Params".		String	39
Ds_Type	Set to "G" for Global Annotation Data Set.		Enum	20
Filename	Set to "Unused".		String	27

Ds_Offset	Set to “1”.		IntAd	37
Ds_Size	Set to “1”.		IntAul	36
Num_Dsr	Number of data set records in data set.		IntAl	20
Dsr_Size	Set to “1”.		IntAl	38
Byte_Order	“3210 for binary DS’s to designate byte order is most significant byte first.		String	29
Spare_1			Spare	10
Total size for XML SPH in bytes				**256**

4.7 Level 2A Processing Parameters GADS

Table 4-8 Level 2A Processing Parameters GADS DSR

Name	Description / Comment	Unit	Type	XML
Level_2A_Processing_Parameters	Root tag.		Structure	65
FH_Default_Fields	Values responsible for populating the fixed header. See Table 4-9 for structure definition.		Structure	336
MPH_Default_Fields	Values responsible for populating the main product header. See Table 4-10 for structure definition		Structure	153
Config_Params	Configurable processing parameters. See Table 4-11 for structure definition.		Structure	12657
System_Params	System set-up parameters. See Table 4-44 for structure definition.		Structure	126
Total size in bytes				**13337**

Table 4-9 Level 2A Processing Parameters GADS FH_Default_Fields Content Description

Name	Description / Comment	Unit	Type	XML
File_Description	1-line description of the file		String	53
Notes	Multi-lines free text		String	40
Mission	Set to "Aeolus".		String	25
Mission_Id	Set o "AE".		String	27
File_Class	Set to "TEST".		String	29
File_Version	Set to "0001".		String	33
System	Set to "Aeolus L2aP".		String	21
Creator	Set to "AE_L1B_L2A".		String	29
Creator_Version	Set to "3.10".		String	40
Total size in bytes				**297**

Table 4-10 Level 2A Processing Parameters GADS MPH_Default_Fields Content Description

Name	Description / Comment	Unit	Type	XML
Ref_Doc	Reference document describing the product		String	32
Software_Ver	Current software version that uses this file.		String	43
Proc_Centre	Set to "Local".		String	37
Total size in bytes				**112**

Table 4-11 Level 2A Processing Parameters GADS Config_Params Content Description

Name	Description / Comment	Unit	Type	XML
ATB	Structure containing configurable parameters and look-up table of the ATB calculation algorithm. See Table 4-12 for structure description.		Structure	5652

AEL_PRO	Structure containing configurable parameters of the AEL_PRO algorithm. See Table 4-15 for structure description.		Structure	2403
Feature_KNMI	Structure containing configurable parameters of the KNMI feature mask algorithm. See Table 4-22 for structure description.		Structure	1280
SAMS	Structure containing configurable parameters of the Synthetic Accumulated Molecular Signal Construction algorithm. See Table 4-28 for structure description.		Structure	474
L2Ap	Structure containing configurable parameters of the L2A processor itself. See Table 4-30 for structure description.		Structure	2817
Total size in bytes				**12626**

Table 4-12 Level 2A Processing Parameters GADS ATB Content Description

Name	Description / Comment	Unit	Type	XML
G_Ray	The fraction of particulate backscatter that is detected by the (non-central) pixels of the MSP detector assigned to the "virtual Rayleigh channel" (zero Doppler-shift).		Fadoxy	39
G_Mie	The fraction of particulate backscatter that is detected by the (central) pixels of the MSP detector assigned to the "virtual Mie channel" (zero Doppler-shift).		Fadoxy	39
P_Xt_Lookup	Pressure grid for the F_Ray and F_Mie look-up table, consisting of N_P = 6 pressure values	hPa	N_P * Fadoxy	176
T_Xt_Lookup	Pressure grid for the F_Ray and F_Mie look-up table, consisting of N_T = 15 pressure values	K	N_T * Fadoxy	401
List_of_F_Rays	List of F_Ray values. See Table 4-13 for structure description.		List of N_T Structures	2493
List_of_F_Mies	List of F_Mie values. See Table 4-14 for structure description.		List of N_T Structures	2493
Total size in bytes				**5641**

Table 4-13 Level 2A Processing Parameters GADS List_of_F_Rays Content Description

Name	Description / Comment	Unit	Type	XML
F_Ray	The fraction of molecular backscatter that is detected by the (central) pixels of the MSP detector assigned to the "virtual Rayleigh channel" (zero Doppler shift). Array of N_P entries of the look-up table for F_Ray.		N_P * Fadoxy	164

Table 4-14 Level 2A Processing Parameters GADS List_of_F_Mies Content Description

Name	Description / Comment	Unit	Type	XML
F_Mie	The fraction of molecular backscatter that is detected by the (central) pixels of the MSP detector assigned to the "virtual Mie channel" (zero Doppler shift). Array of N_P entries of the look-up table for F_Mie.		N_P * Fadoxy	164

Table 4-15 Level 2A Processing Parameters GADS AEL_PRO Content Description

Name	Description / Comment	Unit	Type	XML
ATB_Creation	Structure containing configurable parameters of the ATB creation. See Table 4-16 for structure description.		Structure	848
Multiple_Scattering_Parameters	Structure containing configurable parameters of the masking. See Table 4-17 for structure description.		Structure	119
Masking	Structure containing configurable parameters of the masking. See Table 4-18 for structure description.		Structure	327

Classification	Structure containing configurable parameters of the classification. See Table 4-19 for structure description.		Structure	242
Prior	Structure containing configurable prior parameters. See Table 4-20 for structure description.		Structure	658
Dfp_Min	Structure containing configurable Dfp_Min parameters for the algorithms. See Table 4-21 for structure description.		Structure	190
Total size in bytes				**2384**

Table 4-16 Level 2A Processing Parameters GADS ATB Creation Content Description

Name	Description / Comment	Unit	Type	XML
Ip_Mie_1	Left pixel defininig the Mie virtual channel on the ACCD (not counting the leading 2 pixels)	Pixels	IntAuc	22
Ip_Mie_2	Right pixel defininig the Mie virtual channel on the ACCD (not counting the leading 2 pixels)	Pixels	IntAuc	23
Cal_Fit_Order	Order of polynomical to use in the Rayleigh signal fitting procedure in the calibration routine		IntAuc	33
Cal_Z_Min	Minimum altitude to consider [m] for calibration procedure	m	Fadoxy	29
Cal_Z_Max	Maximum altitude to consider [m] for calibration procedure	m	Fadoxy	29
Cal_R_Min	Minimum scattering ratio to consider for calibration procedure		Fadoxy	26
Cal_R_Max	Maximum scattering ratio to consider for calibration procedure		Fadoxy	26
Cal_Std_Dev_Fit_Limit	Number of standard deviations away from the mean to allow when fitting the lidar calibration coefficient with observation.		Fadoxy	55
Cal_Min_Number_Of_Points	Minimum number of points required to determine the lidar calibration constants.		IntAus	56
Cal_Number_Of_Wrap_Points	Number of wrap around points to use in the fitting procedure.		InrAus	59
Apply_Dynamic_EMSR	If set to 1, then determine EMSR (TOBS replacement) using clear-sky values and apply that instead of the values in the L1b input		IntAuc	42
Z_Trop_Lower	Lower limit for tropopause search	m	Fadoxy	35
Z_Trop_Upper	Upper limit for tropopause search	m	Fadoxy	35
Dz_Above_Trop_EMSR	Seach window exclusion-zone above trop level for dynamic EMSR determination	m	Fadoxy	47
Dz_Below_Trop_EMSR	Seach window below trop level for dynamic EMSR determination	m	Fadoxy	47
Z_Min_EMS	Minimum altitude for dynamic EMSR determination	m	Fadoxy	31
R_Thresh_EMSR	Effective R threshold to be used to determine clear-air EMSR		Fadoxy	34
Apply_Excess_Noise_Factor	If set to 1, then apply the in-situ extimated excess noise factor in the noise calculations, if set to 0 then fix excess_noise_factor_per_pixel to 1		IntAuc	56
Detect_Missed_Hot_Pixels	If set to one then try to detect and correct for missed Hot Pixels		IntAuc	54
Hp_Half_Window	1/2 window size to use in hot-pixel line detection	Pixels	Fadoxy	34
Hp_Line_Test_Thresh	Threhold to use for line detection in HP detection routine	LSB/pixels	Fadoxy	46
Total size in bytes				**819**

Table 4-17 Level 2A Processing Parameters GADS Multiple_Scattering_Parameters Content Description

Name	Description / Comment	Unit	Type	XML
Fov_T	Full-angle receiver effective field-of-view	mrads	Fadoxy	23
Div_Laser	Full-sngla transmitter divergence	mrads	Fadoxy	31
Total size in bytes				**54**

Table 4-18 Level 2A Processing Parameters GADS Masking Content Description

Name	Description / Comment	Unit	Type	XML
FM_Fill_Alt	Fill the FM input near the ground: e.g. assume there is always areosol present	km	Fadoxy	30
FM_Thresh	If ALE-FM is greather than or equal to this threshold then a feature is assumed to be present	km	Fadoxy	27
Strong_Feature_Beta_Thresh	Mie ATB values above this level are assumed to be strong features	m-1sr-1	Fadoxy	63
Strong_Feature_R_Thresh	R (scattering ratio) values above this level are assumed to be strong features		Fadoxy	54
Strong_Feature_FM_Thresh	AEL-FM values at or above this level are assumed to be strong features		Fadoxy	56
R_Fill_Thresh	If R_profile-sd_R_profile > R_fill_thresh then AEL-FM is adjusted to be max(5,AEL-FM)		Fadoxy	35
FM_Fill_R_Thres	If R_profile less than 0 and FM less than FM_Fill_R_Thres, then we assume a strong attenuation adn assume a feature is present.		Fadoxy	43
Total size in bytes				**308**

Table 4-19 Level 2A Processing Parameters GADS Classification Content Description

Name	Description / Comment	Unit	Type	XML
Sd_ATB_Mie_Factor	In simple class if ATB_MIE_profile-sd_ATB_MIE_profile/sd_ATB_MIE_factor then there is at least aerosol there		Fadoxy	42
Cld_R_Thresh	In simple class R-sd_R > 2.0 then there may be a cloud of some sort		Fadoxy	32
Cld_ATB_Thresh	In simple class ATB_MIE_profile > cld_ATB_thresh then there may be a cloud of some sort	m-1sr-1	Fadoxy	39
Water_Cld_R_Thresh	In simple class R-sd_R > water_cld_R_thresh then there is a water cloud for sure		Fadoxy	45
Water_Cld_ATB_Thresh	In simple class ATB_MIE_profile > water_cld_ATB_thresh then there is a water cloud	m-1sr-1	Fadoxy	51
Total size in bytes				**209**

Table 4-20 Level 2A Processing Parameters GADS Prior Content Description

Name	Description / Comment	Unit	Type	XML
DC_Lid_Adjust_Factor	Ad-Hoc multiplicative adjustment of lidar calibration constant		Fadoxy	48
Water_Cld_Depol	A priori value of water cld depol (due to MS)		Fadoxy	38
Water_Cld_S	A priori value of water S		Fadoxy	31
Water_Cld_D_S	A priori value of water S relative uncertainity		Fadoxy	34
Water_Cld_Ra	A priori value of water effective area radius		Fadoxy	32
Water_Cld_D_Ra	A priori value of water Ra relative uncertainity		Fadoxy	36
Water_Cld_Eta_O	Fixed value of eta for water		Fadoxy	43
Ice_Cld_Depol	A priori value of ice cld depol (due to MS)		Fadoxy	34
Ice_Cld_S	A priori value of ice S		Fadoxy	27
Ice_Cld_D_S	A priori value of ice S relative uncertainity		Fadoxy	30
Ice_Cld_Ra	A priori value of ice effective area radius		Fadoxy	29
Ice_Cld_D_Ra	A priori value of ice Ra relative uncertainity		Fadoxy	32
Ice_Cld_Eta_O	Fixed value of eta for ice		Fadoxy	35
Aerosol_Depolue	A priori value of ice cld depol (due to MS)		Fadoxy	38
Aerosol_S	A priori value of ice S		Fadoxy	27

Aerosol_D_S	A priori value of ice S relative uncertainity		Fadoxy	30
Aerosol_Ra	A priori value of ice effective area radius		Fadoxy	28
Aerosol_D_Ra	A priori value of ice Ra relative uncertainity		Fadoxy	32
Aerosol_Eta_O	Fixed value of eta for aerosol		Fadoxy	39
Total size in bytes				**643**

Table 4-21 Level 2A Processing Parameters GADS Dfp_Min Content Description

Name	Description / Comment	Unit	Type	XML
Maximum_Step	Maximum allows step side in line minimization search step		Fadoxy	32
Gradient_Tolerance	Check for convergence on zero gradient		Fadoxy	47
Relative_Tolerance	Check for convergence on successive iterations		Fadoxy	47
Maximun_Iterations	Maximum number of iterations		Fadoxy	45
Total size in bytes				**171**

Table 4-22 Level 2A Processing Parameters GADS Feature_KNMI Content Description

Name	Description / Comment	Unit	Type	XML
Sensor_Config	Structure containing configurable parameters of the sensor. See Table 4-23 for structure description.		Structure	513
Algorithm_Configuration	Structure containing configurable parameters for the algorithms. Table 4-24 for structure description.		Structure	738
Total size in bytes				**1251**

Table 4-23 Level 2A Processing Parameters GADS Sensor_Config Content Description

Name	Description / Comment	Unit	Type	XML
Noise_Channel_Lower_Height	Lower height for which the mean noise level in the channel is calculated.	m	Fadoxy	64
Noise_Channel_Upper_Height	Upper height for which the mean noise level in the channel is calculated.	m	Fadoxy	64
PRF_Lidar	Pulse reapeat frequency of ALADIN.	Hz	Fadoxy	27
Surf_Multiply	The value for which the Mie signals have to be above the noise to detect surface.		Fadoxy	47
Sat_Velocity	Velocity of the ADM satellite	km/s	Fadoxy	32
Max_Gap_Statistics	Maximum size of the gap allowed for which the atmospheric statistics does not change (~60 km)	m	Fadoxy	48
Surface_Diff_DEM	Maximum difference between Lidar surface and DEM information allowed.	m	Fadoxy	42
Dual_Surface_Return_Factor	Fraction of the 4 pixels above surface to assign as additional surface peak.		Fadoxy	60
S1_S2_Min_Jump_Ratio	The minimum ratio between the first (s1) to second (s2) pixel required to set s1 as surface.		Fadoxy	48
S0_S1_Max_Jump_Ratio	The maximum ratio between the surface signal (s0) and the first pixel (s1) to set s1 as surface.		Fadoxy	50
Total size in bytes				**482**

Table 4-24 Level 2A Processing Parameters GADS Algorithm_Configuration Content Description

Name	Description / Comment	Unit	Type	XML
Feature_Mask	Structure containing configurable parameters of the KNMI Feature Mask algorithm. See Table 4-25 for structure description.		Structure	242

Gauss_Fitting	Structure containing configurable parameters of the Gaussian fitting of the KNMI algorithm. See Table 4-26 for structure description.		Structure	173
Max_Entropy	Structure containing configurable parameters of max_entropy function of the KNMI algorithm. See Table 4-27 for structure description.		Structure	272
Total size in bytes				**687**

Table 4-25 Level 2A Processing Parameters GADS Feature_Mask Content Description

Name	Description / Comment	Unit	Type	XML
Prob_Mie_Min_Val	Minimum probability value accepted by hybrid median masking		Fadoxy	41
Prob_Ray_Max_Val	Maximum Rayleigh probability value accepted by hybrid median masking (between 0 and 100)		Fadoxy	41
Always_Feature	Minimum probability for which the pixel is always assigned as feature		Fadoxy	37
Hybrid_Median_Iteration	Number of iterations performed with the hybrid median algorithm.		IntAuc	52
Hybrid_Median_Size	Width of the hybrid median window.		IntAuc	42
Total size in bytes				**213**

Table 4-26 Level 2A Processing Parameters GADS Gauss_Fitting Content Description

Name	Description / Comment	Unit	Type	XML
Gauss_Version	Possible entries are "Quadratic" and "MultiGauss".		Enum	40
N_Histo	Number of histogram data points.		IntAus	22
Histo_Min_Val	Minimum histogram value.		Fadoxy	34
Gauss_Ratio	Ratio for which signal has to exceed the gaussian fit to be qualified as feature		4 * Fadoxy	46
Total size in bytes				**142**

Table 4-27 Level 2A Processing Parameters GADS Max_Entropy Content Description

Name	Description / Comment	Unit	Type	XML
Convol_Dims	Size in pixels of the convolution kernel (x,z) used		2 * IntAuc	31
Convol_Size	Gaussian width of the convolution kernel (x,z) used in the procedure (sig=value/alog(8))		IntAuc	28
Convol_Params	Defines the iteration steps after which the convolution results are checked for gaussian fit.		4 * IntAus	44
Max_Feat_Convol	Maximum value of the featuremask assigned per convolution (negative=full stat.)		4 * IntAuc	42
N_Convol	Number of iterations for convolution		IntAus	24
Prob_Noise_Val	Factor for surface noise probability.		Fadoxy	44
Surface_Noise	Value given to the lowest bin to increase chance of finding surface values		IntAuc	32
Total size in bytes				**245**

Table 4-28 Level 2A Processing Parameters GADS SAMS Content Description

Name	Description / Comment	Unit	Type	XML
Wavelength	Laser wavelength.	m	Fadoxy	33
Maximum_Altitude	Altitude up to which AMD profiles are calculated.	m	IntAul	42
Minimum_Altitude	Altitude down to which AMD profiles are calculated.	m	IntAs	42
Altitude_Step	Vertical resolution of the calculation of AMD profiles.	m	IntAus	36

Betam_Factor	Multiplicative factor in the formula to get the molecular backscatter coefficient from atmospheric data.	1/m/sr	Fadoxy	37
Reference_Wavelength	Reference wavelength in the formula to get the molecular backscatter coefficient from atmospheric data.	m	Fadoxy	53
Wavelength_Exponent	Exponent of the ratio of wavelengths in the formula to get the molecular backscatter coefficient from atmospheric data.		Fadoxy	53
Reference_Pressure	Reference pressure in the formula to get the molecular backscatter coefficient from atmospheric data.	hPa	IntAus	46
Reference_Temperature	Reference temperature in the formula to get the molecular backscatter coefficient from atmospheric data	K	IntAus	52
MatchAMD	Structure containing the parameters for the algorithm that identifies the AMD profiles that match the L1B measure-ments. See Table 4-29 for structure description.		Structure	67
Total size in bytes				**461**

Table 4-29 Level 2A Processing Parameters GADS MatchAMD Content Description

Name	Description / Comment	Unit	Type	XML
Time_Gap_Threshold	Threshold lesser than which the delay between a meas-urement and an AMD profile must be.	s	IntAus	46
Total size in bytes				**46**

Table 4-30 Level 2A Processing Parameters GADS L2Ap Content Description

Name	Description / Comment	Unit	Type	XML
Quality_Flag	Structure containing the different thresholds used to provide a data quality flag on each of the main L2A optical proper-ties: particle extinction and backscatter coefficients, backscatter-to-extinction. See for structure description.		Structure	**596**
Find_Matching_Bins	Structure containing configurable parameters of the matching bin finder between both channels. See for structure description.		Structure	99
Radiometric_Correction	Structure containing parameters used for the radiometric cor-rection algorithm. See for structure description.		Structure	318
Denoising_Optimizer	Structure containing parameters used for the denoising algo-rithm. See for structure description.		Structure	486
Cloud_Screening	Structure containing parameters used for the cloud screening algorithm. See for structure description.		Structure	154
Feature_Finder	Structure containing configurable parameters of the feature finder. See for structure description.		Structure	229
SCA	Structure containing configurable parameters of the SCA. See for structure description.		Structure	255
Trans2LOD	Structure containing configurable parameters of the Trans2LOD. See for structure description.		Structure	199
MCA	Structure containing configurable parameters of the MCA. See for structure description.		Structure	66
Scene_Classification	Structure containing configurable parameters of the scene classification. See for structure description.		Structure	380
Total size in bytes				**2782**

Table 4-31 Level 2A Processing Parameters GADS Quality_Flag Content Description

Name	Description / Comment	Unit	Type	XML
Mie_Snr_Threshold	Threshold on the Mie SNR to consider the Mie signal as valid		IntAus	41

Rayleigh_Snr_Threshold	Threshold on the Rayleigh SNR to consider the Rayleigh signal as valid		IntAus	49
Mid_Mie_Snr_Threshold	Threshold on the Mie SNR defined on middle bins to consider the Mie signal as valid		IntAus	47
Mid_Rayleigh_Snr_Threshold	Threshold on the Rayleigh SNR defined on middle bins to consider the Rayleigh signal as valid		IntAus	57
Beta_Error_Bar_Threshold	Threshold on the relative error of particle backscatter retrieval (ratio of the variance of the particle backscatter coefficient to the particle backscatter coefficient)	%	IntAus	53
Alpha_Error_Bar_Threshold	Threshold on the relative error of particle extinction retrieval (ratio of the variance of the particle extinction coefficient to the particle extinction coefficient)	%	IntAus	55
Mid_Beta_Error_Bar_Threshold	Threshold on the relative error of particle backscatter retrieval on middle bins (ratio of the variance of the particle backscatter coefficient to the particle backscatter coefficient defined on middle bins)	%	IntAus	61
Mid_Alpha_Error_Bar_Threshold	Threshold on the relative error of particle extinction retrieval on middle bins (ratio of the variance of the particle extinction coefficient to the particle extinction coefficient defined on middle bins)	%	IntAus	63
Total_Optical_Depth_Threshold	Threshold above which we consider that the backscattered signal was totally attenuated by absorption.		IntAus	63
BER_Max_Threshold	Above this value, the BER retrieval is supposed to be invalid	1/sr	Fadoxy	39
BER_Min_Threshold	Below this value, the BER retrieval is supposed to be invalid	1/sr	Fadoxy	39
Total size in bytes				**567**

Table 4-32 Level 2A Processing Parameters GADS Find_Matching_Bins Content Description

Name	Description / Comment	Unit	Type	XML
Altitude_Match_Threshold	Threshold lesser than which the gap between a Rayleigh bin border and a Mie bin border must be for them to match.	m	IntAus	58
Total size in bytes				**58**

Table 4-33 Level 2A Processing Parameters GADS Radiometric_Correction Content Description

Name	Description / Comment	Unit	Type	XML
Radiometric_Correction_Switch_On	If radiometric correction shall be applied, set to '1', else '0'.		IntAuc	70
Min_Signal_Level	Minimum signal level for observed signal to be used for the radiometric correction.	ACCD counts	Fadoxy	57
Rho_Threshold	SR threshold for selection of aerosol free bins within the height regime specified by Lower_Height and Upper_Height.		Fadoxy	32
Lower_Height	Lower boundary of height regime for signals used for radiometric correction.	m	IntAus	39
Upper_Height	Upper boundary of height regime for signals used for radiometric correction.	m	IntAus	39
Filter_Size	2*Filter_Size + 1 is used as the window size for the median filter applied to energy corrected Kray/Kmie derived from aerosol free bins on BRC level.		IntAus	31
Total size in bytes				**268**

Table 4-34 Level 2A Processing Parameters GADS Denoising_Optimizer Content Description

Name	Description / Comment	Unit	Type	XML
Denoising_Optimizer_Switch_On	Switch for denoising algorithm. If set to 1, the algorithm is run, 0 otherwise.		IntAus	67

Tolerance	Tolerance parameter for controlling the L-BFGS convergence		Fadoxy	28
Max_Iter	Maximum number of L-BFGS iterations		Fadoxy	24
Scale	Scaling factor for physical regularization		Fadoxy	19
Init_LR	Initial lidar ratio value for physical regularization	sr	Fadoxy	21
Lower_LR_Bound	Lower lidar ratio limit for physical regularization	sr	Fadoxy	34
Upper_LR_Bound	Upper lidar ratio limit for physical regularization	sr	Fadoxy	36
Lower_LR_Bound_for_Error_Calculation	Lower lidar ratio limit for error estimation	sr	Fadoxy	78
Upper_LR_Bound_for_Error_Calculation	Upper lidar ratio limit for error estimation	sr	Fadoxy	80
Homogeneity_Assumption_On	Switch to error calculation from Poisson noise hypothesis if set to 1		IntAus	56
Total size in bytes				**443**

Table 4-35 Level 2A Processing Parameters GADS Cloud_Screening Content Description

Name	Description / Comment	Unit	Type	XML
LR_for_Cloud_Beta_Calculation	Lidar ratio value for cloud backscatter derivation from total cloud extinction	sr	Fadoxy	65
Derived_Beta_Threshold	Backscatter threshold for cloud mask (i.e. value from which the bins are flagged cloud contaminated)	1/(m*sr)	Fadoxy	54
Total size in bytes				**119**

Table 4-36 Level 2A Processing Parameters GADS Feature_Finder Content Description

Name	Description / Comment	Unit	Type	XML
FF_Mie_SNR_Threshold	SNR threshold used in median filter.		Fadoxy	50
FF_Median_Filter_Width	Width given as number of measurements used to smooth SNR values.		IntAus	46
FF_Min_Group_Size	Minimum number of measurements needed to form a group.		IntAus	40
FF_Transmission_Threshold	Transmission threshold used in median filter.		Fadoxy	60
Total size in bytes				**196**

Table 4-37 Level 2A Processing Parameters GADS SCA Content Description

Name	Description / Comment	Unit	Type	XML
Clear_FMB_Beta_Threshold	Particulate backscatter coefficient value below which the first matching bin will be considered empty of any particle, introducing thus no oscillating bias in the extinction retrieval.	1/(m*sr)	Fadoxy	61
Negative_Betap_Threshold	Particulate backscatter coefficient value below which the coefficient and its derivatives will be considered invalid and set to -1. Slightly ngative values may be accepted to catch a glimps of the oscillations around zero.	1/(m*sr)	Fadoxy	61
Negative_SLOD_Threshold	SLOD value below which the coefficient and its derivatives will be considered invalid and set to -1. Slightly negative values may be accepted to catch a glimps of the oscillations around zero.		Fadoxy	59
Negative_Betap_Threshold2	Particulate backscatter coefficient value below which the coefficient and its derivatives will be considered invalid and set to -1. Slightly negative values may be accepted to catch a glimps of the oscillations around zero.	1/(m*sr)	Fadoxy	63

Total size in bytes	**244**

Table 4-38 Level 2A Processing Parameters GADS ICA Content Description

Name	Description / Comment	Unit	Type	XML
Emptiness_Betap_Threshold	Particulate backscatter coefficient value below which it is considered that there is no significant amount of particles. Note that it may be the same as for the feature finder.	1/(m*sr)	Fadoxy	63
Negative_Betap_Threshold	Negative value under which fluctuations are considered to be too high, leading to a rejection of the bin.	1/(m*sr)	Fadoxy	61
List_of_Filling_Cases	Array of the factors enabling case assumption in the equations, see for structure description		List of 3 structures	296
Credibility_Criterion	Particulate backscatter coefficient value below which the coefficient and its derivatives will be considered invalid and set to -1. Slightly negative values may be accepted to catch a glimps of the oscillations around zero.		Fadoxy	55
Max_Cloud_Width	Maximum number of consecutive height bins with cloud allowed for ICA algorithm.		IntAuc	36
Total size in bytes				**511**

Table 4-39 Level 2A Processing Parameters GADS List_of_Filling_Cases Content Description

Name	Description / Comment	Unit	Type	XML
Filling_Case	Factors for one specific filling case, see Table 4-40 for structure description.		Structure	83
Total size in bytes				**83**

Table 4-40 Level 2A Processing Parameters GADS Filling_Case Content Description

Name	Description / Comment	Unit	Type	XML
F1	Factor of the constant member.		Fadoxy	18
F2	Factor of the H function.		Fadoxy	18
F3	Factor of the exponential function.		Fadoxy	18
Total size in bytes				**54**

Table 4-41 Level 2A Processing Parameters GADS Trans2LOD Content Description

Name	Description / Comment	Unit	Type	XML
Iteration_Max	Maximum number of iterations in the iterative estimation of the SLOD.		IntAus	36
Inversion_Tolerance	Maximum gap between the ratio of the normalized two-way transmission and the squared transmission from the satellite to the bin and the value resulting of the SLOD estimation.		Fadoxy	51
Asymptotic_Expansion_Limit_Coefficient	Coefficient involved in the determination of the asymptotic expansion to be used in the inversion to get the SLOD. It's value is set to 0.4 and may be static.		Fadoxy	89
Total size in bytes				**176**

Table 4-42 Level 2A Processing Parameters GADS MCA Content Description

Name	Description / Comment	Unit	Type	XML

Low_SR_fine_Threshold	Value below which the SR_fine frim L1B data is considered not vali. Note that the default value of 0.75 will obviously lead to quantitatively wrong results, but the shape of the variations may be ept in the calculation thus enabling some interpretation.		Fadoxy	55
Total size in bytes				**55**

Table 4-43 Level 2A Processing Parameters GADS Scene_Classification Content Description

Name	Description / Comment	Unit	Type	XML
Scattering_Ratio_Cloud_Threshold	Value of the SR above which the presence of a cloud is strongly assumed.		Fadoxy	77
BER_Cloud_Threshold	Value of the BER below which the presence of a cloud is strongly assumed.	1/(m*sr)	Fadoxy	51
Water_Melting_Temperature	Set to 273.15 K for 1 bar pressure.	K	Fadoxy	63
Surfusion_Threshold_Temperature	Temperature down to which supercooled water may be seen in the atmosphere. Set to 233.15 K.	K	Fadoxy	65
Relative_Humidity_Cloud_Threshold	RH value above which the presence of a cloud is strongly assumed. Taking the incertitude of the model, it is set to 0.94.		Fadoxy	79
Total size in bytes				**335**

Table 4-44 Level 2A Processing Parameters System_Params Content Description

Name	Description / Comment	Unit	Type	XML
Simulated_Data_Flag	Set to TRUE if input L1B product was generated of E2S simulated data.		Boolean	48
Random_Seed_Value	Seed value for random number generation used in high resolution ATB calculation.		Fadoxy	47
Total size in bytes				**95**

4.8 Size

The size figures given here are just an estimation of the size of the XML file.

Table 4-45 Overall size of AUX_PAR_2A file

	Section	Format	Size per file
Header	FH	XML	708
	MPH	XML	1489
	SPH	XML	400
	Level_2A_Proc_Params_ADS	XML	13248
Total size in bytes for XML file			**15845**

5 Auxiliary Climatology Dataset

Auxiliary Climatology look-up tables are contained in the AUX CLM L2 data product. The initial tables have been generated by KNMI, but maintenance has been taken over by the L2A team, which will provide updated versions if applicable.

They contain values for the extinction-to-backscatter ratio for aerosols as function of location and time of the year.

5.1 Product Structure

The Level 2A product structure corresponds to the product structure described in [AD-3].

5.2 File Name

The Clim data file name has the format defined in Section 3.2:

AE CCCC AUX CLM_L2_yyyymmddThhmmss_yyyymmddThhmmss_vvvv.EEE

The extension EEE is HDR for the header and DBL for the data block.

5.3 File Structure

The Clim product consists of two files.

- A header containing a Fixed Header, MPH, and SPH with DSDs. The header is in XML format and has extension EEE='HDR'.
- A datablock containing a copy of MPH and SPH in KVT format followed by the DataSets in binary format. The data block has the file extension EEE='DBL'.

5.4 FH

See also section 3.5.

Table 5-1 AUX_CLM Fixed Header Content Description

Tag Name	Content Description	Unit	Type	Size (XML)		
Fixed_Header	Root Tag		Structure		29	
File_Name	Logical file name without the extension		String	11	62	13
File_Description	One line description of the file		String	18	32	20
Notes	Multi-lines free text		String	7	32	9
Mission	String representing the mission name ('Aeolus' for the ADM-Aeolus mission). Note that, in the File_Name, the Mission ID is a two character string ('AE' for the ADM-Aeolus mission)		String	9	6	11
File_Class	OPER or TEST (file type as indicated in the file name)		String	12	4	14
File_Type	The part of the file name that gives the file type. Here AUX_CLM_L2.		String	11	10	13
Validity_Period	See Table 5-2 for structure description		Structure	18	112	19
File_Version	The vvvv part of the file name (see section 3.2)		Integer	14	4	16
Source	See Table 5-3 for structure description		Structure	9	172	10
Total size for XML FH in bytes:					**697**	

Table 5-2 AUX_CLM Fixed Header Validity_Period Content Description

Tag Name	Content Description	Unit	Type	Size (XML)		
Validity_Start	Validity start time as specified in the file name. To indicate the beginning of the mission, the special value: 'UTC=0000-00-00T00:00:00' can be used.	UTC	DateTime	16	23	18
Validity Stop	Validity stop time as specified in the file name. To indicate the end of the mission, the special value: 'UTC=9999-99-99T99:99:99' can be used.	UTC	DateTime	15	23	17
Total size in bytes					**112**	

Table 5-3 AUX_CLM Fixed Header Source content description

Tag Name	Content Description	Unit	Type	Size (XML)		
System	Name of facility in charge of running the L2A processor.		String	8	19	10
Creator	L2A_ProcMain (official name of L2A processor).		String	9	12	11

Creator_Version	Version of L2AP used for the generation of the present product file.		String	17	12	19
Creation_Date	Date/time of creation.	UTC	DateTime	15	23	17
Total size in bytes:				**172**		

5.5 MPH

See also section 3.6.

Table 5-4 AUX_CLM Main Product Header

Tag Name	Content Description	Unit	Type	Size (KVT)			Size (XML)		
Main_Product_Header	Root tag for XML format only.		Structure	0	0	0	43		
Product	Logical file name, extension i.e., file name excluding the		String	9	62	2	9	62	11
Proc_Stage	Processing stage flag: 'N' for nominal process-ing (quasi-or close to real-time), 'T' for test product, 'R' for reprocessed.		Enum	11	1	1	12	1	14
Ref_Doc	Reference document describing the product		String	9	23	2	9	23	11
Spare_1			Spare	40	0	1	10	0	11
Acquisition_Station	Acquisition station ID		String	21	20	2	21	20	23
Proc_Center	Processing centre ID		String	13	6	2	13	6	15
Proc_Time	Time of processing	UTC	DateTime	11	27	2	11	23	13
Software_Ver	Software version number of processing soft-ware. Format: name of processor (up to 10 characters)/version number(4 characters)		String	14	14	2	14	14	16
Baseline	Baseline identifier (as provided by the Job Order File)		String	10	29	2	10	29	11
Sensing_Start	Start time of sensing	UTC	DateTime	15	27	2	15	23	17
Sensing_Stop	Stop time of sensing	UTC	DateTime	14	27	2	14	23	16
Spare_3			Spare	40	0	1	10	0	11
Phase	Phase number. If not used set to 'X', copied from L1B input product header.		Enum	6	1	1	7	1	9
Cycle	Cycle number, copied from L1B input product header.		IntAuc	6	4	1	7	4	9
Rel_Orbit	Start relative orbit number, copied from L1B input product header.		IntAs	10	6	1	11	6	13
Abs_Orbit	Start absolute orbit number, copied from L1B input product header.		IntAs	10	6	1	11	6	13
State_Vector_Time	Time of state vector, copied from L1B input product header.	UTC	DateTime	19	27	2	19	23	21
Delta_UT1	Delta_UT1 = UT1-UTC, copied from L1B input product header.	s	FAdo06	10	8	4	11	8	13
X_Position	X position in Earth-fixed reference, copied from L1B input product header.	m	FAdo73	11	12	4	12	12	14
Y_Position	Y position in Earth-fixed reference, copied from L1B input product header.	m	FAdo73	11	12	4	12	12	14
Z_Position	Z position in Earth-fixed reference, copied from L1B input product header.	m	FAdo73	11	12	4	12	12	14
X_Velocity	X velocity in Earth-fixed reference, copied from L1B input product header.	m/s	FAdo46	11	12	6	12	12	14
Y_Velocity	Y velocity in Earth-fixed reference, copied from L1B input product header.	m/s	FAdo46	11	12	6	12	12	14
Z_Velocity	Z velocity in Earth-fixed reference	m/s	FAdo46	11	12	6	12	12	14
Vector_Source	Not used by ADM, set to fixed string 'GP'.		String	15	2	2	15	2	17
Spare_4			Spare	40	0	1	10	0	11

Utc_Sbt_Time	Time corresponding to SBT below (not used by ADM-Aeolus), copied from L1B input product header.	UTC	DateTime	14	27	2	14	23	16
Sat_Binary_Time	Satellite Binary Time (not used by ADM-Aeolus), copied from L1B input product header.		IntAul	16	11	1	17	11	19
Clock_Step	Clock step size (not used by ADM-Aeolus), copied from L1B input product header.	ps	IntAul	11	11	5	12	11	14
Spare_5			Spare	32	0	1	10	0	11
Leap_Utc	Time of occurrence of the next leap second	UTC	DateTime	10	27	2	10	23	12
Gps_Utc_Time_Difference	Difference between GPS and UTC before time of occurrence of the next leap second		IntAc	24	4	1	25	4	27
Leap_Sign	Leap second sign (+001 if positive leap second, -001 if negative)		IntAc	10	4	1		11	
Leap_Err	Leap second error. '1' if leap second error occurs during processing segment, '0' otherwise		Boolean	9	1	1	10	1	12
Spare_6			Spare	11	0	1	10	0	11
Product_Err	'1' or '0'. If '1', errors have been reported in the product. User should then refer to the SPH or Quality ADS of the product for details of the error condition. '0' otherwise.		Boolean	12	1	1	13	1	15
Tot_Size	Total size of product (#bytes DSR+SPH+MPH)	bytes	IntAd	9	21	8	10	21	12
Sph_Size	Length of SPH (#bytes in SPH)	bytes	IntAl	9	11	8	10	11	12
Num_Dsd	Number of DSDs		IntAl	8	11	1	9	11	11
Dsd_Size	Length of each DSDs (#bytes for each DSD, all DSDs shall have the same length	bytes	IntAl	9	11	8	10	11	12
Num_Data_Sets	Number of DSs attached (not all DSDs have a DS attached)		IntAl	14	11	1	15	11	17
Spare_7			Spare	40	0	1	10	0	11
Total size in bytes				**1247**			**1606**		

5.6 SPH

Table 5-5 AUX_CLM Specific Product Header

Name	Description / Comment	Unit	Type	Size (KVT)			Size (XML)		
Specific_Product_Header	Root tag for XML format only. Set to AEOLUS_L2A_SPECIFIC_HEADER		Structure	0	0	0		51	
Sph_Descriptor	Specific Product Header descriptor: ASCII string describing the product		String	16	28	2	16	28	18
Spare_1			Spare	40	0	1	10	0	11
AuxClim_Ref_Name	Reference name to indicate which set of climatological data was used for constructing this look-up-table.			18	50	2	18	50	20
Spare_2			Spare	40	0	1	10	0	11
List_of_Dsds	See section 5.7 for a description.				288			357	
Total size for KVT and XML in bytes					**486**			**600**	

5.7 Data Set Descriptors

In the AUX_CLIM data product only one annotation data set appears. It is described in the SPH, see [RD-4] for format of the DSD structure.

Table 5-6 AUX_CLM Data Sets

Num.	Data Set Descriptor Name	Content Description	Type	Update Frequency
1	AuxClim_ADS	DSD for climatology table. See Table 3.7 for a description.	A	1 DSR

5.8 AuxClim Data Set

Table 5-7 AuxClim_ADS

Name	Description / Comment	Unit	Type	Size (binary)
Num_DateTime_Ranges	Number of DateTime ranges used by this climatology (Typical values: 4 or 12)		IntAs	2
List_of_ClimDataAltLonLat	List of Num_DateTime_Ranges structures ClimDataAltLonLat containing the climatology as a function of Latitude, Longitude and Altitude (see Table 5-8) for a series of dates		Num_DateTime_Ranges structures	2754926
Total size in bytes				**2754928**

Table 5-8 List_of_ClimDataAltLonLat Data Set Content Description

Name	Description / Comment	Unit	Type	XML
ClimDataAltLonLat	Data for one specific date range. See Table 5-9 for structure description.		Structure	2754926
Total size in bytes				**2754926**

Table 5-9 ClimDataAltLonLat Data Set Content Description

Name	Description / Comment	Unit	Type	Size (binary)
StartDateTime	Start of timerange for which this data should be used	UTC	Date Time	12
EndDateTime	End of timerange for which this data should be used	UTC	Date Time	12
Num_Latitude_Ranges	Number of Latitude ranges used by this climatology (typical value: 18 or 90)		IntAs	2
List_of_ClimDataAltLon	List of Num_Latitude_Ranges structures ClimDataAltLon containing the climatology as a function of Longitude and Altitude (see Table 5-10) for the given date and latitude		Num_Latitude_Ranges structures	2754900
Total size in bytes				**2754926**

Table 5-10 List_of_ClimDataAltLon Data Set Content Description

Name	Description / Comment	Unit	Type	XML

ClimDataAltLon	Data for one specific latitude range. See Table 5-11 for structure description.		Structure	30610
Total size in bytes				**30610**

Table 5-11 ClimDataAltLon Data Set Content Description

Name	Description / Comment	Unit	Type	Size (binary)
StartLatitude	Start of latitude range for which this data should be used	10-6degN	IntAl	4
EndLatitude	End of latitude range for which this data should be used	10-6degN	IntAl	4
Num_Longitude_Ranges	Number of Longitude ranges used by this climatology (typical value: 36 or 180)		IntAs	2
List_of_ClimDataAlt	List of Num_Longitude_Ranges structures ClimDataAlt containing the climatology as a function of Altitude (see Table 5-12) for the given date, latitude, and longitude		Num_Latitude_Ranges structures	30600
Total size in bytes				**30610**

Table 5-12 List_of_ClimDataAlt Data Set Content Description

Name	Description / Comment	Unit	Type	XML
ClimDataAlt	Data for one specific longitude range. See Table 5-13 for structure description.		Structure	170
Total size in bytes				**170**

Table 5-13 ClimDataAlt Set Content Description

Name	Description / Comment	Unit	Type	Size (binary)
StartLongitude	Start of longitude range for which this data should be used	10-6degN	IntAl	4
EndLongitude	End of longitude range for which this data should be used	10-6degN	IntAl	4
Num_Altitude_Ranges	Number of altitude ranges used by this climatology (typical value: 4 or 10)		IntAs	2
List_of_ClimData	List of Num_Altitude_Ranges structures ClimData containing the climatology as a function of Altitude (see Table 5-14) for the given date, latitude, and longitude		Num_Latitude_Ranges structures	160
Total size in bytes				**170**

Table 5-14 List_of_ClimData Data Set Content Description

Name	Description / Comment	Unit	Type	XML
ClimData	Data for one specific altitude range. See Table 5-15 for structure description.		Structure	16
Total size in bytes				**16**

Table 5-15 ClimData Data Set Content Description

Name	Description / Comment	Unit	Type	Size (binary)
StartAltitude	Start of altitude range for which this data should be used	m	IntAl	4
EndALtitude	End of altitude range for which this data should be used	m	IntAl	4
S	Extinction-to-backscatter ratio	10-3 Sr	IntAl	4
S_stdev	Standard deviation of the reported extinction-to-backscatter ratio	10-3 Sr	IntAl	4
Total size in bytes				**16**

5.9 Size

For an example size estimation, the following numbers have been assumed: Num_DateTime_Ranges = 1, Num_Latitude_Ranges = 90, Num_Longitude_Ranges = 180, and Num_Altitude_Ranges = 10.

Table 5-16 AUX_CLM file size estimation

	Section	Format	Size per orbit in bytes	
Header File	FH	XML	~ 650	
	MPH	XML	~ 1800	
	SPH	XML	~ 4250	
Total size in bytes for HDR file			**~ 6700**	
Data Block	MPH	KVT	1247	
	SPH	KVT	486	
	AuxClim_ADS	Binary	2754928	
Total size in bytes for DBL file			**2756661**	**~ 27,5MB**

6 Auxiliary Meteorological Data

AUX_MET_12, see section 5.1 of [RD-1].

7 Calibration Coefficients

AUX_CAL_L2, see section 5.3 of reference [RD-10].