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Doc.-Title:	**WMO FM94 (BUFR) description** **ADM-Aeolus L1B/L2B products**
Number of pages:	36 pages
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Document Change Log

Issue.	Datum	New pages	Modified pages (after introducing new pages)	Observations	Name
Draft	01.11.2005	--	--	Draft	M.Rohn
Draft	12.12.2005	--	--	Remove full BUFR representation / keep pure input data to L2Bp/assimilation	M.Rohn
Draft	10.01.2006	--	--	after PM4 for distribution to ADMAG	M.Rohn
Draft	27.01.2006	--	--	Merge Obs and Meas scale into one template	M.Rohn
1.0	06.03.2006	--	--	Adopt scaling of elements and consolidated L1B definition	M.Rohn
1.1	29.02.2008		12, 14-15, 18-21, 36	For L2BP Release 1.2 onwards: increase Mie Reference Pulse and Spectrometer data from 18 to 20 entries. Other editorials.	D. Tan

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1 Introduction and Purpose of Document

This document defines the BUFR representation of ADM-Aeolus wind products corresponding to processing levels L1B and L2B. It is part of workpackage WP2310 which provides data handling software to link the output of the L1B processing at the Core PDS, provided in Earth Explorer (EE) format, to an operational NWP system as required by the three principal modes of the L2B processing [R4]. The document could be used as basis for a WMO approval of the BUFR representation of the L1B product in the future.

Chapter 3, 4, and 5 contain tables describing the mapping of EE parameters into appropriate BUFR elements. Chapter 6 contains all extensions needed to existing Code Tables together with required new Table B and Table D entries.

Since the definition of L1B and L2B data is still partly under development these lists are subject to future changes. Some elements still need to be clarified in order to assign an exact scaling to the corresponding Table B elements. A large number of new elements are very specific to satellite processing and quality screening and could be accommodated in an appropriate manner by satellite specific element tables. This feature is currently being discussed for future BUFR versions. The large quantity of ADM specific elements could also lead to the assignment of a new class of elements. Given these uncertainities, temporary descriptors are being assigned to all newly defined BUFR elements and grouped in the currently unused class “017”. The development of conversion software can be based on the temporary descriptors. A grouping of all elements into classes according to the existing BUFR conventions should be performed once the underlying IODD for L1B and L2B are more consolidated closer to a possible submission for WMO approval of the L1B template. However, a proposal for this element classification is also appended in the list of new elements in Chapter 5 in Table 5-3.

2 Requirements

2.1 Data structure

The Aeolus instrumental input data needed by the L2B processor are L1B measurements. For each BRC one L1B observation is derived at the CorePDS from a set of L1B measurements. The L2B processor derives a set of up to 5 wind profiles corresponding to different meteorological conditions along the sensing track of one BRC.

The L1B product and input to the L2B processor will be provided by ESA in BUFR format. The L2B wind profiles describe the actual observations being used by the analysis of a NWP centre. This process is different to the “classical” approach in that a NWP centre is provided with a L2B processor in order to derive the observations by using the background fields of its own NWP model. However, the L1B observations provide a benchmark to the L2B processing independent from NWP background information. The data flow within a NWP system might also need to represent L2B windprofiles in BUFR. Therefore, data templates are designed for the L1B input as well as for the L2B wind profiles.

This process introduces characteristic dimensions of the L1B and L2B products which need to be reflected by the data format:

Measurement scale

For each BRC measurement-scale data, including wind profiles, are provided on the basis of an on-board accumulation of laser return signals. The number of measurements is variable and does not exceed 67.

Observation scale

The measurements of one BRC are used in the L1B processing to derive one L1B observation representative for a horizontal integration length of about 50 Km.

As part of the L2B processing, different cloud conditions are distinguished. Accordingly, measurements are grouped into several observation wind profiles. The number of classes varies and does not exceed 5. The dependencies between these two scales are illustrated in Figure 1.

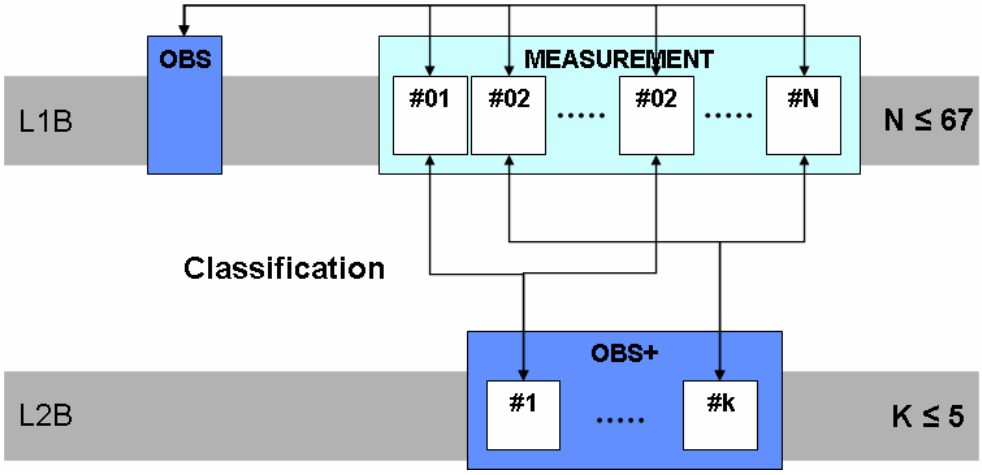

Figure 1: Dependencies between observation and measurement scales of the L1B and L2B wind profiles.

Besides this scales related to spatial aggregation of observations data of different validity periods are included. The L1B product contains also parameters describing instrument calibration valid for weeks or months as well as satellite characterization which can be considered constant during the lifetime of the satellite. Additionally, Rayleigh-Brillouin calibration (RBC) information is provided as separate data set. The RBC data contains lookup tables describing the instruments response to different pressure and temperature conditions. A detailed description of RBC data is given in [R5]. The size of the RBC data can not be neglected (expected 30 MB) and the information has no link to either the location or the time of observations. Therefore, it will be organized as a separate data set encoded in the ESA Earth-Explorer format and not be converted into BUFR. Note that the L2B processor depends on the supply of the actual L1B observation (BUFR) as well as the RBC data set. This is illustrated in Figure 2.

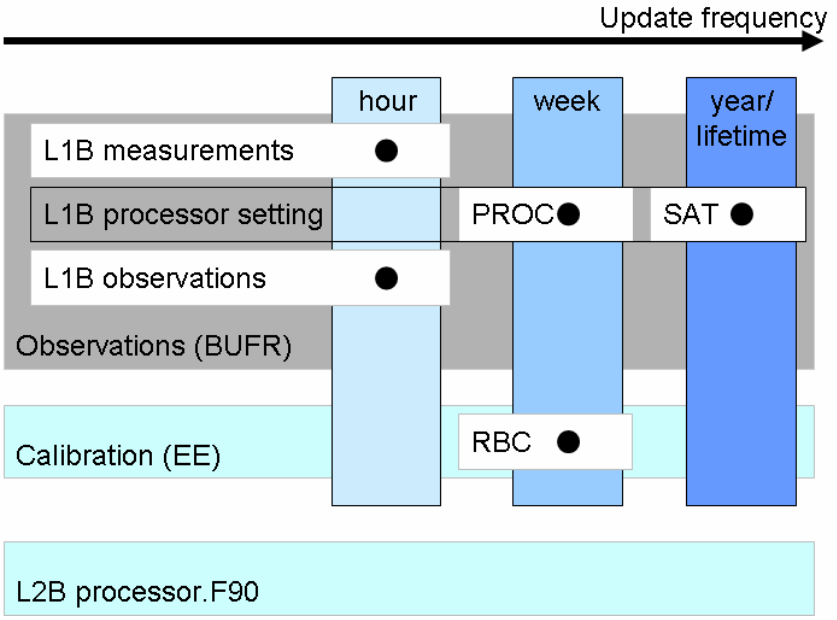

Figure 2: Typical validity period of different informations. Processor (PROC) and Satellite (SAT) specific elements are organized as part of the observational data. The Rayleigh-Brillouin calibration data is provided as separate data set.

2.2 Layout of templates

Different products are represented by separate templates which agree in a common header part. Each template corresponds to the BUFR concept of an observation subtype. A separation of the observation and measurement scale of the L1B products is avoided in order to facilitate the following processing of observations within a parallel computing environment. This leads to a rather long list of expanded list of descriptors (~80.000 in case of 67 measurements).

The following sections contain two BUFR templates corresponding to the L1B and the L2B product. Different tables are used to describe the corresponding EE data sections. The entire template is a simple concatenation of these tables.

The table columns list the following parameters:

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments

- **EE tag name** : Element name used in the EE format description
- **Ref Table** : Reference to the table in the corresponding EE format description document
- **No.** : Position of element within the BUFR template
- **Element name** : Element name according to BUFR Table B
- **Descript.** : Element descriptor according to BUFR Table B
- **Table B Scale** : Precision definition according to BUFR Table B
- **Table B Ref.Val.** : Reference value according to BUFR Table B
- **Table B Width** : number of bits attributed to element according to BUFR Table B
- **Units** : Physical unit as defined in BUFR Table B
- **Comments** : Additional information to explain usage of the template.

Table 2-1 gives an overview of the templates together with the length of the expanded descriptor list.

Table 2-1: BUFR templates and corresponding parameters.

ADM product	Observation type	Subtype	No. of elements
L1B	3	251	(N=67) 88.429
L2B	3	253	6.508

The characteristic dependencies between different data scales and corresponding dimensions are described by the following definitions:

Header elements

The two templates use an identical list of 18 header elements which serve to link the corresponding informations of L1B data on observation and measurement scale as well as the L2B observation data.

An unique identification of time and location is required in order to clearly describe any information. The master time chosen is the start of the observation for each BRC. The location of each profile is anchored by latitude, longitude, and altitude of the laser beam intersection with the digitial elevation model (DEM). Two string elements are included in order to identify the originating EE data. This feature is required to support the obligation of ECMWF as L2 meteorological processing facility to deliver on an operational basis the L2B product in EE format to ESA

Height Bin index

The characteristic profile dimension (24 levels) is repeated in various sections of the template. A Height Bin Index is introduced to clearly relate the different informations on each profile level. In case of the geolocation the upper boundary of the first level is identified by “Height Bin Index = 0”.

Measurement Index

Measurements belonging to one L1B BRC are repeated within one BUFR subset using a delayed replication factor. A measurement index is introduced to clearly mark each block by the array position within the EE data set array.

L2B classification

A new dimension corresponding to the L2B classification of cloud conditions (maximum 5 classes) is introduced. The L2B template provides space for a maximum of five observations by means of a replications factor. The Product Confidence section describes the exact conditions of that classification.

3 L1B product

3.1 Header data

These elements define a master time and position as anchor for the wind profiles and additional parameters. The header elements are repeated in the templates for L1B measurement and L2B data below.

Table 3-1: Identication and header information.

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		Satellite data origin							
		1	SATELLITE IDENTIFIER	001007	0	0	10	CODE	"600" for ADM Aeolus
		2	SATELLITE INSTRUMENT	002019	0	0	11	CODE	"130" for ALADIN
		3	ORIGINATING CENTER	001033	0	0	8	CODE	ESA="97"
		4	ORIGINATING SUB CENTER	001034	0	0	8	CODE	ECMWF="98"
		5	TIME SIGNIFI-CANCE	008021	0	0	2	CODE	Start of Scan = "28"
Start_of_Observa-tion_Time	*[R2] 2-3*								*Extract*
		Date sequence		**301011**					
		6	*YEAR*	*004001*	0	0	12	YEAR	
		7	*MONTH*	*004002*	0	0	4	MONTH	
		8	*DAY*	*004003*	0	0	6	DAY	
		Time sequence		**301012**					
		9	*HOUR*	*004004*	0	0	5	HOUR	
		10	*MINUTE*	*004005*	0	0	6	MIN	
		11	SECONDS WITHIN A MINUTE	004007	6	0	26	SEC	
		12	ADM INSTRU-MENT TARGET POSITION SIGNIFICANCE	017005	0	0	3	CODE	="5" OBS GEOID INTERSECT
		Position sequence		**331004**					
			CHANGE SCALE	*207001*					
Lati-tude_of_DEM_Inters ection	[R2] 2-18	*13*	*LATITUDE (HIGH ACCURACY)*	*005001*	6	-9 000 000	25	DEG	
Longi-tude_of_DEM_Inters ection	[R2] 2-18	*14*	*LONGITUDE (HIGH ACCURACY)*	*006001*	6	-18 000 000	26	DEG	
			CANCEL CHANGE SCALE	*207000*					
Alti-tude_of_DEM_Inters ection	[R2] 2-18	15	HEIGHT BIN ALTITUDE	017010	3	-10 000 000	28	M	
		L1B header							
		16	ADM DATA SECTION...	017002	0	0	4	CODE	HDR="0"
L1B_File_Name	*[R1] 3-4*								*Extract*
		17	PRODUCT NAME	017100	0	0	512	CCITT IA5	

3.2 L1B observation scale

This part of the BUFR template has to include all elements of the original L1B product which are input parameter to the L2B processor. All parameters provided on the observation scale are included here. The L1B observation wind profiles are included as baseline of the L2B processing. The different tables correspond to different data sections as described by the EE format [R1].

Table 3-2: Geolocation data.

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		Geoloc ADS							
		18	ADM DATA SECTION...	017002	0	0	4	CODE	GEO=”1”
Geoid_Separation_of_Height_Bin	[R2] 2-7	19	GEOID SEPARATION	017006	3	-2 000 000	22	M	
		Obs Mie Height.Bin.Geoloc. *P Repeated x(1+24)*							
		20	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	“Mie”=”0”
		P=0-24	REPLICATION FACTOR	102025					
		+P*7 + 1	HEIGHT BIN INDEX	017003	0	0	8	NUMERIC	
		Geoloc. of Height Bin		**331001**					
			CHANGE SCALE	*207001*					
Latitude_of_Height_bin	[R2] 2-11	+P*7 + 2	*LATITUDE (HIGH ACCURACY)*	*005001*	6	-9 000 000	25	DEG	
Longitude_of_Height_bin	[R2] 2-11	+P*7 + 3	*LONGITUDE (HIGH ACCURACY)*	*006001*	6	-18 000 000	26	DEG	
			CANCEL CHANGE SCALE	*207000*					
Altitude_of_Height_bin	[R2] 2-11	+P*7 + 4	*HEIGHT BIN ALTITUDE*	*017010*	3	-10.000.000	28	M	
Topocentric_Azimuth_of_Height_bin	[R2] 2-11	+P*7 + 5	*BEARING OR AZIMUTH*	*005021*	2	0	16	DEG TRUE	
Topocentric_Elevation_of_Height_bin	[R2] 2-11	+P*7 + 6	*ELEVATION (SEE NOTE 2)*	*007021*	2	-9 000	15	DEG	
Target_to_Sun_Visibility_flag	[R2] 2-11	+P*7 + 7	*(CBS) SUN-GLINT INDICATOR*	*008065*	0	0	2	CODE	
		Obs Rayleigh Height.Bin.Geoloc. *P Repeated x(1+24)*							
		196	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	“Rayleigh”=”1”
		P=0-24	REPLICATION FACTOR	102025					
		+P*7 + 1	HEIGHT BIN INDEX	017003	0	0	8	NUMERIC	
		Geoloc. of Height Bin		**331001**					
			CHANGE SCALE	*207001*					
Latitude_of_Height_bin	[R2] 2-11	+P*7 + 2	*LATITUDE (HIGH ACCURACY)*	*005001*	6	-9 000 000	25	DEG	

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
Longi-tude_of_Height_bin	[R2] 2-11	+P*7 + 3	*LONGITUDE (HIGH ACCURACY)*	*006001*	6	-18 000 000	26	DEG	
			CANCEL CHANGE SCALE	*207000*					
Alti-tude_of_Height_bin	[R2] 2-11	+P*7 + 4	*HEIGHT BIN ALTITUDE*	*017010*	3	-10 000 000	28	M	
Topocen-tric_Azimuth_of_Height_bin	[R2] 2-11	+P*7 + 5	*BEARING OR AZIMUTH*	*005021*	2	0	16	DEG TRUE	
Topocen-tric_Elevation_of_Height_bin	[R2] 2-11	+P*7 + 6	*ELEVATION (SEE NOTE 2)*	*007021*	2	-9 000	15	DEG	
Tar-get_to_Sun_Visibility_Flag	[R2] 2-11	+P*7 + 7	*(CBS) SUN-GLINT INDICATOR*	*008065*	0	0	2	CODE	

Table 3-3: Product confidence data.

EE tag name	Ref Table		Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		PCD ADS							
		372	ADM DATA SECTION...	017002	0	0	4	CODE	PCD=”2”
		Obs. Alt.Bin. PCD *Repeated x(1+24)*							
		P=0-24	REPLICATION FACTOR	102025					
		+P*2 + 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
Scatter-ing_Ratio_Mie	[R2] 2-22	+P*2 + 2	BACK SCATTER (HIGH ACCURACY)	017020	6	-67 108 863	27	dB	
		423	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	“Mie”=”0”
		Obs. Alt.Bin. PCD *Repeated x(1+24)*							
		P=0-24	REPLICATION FACTOR	103025					
		+P*3 + 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
		+P*3 + 2	FIRST ORDER STATISTICS	008023	0	0	6	CODE	STD = “10”
Mie_Wind_Velocity_Std_Dev	[R2] 2-22	+P*3 + 3	ADM LOS VELOCITY	017062	2	-32 767	16	M/S	
		499	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	“Rayleigh”=”1”
		Obs. Alt.Bin. PCD *Repeated x(1+24)*							
		P=0-24	REPLICATION FACTOR	103025					
		+P*3 + 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
		+P*3 + 2	FIRST ORDER STATISTICS	008023	0	0	6	CODE	STD = “10”
Rayleigh_Wind_Velocity_Std_Dev	[R2] 2-22	+P*3 + 3	ADM LOS VELOCITY	017062	2	-32 767	16	M/S	

Table 3-4: Ground wind detection data.

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		Ground Wind							
		575	ADM DATA SECTION...	017002	0	0	4	CODE	GWD="3"
		576	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie"="0"
Mie_Ground_Correction_Velocity	[R2] 2-29	577	ADM LOS GROUND CORRECTION VELOCITY	017030	2	-32 767	16	M/S	
Mie_Ground_Correction_Weighting_Factor	[R2] 2-29	578	ADM LOS GROUND CORRECTION WEIGHTING FACTOR	017031	2	0	7	NUMERIC	
		579	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Rayleigh"="1"
Rayleigh_Ground_Correction_Velocity	[R2] 2-29	580	ADM LOS GROUND CORRECTION VELOCITY	017030	2	-32 767	16	M/S	
Rayleigh_Ground_Correc-tion_Weighting_Factor	[R2] 2-29	581	ADM LOS GROUND CORRECTION WEIGHTING FACTOR	017031	2	0	7	NUMERIC	

Table 3-5: Measurement data.

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
Measurement ADS									
		582	ADM DATA SECTION...	017002	0	0	4	CODE	MEAS="4"
		Mie_Time_Delays *Background + 24*							
		583	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie"="0"
Background_Integration_Time	[R2] 2-39	584	BACKGROUND INTEGRATION TIME	017041	0	-32 767	16	NUMERIC	
		P=0-23	REPLICATION FACTOR	102024					
		+P*2 + 1	HEIGHT BIN INDEX	017003	0	0	8	NUMERIC	
Bin_Integration_Time	[R2] 2-41	+P*2 + 2	BIN INTEGRATION TIME	017040	0	-32 767	16	NUMERIC	
		Rayleigh_Time_Delays *Background + 24*							
		633	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Rayleigh"="1"
Background_Integration_Time	[R2] 2-40	634	BACKGROUND INTEGRATION TIME	017041	0	-32 767	16	NUMERIC	
		P=0-23	REPLICATION FACTOR	102024					
		+P*2 + 1	HEIGHT BIN INDEX	017003	0	0	8	NUMERIC	
Bin_Integration_Time	[R2] 2-41	+P*2 + 2	BIN INTEGRATION TIME	017040	0	-32 767	16	NUMERIC	

Table 3-6: Wind velocity data.

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		Wind Velocity ADS							
		683	ADM DATA SECTION...	017002	0	0	4	CODE	WV="6"
		Obs._Wind_Profile							
		Mie_Altitude_Bin_Wind_Info *Repeated x24*							
		684	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie"="0"
		P=0-23	REPLICATION FACTOR	102024					
		+P*3 + 1	HEIGHT BIN INDEX	017003	0	0	8	NUMERIC	
		Measurement data		**331002**					
Bin_Quality_Flag	[R2] 2-76	+P*3 + 2	*ADM BIN QUALITY FLAG*	*017060*	0	0	9	FLAG	
Wind_Velocity	[R2] 2-76	+P*3 + 3	*ADM LOS VELOCITY*	*017062*	2	-32 767	16	M/S	
		Rayleigh_Altitude_Bin_Wind_Info *Repeated x24*							
		757	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Rayleigh"="1"
		P=0-23	REPLICATION FACTOR	102024					
		+P*3 + 1	HEIGHT BIN INDEX	017003	0	0	8	NUMERIC	
		Measurement data		**331002**					
Bin_Quality_Flag	[R2] 2-77	+P*3 + 2	*ADM BIN QUALITY FLAG*	*017060*	0	0	9	FLAG	
Wind_Velocity	[R2] 2-77	+P*3 + 3	*ADM LOS VELOCITY*	*017062*	2	-32 767	16	M/S	
		829							

3.3 Calibration and Characterization Data

These parameters describe instrument calibration data and satellite characteristics required for the L2B processing. The information is not expected to change with every observation. However, the transmission together with the actual observation allows the L2B processor to immediate react to changes of the instrument characteristics.

Table 3-7: L1B characterization

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		830	ADM DATA SECTION...	017002	0	0	4	CODE	PS="7"
		L1B characterisation							
Laser_Wavelength	[R2] 2-46	831	LASER WAVELENGTH	017200	6	0	30	NANOM	
		832	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie"="0"
Mie_Error_Quantifier_K1	[R2] 2-47	833	ADM ERROR QUANTIFIER	017201	6	0	27	NUMERIC	
Mie_Error_Quantifier_K2	[R2] 2-47	834	ADM ERROR QUANTIFIER	017201	6	0	27	NUMERIC	
Mie_Error_Quantifier_K3	[R2] 2-47	835	ADM ERROR QUANTIFIER	017201	6	0	27	NUMERIC	

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		836	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Rayleigh" ="1"
Rayleigh_Error_Quantifier_Ka2	[R2] 2-47	837	ADM ERROR QUANTIFIER	017201	6	0	27	NU-MERIC	
Rayleigh_Error_Quantifier_Ka3	[R2] 2-47	838	ADM ERROR QUANTIFIER	017201	6	0	27	NU-MERIC	
Rayleigh_Error_Quantifier_Kb2	[R2] 2-47	839	ADM ERROR QUANTIFIER	017201	6	0	27	NU-MERIC	
Rayleigh_Error_Quantifier_Kb3	[R2] 2-47	840	ADM ERROR QUANTIFIER	017201	6	0	27	NU-MERIC	
List_of_Triod_Obscuration_Corrections	*[R2] 2-48*		*16 x FAdoxy*						
			Repeated x16						
			REPLICATION FACTOR	101016					
Tripod Obscuration Correction		841-856	ADM TRIPOD CORRECTION	017202	6	0	20	NU-MERIC	
		Mie Response Calibration							
		857	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie" ="0"
Calibration Valid	*[R2] 2-49*	858	ADM CALIBRATION VALIDITY CODE	017203	0	0	2	CODE	
List of Mie Fequency Step Results	*[R2] 2-49*								
			Repeated x60						
		C=0-59	REPLICATION FACTOR	106060					
Frequency Offset	*[R2] 2-53*	+C*6 +1	SATELLITE CHANNEL FREQUENCY OFFSET	017205	6	-16 777 215	25	GHz	
Frequency Valid	*[R2] 2-53*	+C*6 +2	ADM FREQUENCY VALIDITY CODE	017204	0	0	2	CODE	
Measurement Response	*[R2] 2-53*	+C*6 +3	ADM MEASUREMENT RESPONSE	017206	6	-33 554 431	26	NU-MERIC	
Measurement Error Mie Response	*[R2] 2-53*	+C*6 +4	ADM MEASURMENT RESPONSE ERROR	017207	6	-16 777 215	25	NU-MERIC	
Reference Pulse Response	*[R2] 2-53*	+C*6 +5	ADM REFERENCE PULSE RESPONSE	017208	6	-33 554 431	26	NU-MERIC	
Reference Pulse Error Mie Response	*[R2] 2-53*	+C*6 +6	ADM REFERENCE PULSE RESPONSE ERROR	017209	6	-16 777 215	25	NU-MERIC	
Measurement_Mean_Sensitivity	[R2] 2-56	1219	ADM MEASUREMENT RESPONSE SLOPE	017218	6	-16 777 215	25	1/GHz	
Measurement_Zero_Frequency	[R2] 2-56	1220	ADM MEASUREMENT RESPONSE INTERCEPT	017219	6	-33 554 431	26	NU-MERIC	
Measurement_Error_Mie_Response_Std_Dev	[R2] 2-56	1221	ADM MEASUREMENT RESPONSE STDDEV	017220	6	0	24	NU-MERIC	
Reference_Pulse_Mean_Sensitivity	[R2] 2-58	1222	ADM REFERENCE PULSE RESPONSE SLOPE	017221	6	-16 777 215	25	NU-MERIC	

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
Reference_Pulse_Zero_Frequency	[R2] 2-58	1223	ADM REFERENCE PULSE RESPONSE INTERCEPT	017222	6	-33 554 431	26	NUMERIC	
Reference_Pulse_Error_Mie_Response_Std_Dev	[R2] 2-58	1224	ADM REFERENCE PULSE RESPONSE STDDEV	017223	6	0	24	NUMERIC	
Measurement_Calibration_Validity	[R2] 2-60	1225	ADM MEASUREMENT CALIBRATION FLAG	017224	0	0	5	FLAG	
Reference_Pulse_Calibration_Validity	[R2] 2-61	1226	ADM REFERENCE PULSE CALIBRATION FLAG	017225	0	0	5	FLAG	
		Rayleigh Response Calibration							
		1227	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Rayleigh" ="1"
Calibration Valid	*[R2] 2-50*	1228	ADM CALIBRATION VALIDITY CODE	017203	0	0	2	Code	
List of Rayleigh Requency Step Results	*[R2] 2-50*								
			Repeated x60						
		C=0-59	REPLICATION FACTOR	106060					
Frequency Offset	*[R2] 2-54*	+C*6 +1	SATELLITE CHANNEL FREQUENCY OFFSET	017205	6	-16 777 215	25	GHz	
Frequency Valid	*[R2] 2-54*	+C*6 +2	ADM FREQUENCY VALIDITY CODE	017204	0	0	2	CODE	
Measurement Response	*[R2] 2-54*	+C*6 +3	ADM MEASUREMENT RESPONSE	017206	6	-33 554 431	26	NUMERIC	
Measurement Error Rayleigh Response	*[R2] 2-54*	+C*6 +4	ADM MEASURMENT RESPONSE ERROR	017207	6	-16 777 215	25	NUMERIC	
Reference Pulse Response	*[R2] 2-54*	+C*6 +5	ADM REFERENCE PULSE RESPONSE	017208	6	-33 554 431	26	NUMERIC	
Reference Pulse Error Rayleigh Response	*[R2] 2-54*	+C*6 +6	ADM REFERENCE PULSE RESPONSE ERROR	017209	6	-16 777 215	25	NUMERIC	
Measurement_Mean_Sensitivity	[R2] 2-57	1589	ADM MEASUREMENT RESPONSE SLOPE	017218	6	-16 777 215	25	1/GHz	
Measurement_Zero_Frequency	[R2] 2-57	1590	ADM MEASUREMENT RESPONSE INTERCEPT	017219	6	-33 554 431	26	NUMERIC	
Measurement_Error_Rayleigh_Response_Std_Dev	[R2] 2-57	1591	ADM MEASUREMENT RESPONSE STDDEV	017220	6	0	24	NUMERIC	
Reference_Pulse_Mean_Sensitivity	[R2] 2-59	1592	ADM REFERENCE PULSE RESPONSE SLOPE	017221	6	-16 777 215	25	NUMERIC	

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
Reference_Pulse_Zero_Frequency	[R2] 2-59	1593	ADM REFERENCE PULSE RESPONSE INTERCEPT	017222	6	-33 554 431	26	NUMERIC	
Reference_Pulse_Error_Rayleigh_Response_Std_Dev	[R2] 2-59	1594	ADM REFERENCE PULSE RESPONSE STDDEV	017223	6	0	24	NUMERIC	
Measurement_Calibration_Validity	[R2] 2-60	1595	ADM MEASUREMENT CALIBRATION FLAG	017224	0	0	5	FLAG	
Reference_Pulse_Calibration_Validity	[R2] 2-61	1596	ADM REFERENCE PULSE CALIBRATION FLAG	017225	0	0	5	FLAG	
		Last: 1596							

3.4 L1B measurement scale

The measurement scale varies between 30 and 67 which are used to derive one L1B observation during one BRC. Measurements are therefore appended using the deplayed replication feature.

Table 3-8: Replication block.

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		Repeat measurements							
		1597	DELAYED DESCRIPTOR REPLICATION FACTOR	031001	0	0	8	NUMERIC	Number of measurements

Table 3-9: Geolocation data.

EE tag name	Ref Table	No. +1597	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		Geoloc ADS							
		1	MEASUREMENT INDEX	017004	0	0	8	NUMERIC	
		2	ADM DATA SECTION...	017002	0	0	4	CODE	GEO="1"
		3	ADM INSTRUMENT TARGET POSITION SIGNIFICANCE	017005	0	0	3	CODE	="5" OBS GEOID INTERSECT
AOCS_LOS_Velocity	[R2] 2-13	4	ADM LOS VELOCITY	017062	2	-32 767	16	M/S	
		Position sequence		**331004**					
			CHANGE SCALE	*207001*					
Latitude_of_DEM_Intersection	[R2] 2-18	5	*LATITUDE (HIGH ACCURACY)*	*005001*	6	-9 000 000	25	DEG	
Longitude_of_DEM_Intersection	[R2] 2-18	6	*LONGITUDE (HIGH ACCURACY)*	*006001*	6	-18 000 000	26	DEG	
			CANCEL CHANGE SCALE	*207000*					
Altitude_of_DEM_Intersection	[R2] 2-18	7	HEIGHT BIN ALTITUDE	017010	3	-10 000 000	28	M	

EE tag name	Ref Table	No. +1597	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		Meas. Mie Height.Bin.Geoloc. *Repeated x(1+24)*							
		8	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie" ="0"
		P=0-24	REPLICATION FACTOR	104025					
		+P*4 + 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
		Position sequence		**331004**					
			CHANGE SCALE	*207001*					
Lati-tude_of_Height_bin	[R2] 2-17	+P*4 + 2	*LATITUDE (HIGH ACCURACY)*	*005001*	6	-9 000 000	25	DEG	
Longi-tude_of_Height_bin	[R2] 2-17	+P*4 + 3	*LONGITUDE (HIGH ACCURACY)*	*006001*	6	-18 000 000	26	DEG	
			CANCEL CHANGE SCALE	*207000*					
Alti-tude_of_Height_bin	[R2] 2-17	*+P *4 + 4*	HEIGHT BIN ALTITUDE	017010	3	-10 000 000	28	M	
		Meas. Rayleigh Height.Bin.Geoloc. *Repeated x(1+24)*							
		109	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Rayleigh" ="1"
		P=0-24	REPLICATION FACTOR	104025					
		+P*4 + 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
		Position sequence		**331004**					
			CHANGE SCALE	*207001*					
Lati-tude_of_Height_bin	[R2] 2-18	+P*4 + 2	*LATITUDE (HIGH ACCURACY)*	*005001*	6	-9 000 000	25	DEG	
Longi-tude_of_Height_bin	[R2] 2-18	+P*4 + 3	*LONGITUDE (HIGH ACCURACY)*	*006001*	6	-18 000 000	26	DEG	
			CANCEL CHANGE SCALE	*207000*					
Alti-tude_of_Height_bin	[R2] 2-18	*+P*/ + 4*	HEIGHT BIN ALTITUDE	017010	3	-10 000 000	28	M	

Table 3-10: Product confidence data.

EE tag name	Ref Table	No. +1597	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		PCD ADS							
		210	ADM DATA SECTION...	017002	0	0	4	CODE	PCD="2"
		211	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie" ="0"
Mie_Mean_Emitted_Frequency	[R2] 2-25	212	SATELLITE CHANNEL FREQUENCY OFFSET	017205	6	-16 777 215	25	GHz	
		213	FIRST ORDER STATISTICS	008023	0	0	6	CODE	STD = "10"
Refer-ence_Pulse_FWHM	[R2] 2-25	214	SATELLITE CHANNEL FREQUENCY OFFSET	017205	6	-16 777 215	25	GHz	

EE tag name	Ref Table	No. +1597	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		215	ADM RECEIVER CHANNEL	017001	0	0	4	Flag Table	"Rayleigh" ="1"
Rayleigh_Mean_Emitted_Frequency	[R2] 2-25	216	SATELLITE CHANNEL FREQUENCY OFFSET	017205	6	-16 777 215	25	GHz	
		217	FIRST ORDER STATISTICS	008023	0	0	6	CODE	STD = "10"
Rayleigh_Emitted_Frequency_Std_Dev	[R2] 2-25	218	SATELLITE CHANNEL FREQUENCY OFFSET	017205	6	-16 777 215	25	GHz	
		Scattering Ratio *Repeated x(1+24)*							
		P=0-24	REPLICATION FACTOR	102025					
		+P*2 + 1	HEIGHT BIN INDEX	017003	0	0	8	NUMERIC	
Scattering_Ratio_Mie	[R2] 2-27	+P*2 + 2	BACK SCATTER (HIGH ACCURACY)	017020	6	-67 108 863	27	dB	
		Mie Signal to Noise *Repeated x(1+24)*							
		269	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie" ="0"
		P=0-24	REPLICATION FACTOR	102025					
		+P*2 + 1	HEIGHT BIN INDEX	017003	0	0	8	NUMERIC	
Mie_Signal_to_Noise_Ratio	[R2] 2-27	+P*2 + 2	SIGNAL TO NOISE RATIO (HIGH ACCURACY)	017021	6	-67 108 863	27	db	
		RayleighA Signal to Noise *Repeated x(1+24)*							
		320	ADM RECEIVER CHANNEL	017001	0	0	4	Flag Table	"Rayleigh A" ="2"
		P=0-24	REPLICATION FACTOR	102025					
		+P*2 + 1	HEIGHT BIN INDEX	017003	0	0	8	NUMERIC	
Rayleigh_Signal_to_Noise_Ratio_Channel_A	[R2] 2-27	+P*2 + 2	SIGNAL TO NOISE RATIO (HIGH ACCURACY)	017021	6	-67 108 863	27	db	
		RayleighB Signal to Noise *Repeated x(1+24)*							
		371	ADM RECEIVER CHANNEL	017001	0	0	4	Flag Table	"Rayleigh B" ="3"
		P=0-24	REPLICATION FACTOR	102025					
		+P*2 + 1	HEIGHT BIN INDEX	017003	0	0	8	NUMERIC	
Rayleigh_Signal_to_Noise_Ratio_Channel_B	[R2] 2-27	+P*2 + 2	SIGNAL TO NOISE RATIO (HIGH ACCURACY)	017021	6	-67 108 863	27	db	

Table 3-11: Measurement data.

EE tag name	Ref Table	No. +1597	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		Measurement ADS							
		422	ADM DATA SECTION...	017002	0	0	4	CODE	MEAS="4"
		423	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie"="0"
Mie_Reference_Pulses	[R2] *2-36*		*20 x 2 byte INT*						
			Repeated x20						
		C=0-19	REPLICATION FACTOR	101020					
_Pulse(k)		+C*1 + 1	REFERENCE PULSES	017226	2	0	30	NU-MERIC	
		444	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Rayleigh A" ="2"
Rayleigh_Reference_Pulses_A	[R2] *2-37*	445	REFERENCE PULSES	017226	2	0	30	NU-MERIC	
		446	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Rayleigh B" ="3"
Rayleigh_Reference_Pulses_B	[R2] *2-37*	447	REFERENCE PULSES	017226	2	0	30	NU-MERIC	
		448	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie" ="0"
Mie_Measurement_Data	[R2] *2-35*		*(1+24) x[1 + (20 X 2 byte INT)]*						
		P=0-24	REPLICATION FACTOR	103025					
		+P*21 + 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
			Repeated x20						
		C=0-19	REPLICATION FACTOR	101020					
_data(k)	[R2] 2-38	+P*21 + C + 1	SPECTROME-TER COUNTS	017227	0	0	16	NU-MERIC	

Table 3-12: Useful signal data.

EE tag name	Ref Table	No. +1597	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		UsefulSignal ADS							
		974	ADM DATA SECTION...	017002	0	0	4	CODE	US="5"
		Meas. Mie_Altitude_Bin_Useful_Signal_Infos *Repeated x(1+24)*							
		975	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie"="0"
		P=0-24	REPLICATION FACTOR	103025					
		+P*3 + 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
Data_Quality_Flag	[R2] 2-67	+P*3 + 2	ADM_USEFUL_SIGNAL_QUALITY FLAG	017050	0	0	9	FLAG	
Useful_Signal	[R2] 2-67	+P*3 + 3	ADM_USEFUL_SIGNAL	017051	2	0	31	NU-MERIC	
		Rayleigh_Altitude_Bin_Useful_Signal_Infos *Repeated x(1+24)*							

EE tag name	Ref Table	No. +1597	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		1051	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	“Rayleigh” =”1”
		P=0-24	REPLICATION FACTOR	106025					
		+P*6 + 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
Data_Quality_Flag	[R2] 2-69	+P*6 + 2	ADM_USEFUL_ SIGNAL_ QUALITY FLAG	017050	0	0	9	FLAG	
		+P*6 + 3	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	“Rayleigh-A” =”2”
Use-ful_Signal_Channel _A	[R2] 2-69	+P*6 + 4	ADM_USEFUL_ SIGNAL	017051	2	0	31	NU-MERIC	
		+P*6 + 5	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	“Rayleigh-B” =”3”
Use-ful_Signal_Channel _B	[R2] 2-69	+P*6 + 6	ADM_USEFUL_ SIGNAL	017051	2	0	31	NU-MERIC	

Table 3-13: Wind velocity data.

EE tag name	Ref Table	No +1597	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		Wind Velocity ADS							
		1202	ADM DATA SECTION...	017002	0	0	4	CODE	WV=”6”
		Mie_Altitude_Bin_Wind_Info *Repeated x24*							
		1203	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	“Rayleigh” =”1”
		P=0-23	REPLICATION FACTOR	102024					
		+P*3 + 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
		Measurement data		**331002**					
Bin_Quality_Flag	[R2] 2-76	+P*3 + 2	*ADM BIN QUALITY FLAG*	*017060*	0	0	9	FLAG	
Wind_Velocity	[R2] 2-76	+P*3 + 3	*ADM LOS VELOCITY*	*017062*	2	-32 767	16	M/S	
		Rayleigh_Altitude_Bin_Wind_Info *Repeated x24*							
		1276	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	“Rayleigh” =”1”
		P=0-23	REPLICATION FACTOR	102024					
		+P*3 + 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
		Measurement data		**331002**					
Bin_Quality_Flag	[R2] 2-77	+P*3 + 2	*ADM BIN QUALITY FLAG*	*017060*	0	0	9	FLAG	
Wind_Velocity	[R2] 2-77	+P*3 + 3	*ADM LOS VELOCITY*	*017062*	2	-32 767	16	M/S	
		1348							

4 L2B product

4.1 Header data

For a BUFR representation of L2B wind profiles the common header described in Table 3-1 has to be included. This set of common header elements serves to relate the L2B wind profiles and the corresponding L1B product. The details are described in 3.1.

4.2 L2B observation data

Table 4-1: Wind Geolocations.

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		18	ADM DATA SECTION...	017002	0	0	4	CODE	GEO=”1”
		Mie							
		19	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	“Mie”=”0”
		Possible Profiles Repeat Mmax = 5							
		M=0-4	REPLICATION FACTOR	103005					
		Single profile Repeat x 24							
		P=0-23/ + P * 16	REPLICATION FACTOR	102024					
		+ 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
		Geoloc. of Height Bin		**331003**					
		+ 2	*ADM INSTRUMENT TARGET POSITION SIGNIFICANCE*	*017005*	0	0	3	Code Table	START=”0”
			CHANGE SCALE	*207001*					
Latitude_Start	[R3] 14	+ 3	*LATITUDE (HIGH ACCURACY)*	*005001*	6	-9 000 000	25	DEG	
Longitude_Start	[R3] 14	+ 4	*LONGITUDE (HIGH ACCURACY)*	*006001*	6	-18 000 000	26	DEG	
			CANCEL CHANGE SCALE	*207000*					
		+ 5	*ADM INSTRUMENT TARGET POSITION SIGNIFICANCE*	*017005*	0	0	3	Code Table	STOP=”1”
	[R3] 14		*CHANGE SCALE*	*207001*					
Latitude_Stop	[R3] 14	+ 6	*LATITUDE (HIGH ACCURACY)*	*005001*	6	-9 000 000	25	DEG	
Longitude_Stop	[R3] 14	+ 7	*LONGITUDE (HIGH ACCURACY)*	*006001*	6	-18 000 000	26	DEG	
			CANCEL CHANGE SCALE	*207000*					

		+ 8	*ADM INSTRUMENT TARGET POSITION SIGNIFICANCE*	*017005*	0	0	3	Code Table	BOTTOM=”2”
Altitude_Bottom		+ 9	*HEIGHT BIN ALTITUDE*	*017010*	3	-10 000 000	28	M	
		+ 10	*ADM INSTRUMENT TARGET POSITION SIGNIFICANCE*	*017005*	0	0	3	Code Table	TOP=”3”
Altitude_Top		+ 11	*HEIGHT BIN ALTITUDE*	*017010*	3	-10 000 000	28	M	
		+ 12	*ADM INSTRUMENT TARGET POSITION SIGNIFICANCE*	*017005*	0	0	3	Code Table	COG=”4”
			CHANGE SCALE	*207001*					
Latitude_COG		+ 13	*LATITUDE (HIGH ACCURACY)*	*005001*	6	-9 000 000	25	DEG	
Longitude_COG		+ 14	*LONGITUDE (HIGH ACCURACY)*	*006001*	6	-18 000 000	26	DEG	
			CANCEL CHANGE SCALE	*207000*					
Altitude_COG		+ 15	*HEIGHT BIN ALTITUDE*	*017010*	3	-10 000 000	28	M	
LOS_Azimuth		+ 16	*BEARING OR AZIMUTH*	*005021*	2	0	16	DEG TRUE	
		Rayleigh							
		1940	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	“Rayleigh”=”1”
		Possible Profiles Repeat Mmax = 5							
		M=0-4	REPLICATION FACTOR	103005					
		Single profile Repeat x 24							
		P=0-23/ + P * 16	REPLICATION FACTOR	102024					
		+ 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
		Geoloc. of Height Bin		**331003**					
		+ 2	*ADM INSTRUMENT TARGET POSITION SIGNIFICANCE*	*017005*	0	0	3	Code Table	START=”0”
			CHANGE SCALE	*207001*					
Latitude_Start	[R3] 14	+ 3	*LATITUDE (HIGH ACCURACY)*	*005001*	6	-9 000 000	25	DEG	
Longitude_Start	[R3] 14	+ 4	*LONGITUDE (HIGH ACCURACY)*	*006001*	6	-18 000 000	26	DEG	
			CANCEL CHANGE SCALE	*207000*					
		+ 5	*ADM INSTRUMENT TARGET POSITION*	*017005*	0	0	3	Code Table	STOP=”1”

			SIGNIFICANCE						
	[R3] 14		*CHANGE SCALE*	*207001*					
Latitude_Stop	[R3] 14	+ 6	*LATITUDE (HIGH ACCURACY)*	*005001*	6	-9 000 000	25	DEG	
Longitude_Stop	[R3] 14	+ 7	*LONGITUDE (HIGH ACCURACY)*	*006001*	6	-18 000 000	26	DEG	
			CANCEL CHANGE SCALE	*207000*					
		+ 8	*ADM INSTRUMENT TARGET POSITION SIGNIFICANCE*	*017005*	0	0	3	Code Table	BOTTOM=”2”
Altitude_Bottom		+ 9	*HEIGHT BIN ALTITUDE*	*017010*	3	-10 000 000	28	M	
		+ 10	*ADM INSTRUMENT TARGET POSITION SIGNIFICANCE*	*017005*	0	0	3	Code Table	TOP=”3”
Altitude_Top		+ 11	*HEIGHT BIN ALTITUDE*	*017010*	3	-10 000 000	28	M	
		+ 12	*ADM INSTRUMENT TARGET POSITION SIGNIFICANCE*	*017005*	0	0	3	Code Table	COG=”4”
			CHANGE SCALE	*207001*					
Latitude_COG		+ 13	*LATITUDE (HIGH ACCURACY)*	*005001*	6	-9 000 000	25	DEG	
Longitude_COG		+ 14	*LONGITUDE (HIGH ACCURACY)*	*006001*	6	-18 000 000	26	DEG	
			CANCEL CHANGE SCALE	*207000*					
Altitude_COG		+ 15	*HEIGHT BIN ALTITUDE*	*017010*	3	-10 000 000	28	M	
LOS_Azimuth		+ 16	*BEARING OR AZIMUTH*	*005021*	2	0	16	DEG TRUE	

Table 4-2: Product confidence

EE tag name	Ref Table	No. +3860	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		3861	ADM DATA SECTION...	017002	0	0	4	CODE	PCD="2"
		Classification QC							
		Possible Profiles Repeat Mmax = 5							
		M=0-4	REPLICATION FACTOR	103005					
		Single profile Repeat x 24							
		P=0-23	REPLICATION FACTOR	102024					
		+ P*2 + 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
L2B_Obs_Bin_Classification	[R3] -PCD 18	+ P*2 + 2	ADM L2B BIN CLASSIFICATION FLAG	017145	0	0	9	FLAG	
		+ 4101							
		Mie processing QC							
		4102	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie"="0"
		Possible Profiles Repeat Mmax = 5							
		M=0-4	REPLICATION FACTOR	103005					
		Single profile Repeat x 24							
		P=0-23/ + P*2	REPLICATION FACTOR	102024					
		+ 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
Hlos_Error_Estimate	[R3] -PCD 22	+2	ADM LOS VELOCITY ERROR	017063	2	-32 767	16	M/S	
		+ 4342							
Mie_Background_High	[R3] -PCD 20	4343	ADM L2B BACKGROUND FLAG	017149	0	0	4	FLAG	
		Rayleigh processing QC							
		4344	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Rayleigh"="1"
		Possible Profiles Repeat Mmax = 5							
		M=0-4	REPLICATION FACTOR	103005					
		Single profile Repeat x 24							
		P=0-23/ + P*3	REPLICATION FACTOR	102024					
		+ 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
Hlos_Error_Estimate	2B -PCD 25	+2	ADM LOS VELOCITY ERROR	017063	2	-32 767	16	M/S	
		+ 4584							
Rayleigh_Background_High	[R3] -PCD 20	4585	ADM L2B BACKGROUND FLAG	017149	0	0	4	FLAG	

Table 4-3: Wind profiles

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		4586	ADM DATA SECTION...	017002	0	0	4	CODE	WV="6"

Table 4-4: Mie Wind profiles

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		Mie							
		4587	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie"="0"
		Possible Profiles Repeat Mmax = 5							
		M=0-4	REPLICATION FACTOR	106005					
		Single profile Repeat x 24							
		P=0-23/ + P*5	REPLICATION FACTOR	105024					
		+ 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
Validity_Flag	[R3] 18	+2	ADM WIND VALIDITY CODE	017124	0	0	2	Code	
Mie_Wind_Velocity	[R3] 18	+ 3	ADM WIND VELOCITY	017122	0	-32 767	16	CM/S	
Mie_Error_Quantifier	[R3] 18	+ 4	ADM WIND VELOCITY ERROR QUANTIFIER	017123	0	-32 767	16	CM/S	
Integration_Length	[R3] 18	+ 5	BIN INTEGRA-TION LENGTH	017042	0	0	31	ME-TER	
	Last No.	5187							

Table 4-5: Rayleigh Wind profiles

EE tag name	Ref Table	No.	Element name	Descrip.	Table B Scale	Table B Ref.Val.	Table B Width	Units	Comments
		Rayleigh							
		5188	ADM RECEIVER CHANNEL	017001	0	0	4	CODE	"Mie"="0"
		Possible Profiles Repeat Mmax = 5							
		M=0-4	REPLICATION FACTOR	112005					
		Single profile Repeat x 24							
		P=0-23/ + P *11	REPLICATION FACTOR	111024					
		+ 1	HEIGHT BIN INDEX	017003	0	0	8	NU-MERIC	
Validity_Flag	[R3] 22	+2	ADM WIND VALIDITY CODE	017124	0	0	2	Code	
Mie_Wind_Velocity	[R3] 22	+ 3	ADM WIND VELOCITY	017122	0	-32 767	16	CM/S	
Mie_Error_Quantifier	[R3] 22	+ 4	ADM WIND VELOCITY ERROR	017123	0	-32 767	16	CM/S	

			QUANTIFIER						
Integration_Length	[R3] 22	+ 5	BIN INTEGRA-TION LENGTH	017042	0	0	31	ME-TER	
Rayleigh_Wind_to_ Pressure	[R3] 22	+ 6	DERIVATIVE WIND TO PRESSURE	017130	0	-32 767	16	MI-CROM /S/Pa	
Rayleigh_Wind_to_ Temperature	[R3] 22	+ 7	DERIVATIVE WIND TO TEMPERATURE	017131	0	-32 767	16	CM/S/ K	
Rayleigh_Wind_to_ Backscatter_ratio	[R3] 22	+ 8	DERIVATIVE WIND TO BACKSCATTER	017132	0	-32 767	16	CM/S	
Refer-ence_Pressure	[R3] 22	+ 9	PRESSURE	007004	-1	0	14	Pa	
Refer-ence_Temperature	[R3] 22	+ 10	TEMPERA-TURE/ DRY BULB TEMPERATURE	012001	1	0	12	K	
Refer-ence_Backscatter_ Ratio	[R3] 22	+ 11	BACK SCATTER (HIGH ACCURACY)	017020	6	-67 108 863	27	dB	
	Last No.	6508							

5 BUFR tables and entries

5.1 Extension to existing Tables

Table 5-1: Extension to (001007): SATELLITE IDENTIFIER

Code figure	Description
600	ADM Aeolus

Table 5-2: Extension to (002019): SATELLITE INSTRUMENT

Code figure	Description
130	ALADIN

5.2 New Table B elements

Table 5-3: New Table B elements.

Element name	Table Reference (temporary)	Scale	Ref.Val.	Width	Units	Table Reference (for approval)
Identification						**0 01**
HEIGHT BIN INDEX	017003	0	0	8	NUMERIC	001100
MEASUREMENT INDEX	017004	0	0	8	NUMERIC	001101
PRODUCT NAME	017100	0	0	512	CCITT IA5	001103
Instrumentation						**0 02**
ADM RECEIVER CHANNEL	017001	0	0	4	CODE TABLE	002233
Location (vertical)						**0 07**
HEIGHT BIN ALTITUDE	017010	3	-10 000 000	28	NUMERIC	007011
Significance qualifiers						**0 08**
ADM SECTION TYPE WHICH FOLLOWS	017002	0	0	4	CODE TABLE	008196
ADM INSTRUMENT TARGET POSITION SIGNIFICANCE	017005	0	0	3	CODE TABLE	008197
Vertical elements and pressure						**0 10**
GEOID SEPARATION	017006	3	-2 000 000	22	METER	010037
Wind and turbulence						**0 11**
ADM LOS GROUND CORRECTION VELOCITY	017030	2	-32 767	16	M/S	011203
ADM LOS VELOCITY	017062	2	-32 767	16	M/S	011204
ADM LOS VELOCITY ERROR	017063	2	-32 767	16	M/S	011205
ADM WIND VELOCITY	017122	0	-32 767	16	CM/S	011206 (L2B)
ADM WIND VELOCITY ERROR	017123	0	-32 767	16	CM/S	011207 (L2B)
DERIVATIVE WIND TO PRESSURE	017130	0	-33 554 431	26	MICROM/S/Pa	011208 (L2B)
DERIVATIVE WIND TO TEMPERA-TURE	017131	0	-33 554 431	26	CM/S/K	011209 (L2B)
DERIVATIVE WIND TO BACKSCATTER	017132	0	-33 554 431	26	CM/S	011210 (L2B)
Radar						**0 21**

Element name	Table Reference (temporary)	Scale	Ref.Val.	Width	Units	Table Reference (for approval)
BACK SCATTER (HIGH ACCURACY)	017020	6	-67 108 863	27	dB	021061
SIGNAL TO NOISE RATIO (HIGH ACCURACY)	017021	6	-67 108 863	27	dB	021032
Processing information						**0 25**
ADM LOS GROUND CORRECTION WEIGHTING FACTOR	017031	2	0	7	NUMERIC	025211
BIN INTEGRATION TIME	017040	0	-32 767	16	NUMERIC	025212
BACKGROUND INTEGRATION TIME	017041	0	-32 767	16	NUMERIC	025213
BIN INTEGRATION LENGTH	017042	0	0	31	METER	025214
ADM USEFUL SIGNAL	017051	2	0	31	NUMERIC	025215
LASER WAVELENGTH	017200	6	0	30	NANO METER	025216
SATELLITE CHANNEL FREQUENCY OFFSET	017205	6	-16 777 215	25	GHz	025217
ADM MEASUREMENT RESPONSE	017206	6	-33 554 431	26	NUMERIC	025218
ADM MEASUREMENT RESPONSE ERROR	017207	6	-16 777 215	25	NUMERIC	025219
ADM REFERENCE PULSE RESPONSE	017208	6	-33 554 431	26	NUMERIC	025220
ADM REFERENCE PULSE RESPONSE ERROR	017209	6	-16 777 215	25	NUMERIC	025221
ADM MEASUREMENT RESPONSE SLOPE	017218	6	-16 777 215	25	1/GHz	025230
ADM MEASUREMENT RESPONSE INTERCEPT	017219	6	-33 554 431	26	NUMERIC	025231
ADM MEASUREMENT RESPONSE STDDEV	017220	6	0	24	NUMERIC	025232
ADM REFERENCE PULSE RESPONSE SLOPE	017221	6	-16 777 215	25	NUMERIC	025233
ADM REFERENCE PULSE RESPONSE INTERCEPT	017222	6	-33 554 431	26	NUMERIC	025234
ADM REFERENCE PULSE RESPONSE STDDEV	017223	6	0	24	NUMERIC	025235
REFERENCE PULSES	017226	2	0	30	NUMERIC	025236
SPECTROMETER COUNTS	017227	0	0	16	NUMERIC	025237
Quality information						**0 33**
ADM USEFUL SIGNAL QUALITY FLAG	017050	0	0	9	FLAG TABLE	033103
ADM BIN QUALITY FLAG	017060	0	0	9	FLAG TABLE	033104
ADM WIND VALIDITY CODE	017124	0	0	2	CODE TABLE	033105 (L2B)
ADM L2B BIN CLASSIFICATION FLAG	017145	0	0	9	FLAG TABLE	033118 (L2B)
ADM L2B BACKGROUND FLAG	017149	0	0	4	FLAG TABLE	033122 (L2B)
ADM ERROR QUANTIFIER	017201	6	0	27	NUMERIC	033106
ADM TRIPOD CORRECTION	017202	6	0	20	NUMERIC	033107
ADM CALIBRATION VALIDITY CODE	017203	0	0	2	CODE TABLE	033108

Element name	Table Reference (temporary)	Scale	Ref.Val.	Width	Units	Table Reference (for approval)
ADM FREQUENCY VALIDITY CODE	017204	0	0	2	CODE TABLE	033109
ADM MEASUREMENT CALIBRATION FLAG	017224	0	0	5	FLAG TABLE	033110
ADM REFERENCE PULSE CALIBRATION FLAG	017225	0	0	5	FLAG TABLE	033111

5.3 Table D sequences

Table 5-4: (331001) ADM L1B Geolocation of Height Bin

Table Reference	Table References	Element name
331001	331004	LOCATION (10E-6 DEGREE)
	017010	HEIGHT (10E-6 METER)
	005021	BEARING OR AZIMUTH
	007021	ELEVATION (SEE NOTE 2
	008065	(CBS) SUN GLINT INDICATOR

Table 5-5: (331002) Measurement Data

Table Reference	Table References	Element name
331002	017060	ADM BIN QUALITY FLAG
	017062	ADM LOS WIND VELOCITY

Table 5-6: (331003) ADM L2B Geolocation of Height Bin

Table Reference	Table References	Element name
331003	017005	ADM INSTRUMENT TARGET POSITION SIGNIFICANCE
	331004	LOCATION (10E-6 DEGREE)
	017005	ADM INSTRUMENT TARGET POSITION SIGNIFICANCE
	331004	LOCATION (10E-6 DEGREE)
	017005	ADM INSTRUMENT TARGET POSITION SIGNIFICANCE
	017010	HEIGH BIN ALTITUDE
	017005	ADM INSTRUMENT TARGET POSITION SIGNIFICANCE
	017010	HEIGH BIN ALTITUDE
	017005	ADM INSTRUMENT TARGET POSITION SIGNIFICANCE
	331004	LOCATION (10E-6 DEGREE)
	017010	HEIGH BIN ALTITUDE
	005021	BEARING OR AZIMUTH

Table 5-7: (331004) LOCATION (10E-6 DEGREE)

Table Reference	Table References	Element name
331004	207001	CHANGE SCALE
	005001	LATITUDE (HIGH ACCURACY)
	006001	LONGITUDE (HIGH ACCURACY)
	207000	CANCEL CHANGE SCALE

Table 5-8: (331005) FREQUENCY SEQUENCE

Table Reference	Table References	Element name
331005	017001	ADM RECEIVER CHANNEL
	017205	SATELLITE CHANNEL FREQUENCY OFFSET
	008023	FIRST ORDER STATISTICS
	017205	SATELLITE CHANNEL FREQUENCY OFFSET
	017001	ADM RECEIVER CHANNEL
	017205	SATELLITE CHANNEL FREQUENCY OFFSET
	008023	FIRST ORDER STATISTICS
	017205	SATELLITE CHANNEL FREQUENCY OFFSET

Table 5-9: (331005) SPECTROMETER SEQUENCE

Table Reference	Table References	Element name
331006	017001	ADM RECEIVER CHANNEL
	101018	*(repeat 18 pixel)*
	017226	REFERENCE PULSES
	017001	ADM RECEIVER CHANNEL
	017226	REFERENCE PULSES
	017001	ADM RECEIVER CHANNEL
	017226	REFERENCE PULSES

5.4 Code tables

Table 5-10: (017001) ADM RECEIVER CHANNEL.

Code figure	Description
0	MIE
1	RAYLEIGH
2	RAYLEIGH-A
3	RAYLEIGH-B
-14	*Reserved*
15	*Missing value*

Table 5-11: (017002) ADM DATA SECTION TYPE WHICH FOLLOWS.

Code figure	Description
0	HEADER
1	GEOLOCATION
2	PRODUCT CONFIDENCE
3	GROUND WIND DETECTION
4	MEASUREMENT
5	USEFUL SIGNAL
6	WIND VELOCITY
7	CALIBRATION AND CHARACTERIZATION
-14	*Reserved*
15	*Missing value*

Table 5-12: (017005) ADM INSTRUMENT TARGET POSITION SIGNIFICANCE.

Code figure	Description
0	START POINT SENSING HEIGHT BIN
1	END POINT SENSING HEIGHT BIN
2	BOTTOM OF HEIGHT BIN
3	TOP OF HEIGHT BIN
4	HEIGHT BIN CENTROID
5	LOS GEOID INTERSECTION
-14	*Reserved*
15	*Missing value*

Table 5-13: (017203) ADM CALIBRATION VALIDITY CODE.

Code figure	Description
0	CALIBRATION VALID
1	CALIBRATION NOT VALID
-2	*Reserved*
3	*Missing Value*

Table 5-14: (017204) ADM FREQUENCY VALIDITY CODE.

Code figure	Description
0	FREQUENCY VALID
1	FREQUENCY NOT VALID
-2	*Reserved*
3	*Missing Value*

Table 5-15: (017124) ADM WIND VALIDITY CODE.

Code figure	Description
0	WIND VALID
-2	*Reserved*
3	*Missing Value*

5.5 Flag tables

Table 5-16: (017050) ADM USEFUL SIGNAL QUALITY FLAG.

Bit No.	Description
0	DATA OVERALL INVALID
1	BIN LEVEL VALIDITY
2	DATA SATURATION FOUND
3	DATA SPIKE FOUND
4	MEASUREMENT VALIDITY
5	SOURCE PACKET INVALID
6	LASER FRENQUENCY NOT LOCKED
7	SPACECRAFT ATTITUDE NOT ON TARGET
ALL 9	*Missing Value*

Table 5-17: (017060) ADM BIN QUALITY FLAG.

Bit No.	Description
0	DATA OVERALL INVALID
1	MIE/RAYLEIGH PEAK NOT FOUND
2	DATA SATURATION FOUND
3	DATA SPIKE FOUND
4	REFERENCE PULSE INVALID
5	SOURCE PACKET INVALID
6	LASER FRENQUENCY NOT LOCKED
7	SPACECRAFT ATTITUDE NOT ON TARGET
ALL 9	*Missing Value*

Table 5-18: (017224) ADM MEASUREMENT CALIBRATION FLAG.

Bit No.	Description
0	MEAN SENSITIVITY WITHIN THRESHOLD RANGE
1	ERROR RESPONSE STANDARD DEVIATION WITHIN THRESHOLD RANGE
2	ZERO FREQUENCY RESPONSE WITHIN THRESHOLD RANGE
3	MEASUREMENT DATA IS MONOTONIC
ALL 5	*Missing Value*

Table 5-19: (017225) ADM REFERENCE PULSE CALIBRATION FLAG.

Bit No.	Description
0	MEAN SENSITIVITY WITHIN THRESHOLD RANGE
1	ERROR RESPONSE STANDARD DEVIATION WITHIN THRESHOLD RANGE
2	ZERO FREQUENCY RESPONSE WITHIN THRESHOLD RANGE
3	REFERENCE PULSE DATA IS MONOTONIC
ALL 5	*Missing Value*

Table 5-20: (017145) ADM L2B BIN CLASSIFICATION FLAG.

Bit No.	Description

0	L2B CLASS CLOUD ABOVE
1	L2B CLASS CLOUD
2	L2B CLASS MAYBE CLOUD
3	L2B CLASS AEROSOL
4	L2B CLASS PRECIPITATION
5	L2B CLASS NO EXTINCTION
6	L2B CLASSUNKNOWN SCATTERER
7	L2B CLASS BROKEN CLOUDS
ALL 9	*Missing Value*

Table 5-21: (017149) ADM L2B BACKGROUND FLAG.

Bit No.	Description
0	DATA TAKEN DURING DAYLEIGHT - HIGH BACKGROUND LEVEL POSSIBLE
1-3	*Reserved*
ALL 4	*Missing Value*

6 Abbreviations

ADM	Atmospheric Dynamic Mission
ADS	Annotation Data Set
AMD	Auxiliary meteorological data
APF	Aeolus Processing Facility
BRC	Basic Repeat Cycle
BUFR	Binary Universal Form for the Representation of meteorological data
DEM	Digital Elevation Model
DSD	Data Set Descriptor
ECMWF	European Centre for Medium-Range Weather Forecasts
EE	Earth Explorer
IODD	Input/Output Data Definition
L1B	Level 1B
L2B	Level 2B
PDS	Payload Data Segment
TBD	To be defined

7 References

[R1] Aeolus Level 1b Processor and End-to-End Simulator, ADM-IC-52-1666/090905

[R2] Aeolus Product Modifications for Implementation in L1bP Code V2, AE-TN-DLR-APM-L1B-150206

[R3] TN2.1 Selection of L2B/L2C Parameters, AE-TN-MFG-L2P-0021, Version 2.1, 14 June 2006. See also ADM-Aeolus Level-2B/2C Processor Input/Output Definitions Interface Control Document, AE-IF-ECMWF-L2BP-001, Version 1.32, 16 January 2008.

[R4] ADM-Aeolus Level-2B Processor Design Document, AE-DD-ECMWF-L2BP-001, Version 1.0, 23 February 2008. Supersedes TN2.2 Definition of Baseline Aeolus Level/2B Processing, AE-TN-ECMWF-L2P-0022, Version 1.2, September 2005

[R5] ADM-Aeolus Level-2B Algorithm Theoretical Baseline Document (Mathematical Description of the Aeolus Level-2B Processor), AE-TN-ECMWF-L2BP-0023, Version 2.1, 23 February 2007.