Aeolus Level 1b Processor and End-to-End Simulator

ESA Contract No. 16312/03//NL/MM
ASTRIUM Order AE.CO.ASU.GS.00026

Input/Output Data Definitions Interface Control Document

AED-SD-DoRIT-L1B-006

(former ADM-IC-52-1666)

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CHANGE RECORD

ISSUE	DATE	PAGE(S)	DESCRIPTION
1/0	Sept. 21, 2004	All	First Issue
1/1	Nov. 25, 2004	All	First Issue, First Revision Reason for Change: Update for PDR RIDs.
2/0	Feb. 28, 2005		Second Issue Implementing RID changes: PDR RIDs: 41, 46, 84, 86, 87, 88, 98, 100, 102, 113, 116, 118, 120, 141, 202, 203, 204,205, 206, 207 E2S CDR RIDs: 11994, 12048, 12049, 12050, 12052, 12053, 12055, 12057, 12058, 12059, 12060, 12061, 12144, 12145, 12146, 12148, 12153, 12154, 12155, 12177, 12179, 12186, 12187 Other changes included based on updates to the L1bP Detailed Processing Model document and detailed designs
2/1	May 06, 2005	All	Second Issue, First Revision Reason for Change: L1bP CDR RIDs: 9, 18, 19, 20, 57, 58, 88, 89, 94, 97, 99, 101, 130, 139, 140, 142, 143, 144, 146, 148, 153, 154, 155, 188, 191, 192, 193, 194, 195, 196, 197, 198, 200, 201,
2/2	Sept. 09, 2005	All	Second Issue, Second Revision Updates for L1bP Issue 1.0.
2/3	Sept. 26, 2005	All	Second Issue, Third Revision Reason for Change: Post FAT updates.
3/0	Oct. 05, 2006	All	Third Issue Reason for Change: Updates for MAD Issue 4.0 and AE.TN.DLR.APM-L1B.150206

ISSUE	DATE	PAGE(S)	DESCRIPTION
3/1	Oct. 30, 2006	All	Third Issue, First Revision Reason for Change: Clean up after CCN4 FAT.
3/2	Jan. 19, 2007	4-5, 6-9, 6-14, 6-28	Third Issue, Second Revision Reason for Change: L1bP Issue 1.05 and SPRs ADM-MDA-0047, ADM-MDA-0057, ADM-MDA-0054
3/3	Apr. 12, 2007	3-10, 4-3, 4-5, 5-3 to 5-5, 5-7, 5-9 to 5-16, 5-18, 6-4, 6-5, 6-6, 6-8, 6-9, 6-10, 6-12 to 6-21, 6-24, 6-26 to 6-30	Third Issue, Third Revision Reason for Change: L1bP Issue 1.06 and SPRs ADM-MDA-0059, ADM-MDA-0062, ADM-MDA-0063, ADM-MDA-0064
3/4	Jan. 14, 2008	All	Third Issue, Fourth Revision Reason for Change: SPRs ADM-MDA-0054, ADM-MDA-0063, ADM-MDA-0075, ADM-MDA-0077, ADM-MDA-0078, ADM-MDA-0081, ADM-MDA-0082, ADM-MDA-0083, ADM-MDA-0086, ADM-MDA-0087, ADM-MDA-0088, ADM-MDA-0090, ADM-MDA-0091, ADM-MDA-0092, ADM-MDA-0093, ADM-MDA-0094, ADM-MDA-0095, ADM-MDA-0096, ADM-MDA-0099, ADM-MDA-0100, ADM-MDA-0112, ADM-MDA-0113, ADM-MDA-0123, ADM-MDA-0124, ADM-MDA-0126, ADM-MDA-0127

ISSUE	DATE	PAGE(S)	DESCRIPTION
3/5	Feb. 18, 2008	3-11, 3-13, 4-7, 5-18, 6-31, 7-5, 7-8, 7-13, 7-16, 7-19, 7-25, 7-31, 7-35, 8-2, 8-9, 8-12, 8-17, 8-27	Third Issue, Fifth Revision Reason for Change: SPRs ADM-MDA-0075, ADM-MDA-0118
3/6	Aug. 25, 2008	All	Third Issue, Sixth Revision Resaon for Change: CCN6 – Updates for MAD version 5.1, MAD Version 5, SPRs ADM-MDA-0146, ADM-MDA-0135, ADM-MDA-0136, ADM-MDA-0137, ADM-MDA-0140, ADM-MDA-0142, ADM-MDA-0145
3/8	Mar. 23, 2009	1-2 to 1-4, 3-7, 3-11, 6-3, 6-4, 6-10, 6-11, 6-13 to 6-15, 6-18, 6-19, 6-33, 7-22 to 7-24, 7-27 to 7-31, 7-35 to 7-37, 7-40 to 7-44, 8-20, 8-23, 8-28	Third Issue, Eigth Revision Resaon for Change: Product changes defined by ADM-Aeolus science team; Version number 3/7 skipped, as this is defined in AE-TN-DoRIT-L1B-003 AR updates: AE-IPF-30, AE-IPF-28, AE-IPF-26,
3/9	Jun. 19, 2009	1-2, 1-3, 1-5, 1-6, 2-3, 5-13, 5-14, 6-12, 6-14, 6-15, 7-16, 7-28, 8-23, 8-27	Third Issue, Ninth Revision Resaon for Change: Product changes defined by ADM-Aeolus science team; AR updates: AE-IPF-24, AE-IPF-44, AE-IPF-48

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3/10	Jan. 29, 2010	1-2, 1-3, 2-3, 4-3, 5-3, 5-14, 6-2, 6-9, 6-11, 6-16, 6-32, 7-4, 7-8, 7-25, 7-32, 7-37, 8-10, 8-11, 8-13, 8-14, 8-16, 8-18, 8-19	Third Issue, Tenth Revision Reason for Change: AE-IPF-52, AE-IPF-54, AE-IPF-55, AE-IPF-56, AE-IPF-58, AE-IPF-66, AE-IPF-67
3/11	Oct. 15, 2010		Third Issue, Eleventh Revision Reason for Change: New L1A product for NOP and UDM mode AE-IPF-80, AE-IPF-90, AE-IPF-92 New input/output for updated DCO correction algorithm, ground detection algorithm, quality flagging of wind velocity values, and processing of A2D data.
3/12	Dec. 20, 2010	1-2, 1-3, 2-3, 3-10, 3-12, 6-6, 6-9, 6-10, 6-13, 6-28, 6-29, 7-9, 7-32, 7-37, 8-18, 8-20, 8-23, 8-24, 8-28	Third Issue, Twelfth Revision Reason for Change Clean-up comments on version 3/11, AE-IPF-98 New AUX_PAR_1B parameters

ISSUE	DATE	PAGE(S)	DESCRIPTION
4/00	Oct. 28, 2011	1-2 to 1-4, 1-7, 2-3, 4-3, 4-5, 4-7, 5-3, 5-6, 5-10 to 5-15, 5-17 to 5-19, 6-5 to 6-6, 6-13 to 6-14, 6-16 to 6-17, 6-21, 6-23 to 6-25, 6-28, 6-31, 6-34, 7-22 to 7-24, 7-28 to 7-32, 7-35 to 7-38, 7-40 to 7-43, 7-45, 8-18, 8-20 to 8-21, 8-24, 8-28	Fourth Issue Reason for Change Update of AUX_PAR_1B, AUX_RRC, AUX_PRR, AUX_MRC, and level 0, 1A, 1B product format, for continuous mode operation.
4/01	Jul. 01, 2012	1-2, 1-3, 3-6, 6-33, 7-4 to 7-6, 7-8 to 7-10, 7-16 to 7-18, 7-31, 7-32, 7-36, 7-38	Fourth Issue, First Revision Reason for Change AE-IPF-114, AE-IPF-116, AE-IPF-121, AE-IPF-122; update of geolocation fields in AUX_RRC, clarification for quality flags and latitude/longitude values

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4/02	Oct. 21, 2013	1-2, 1-3, 1-5, 3-5, 3-7, 3-8,-5-8, 5-10, 5-11, -5-13, 5-14, 6-5 to 6-8, 6-10, 6-11, 6-20 to 6-22, 6-25 to 6-30, 6-33, 6-37 to 6-40, 7-2, 7-8, 7-10, 7-12, 7-13, 7-15, 7-16, 7-18 to 7-20, 7-22, 7-23, 7-27, 7-30 to 7-41, 7-43, 7-44, 7-46, 7-47, 7-51, 8-13, 8-16, 8-17, 8-18, 8-20, 8-22, 8-24, 8-26, 8-27, 8-29	Fourth Issue, Second Revision Reason for Change AE-IPF-160, AE-IPF-152, MAD update 7
4/03	13-Jun-2014		Fourth Issue, Third Revision Reason for Change: Peroduct format changes for all but two products

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4/04	26-Feb-2015	1-1 to 1-8,2-1 to 2-3, 3-1 to 3-4, 3-7, 3-8, 3-11 to 3-15, 4-1 to 4-4, 4-6, 4-7, 5-2, 5-8, 6-2, 6-4, 6-5, 6-13, 6-17, 6-22 to 6-24, 6-28, 6-29, 6-47, 6-41, 6-42, 6-44, 7-1 to 7-3, 7-5, 7-7 to 7-11, 7-14 to 7-18, 7-20, 7-23, 7-25, 7-28, 7-33 to 7-36, 7-43, 7-45, 7-47, 7-48, 7-61, 7-63 to 7-65, 7-67, 7-71 to 7-74, 8-1, 8-2, 8-4, 8-9, 8-12, 8-13, 8-17 to 8-19, 8-30 to 8-37, A-1 to A-3	Fourth Issue, Fourth Revision Reason for Change: AE-IPF-178: add Baseline parameter in MPH; AE-IPF-188: new auxiliary inputs AUX_RDB_1B, AUX_HBE_1B, AUX_DCMZ1B; AE-IPF-196: update filenames of several auxiliaries; AE_IPF-199: update Cal & Char 1B data set; AE-IPF-148: remark on LDT added; AE-IPF-160

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4/05	Jan 29, 2016	1-2 to 1-5, 2-3, 3-3, 3-6, 3-7, 3-14, 4-5, 5-6, 5-17, 5-18, 6-3, 3-9, 6-10, 6-12 to 6-14, 6-17, 6-20 to 6-23, 6-27, 6-28, 6-30 to 6-32, 6-35 to 6-38, 7-6, 7-7, 7-13, 7-14, 7-20 to 7-23, 7-26 to 7-28, 7-30 to 7-32, 7-37, 7-40 to 7-43, 7-45, 7-49, 7-1 to 7-53, 756, 7-57, 7-59, 7-60, 7-66 to 7-68, 7-73 to 7-75, 8-4, 8-6, 8-14, 8-17, 8-22 to 8-31, 8-35, 8-36	Fourth Issue, Fifth Revision Reason for Change: AE-IPF-188, update of DCMZ parameter description; AE-IPF-215

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4/06	Jun 01, 2016	X, xii to xvi, xviii to xxvii, xxix, 1-2 to 1-7, 2-3, 3-1, 3-2, 3-4, 3-14, 4-1, 4-3 to 4-8, 5-2, 5-8, 6-9, 6-12, 6-14, 6-43, 7-7 to 7-9, 7-14 to 716, 7-40, 7-49, 7-59, 7-55, 7-58, 7-59, 7-62, 7-67, 7-71, 7-73 to 7-77, 8-11, 8-14, 8-15, 8-18, 8-20, 8-21, 8-23, 8-27, 8-33, 9-1 to 9-4	Fourth Issue, Sixth Revision Reason for Change: AE-IPF-187: comments by TK in doc attached to AR; AE-IPF-266 SR threshold in RRC, AE-IPF-273 geoid separation in RRC; AE-IPF-160 issues 002, 003, 061, 072, 074, 084, 095, 098, 121, 126, 138, 139, 143, 144, 145, 146,153, 154; AE-IPF-263; new LBM mode; corrections of L1B DCMZ GADS description; corrections AUX_PAR_1B size calculation; re-naming of parameters in AUX_ZWC;
4/07	Jul 21, 2017	xi, xiii to xvii, xix to xxxii, 1-1 to 1-3, 2-2, 2-3, 4-1, 4-8, 5-5, 5-11, 5-16, 5-18, 6-1, 6-5, 6-6, 6-8, 6-10, 6-11, 6-15, 6-17, 6-20 to 6-22, 6-24, 6-45, 7-9, 7-11, 7-17, 7-25 - 7-28, 7-47, 7-50, 7-58, 7-65, 7-77 to 7-79, 8-2 to 8-23, 8-27, 8-29 to 8-31, 8-33, 8-37 to 8-40, 8-43 to 8-45, 8-48, 8-49, 8-51 to 8-54, 9-1 to 9-3	Fourth Issue, Seventh Revision Reason for Change: Update number of BRCs per 1 orbit in several places; AE-IPF-293 new params PCD; Aht 12 no longer used; P-2 modified to P-1; some field descriptions improved after comments by UM; new MCP parameters; new IDC parameters; AR 160; new params for AUX_PAR_0, AUX_PAR_1A, and AUX_PAR_1B

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4/08		1-2, 1-3, 5-11, 6-22, 7-77, 7-78, 8-2, 8-3, 9-1 to 9-3	Fourth Issue, Eighth Revision Reason for Change: AE-IPF160 issues no. 164, 165, 166; update example headers in section 9; missing and incorrect table references fixed;
4/09	Dec 14, 2018	1-2, 1-3, 2-3, 3-15, 5-6, 5-9, 5-10, 5-19, 6-14 to 6-18, 6-27, 6-30, 6-33, 6-35, 6-45 to 6-47, 7-11, 7-19, 7-20, 7-37 to 7-39, 7-41, 7-42, 7-45, 7-46, 7-49 to 7-51, 7-54 to 7-57, 7-61, 7-66, 7-68 to 7-75, 7-79, 7-80, 8-3, 8-39, 8-40, 8-42 to 8-44, 8-46 to 8-48, 8-55, 9-2, 9-3	Fourth Issue, Ninth Revision Reason for Change: Comments by MR via email; comments by UM via email; AE-IPF-276; AE-IPF-164 add new parameter Gps_Utc_Time_Difference to MPH; several comments on inconsistencies by UM; new parameters in AUX_PAR_1B, AUX_MRC, AUX_RRC, 1B GWD ADS
4/10	Apr 30, 2019	xii, xiv to xviii, xx to xxxiii, 1-1 to 1-3, 2-1, 7-5, 7-6, 7-12, 7-13, 7-20 to 7-22, 7-31, 7-37, 7-38, 7-49, 7-50, 7-54, 7-66, 7-77 to 7-79, 8-33, 8-36, 8-40, 8-49, 9-1 to 9-3	Fourth Issue, Tenth Revision Reason for change: small refinement of L1B product SPH content description; update PAR_1A, PAR_1B, and DCMZ_1B for new hot pixel correction; AE-IPF-332

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4/11	Oct. 06, 2019	xiii, xv to xix, xxi to xxxiv, 1-2 to 1-5, 2-3, 3-16, 4-3, 4-4, 4-6, 4-7, 5-1, 5-2, 6-21, 6-22, 6-24, 6-25, 6-28, 6-29, 6-37, 6-38, 6-42, 6-48, 7-26, 7-27, 7-29 **7-30 to 7-34 deleted,** 7-62, 7-77, 7-78, 7-80, 8-33, 8-35, 8-36, 8-39, 8-40, 8-43, 8-44, 8-45, 8-47, 8-51 to 8-53, 8-58, 9-1 to 9-3	Fourth Issue, Eleventh Revision Reason for change: improve setting and description of Rayleigh reference pulse quality flag; change some parameters to type FAdoxy in 1B Measurement ADS; add new parameters Mie_Fitted_Non_Linearities to the 1B Calibration & Characterization GADS; add new parameters to the PAR_1B WVM_Params, OWV_Params, DCMZ_Params sections; delete LDT_Params and LCP_Params sections from PAR_1A and PAR_1B file formats; update of examples in section 9; delete product description in sections 7.6 and 7.9 (LCP and LDT); refinement of DSD content description corresponding to AE-IPF-314; new referenced DCMZ data set; update of IDC_1B product format; new parameter LOS_Velocity_Correct_Off_Nadir in PAR_1B; further corrections as stated in AE-IPF-332 **Note: IODD 4/11 dated Oct. 06, 2019 replaces IODD 4/11 dated Aug. 08, 2019. The latter is obsolete.**
4/12	Dec. 10, 2019	xiii, xv to xviii, xxi to xxxiv, 1-2 to 1-6, 2-3, 5-14, 5-15, 5-19, 6-5, 6-6, 6-8, 6-10, 6-13, 6-25, 6-26, 6-38, 6-39, 6-41, 6-42, 6-49, 7-33, 7-41 to 7-43, 7-46, 7-47, 7-49, 7-56, 7-57, 7-59, 8-36, 8-39 to 8-43, 8-47, 8-49, 8-50, 8-57, 8-58, 9-1 to 9-3	DL1B_AUX_003 ideal slopes; new parameter in PAR_1B for useful signal threshold for Mie SR and new Mie PCD parameter; PF1B_017 new M1 temperatures in L1A, L1B, RRC and MRC products; DL1B_DCMZ_005 new DCMZ PAR_1B parameters for DUDE processing DL1B_WVM_004 new threshold in PAR_1B for root selection Newton iteration PF1B_011 update description of US Data_Quality flag PF1B_014 add Mie SR retrieval parameters to Cal&Char DS

ISSUE	DATE	PAGE(S)	DESCRIPTION
4/13	June 12, 2020	i, xiv, xvi to xx, xxii to xxxv, 1-2 to 1-4, 2-3, 5-9, 5-15, 5-17, 5-19, 5-20, 6-3, 6-4, 6-6, 6-7, 6-9, 6-10, 6-11, 6-13, 6-23, 6-50, 7-32, 7-33, 7-36, 7-39, 7-42, 7-47, 7-55, 7-58 to 7-60, 7-75 to 7-78, 8-33, 8-34, 8-36, 8-38 to 8-40, 8-44, 8-50 to 8-53, 8-58, 8-60, 9-1 to 9-3	Renamed document Updated reference documents section and format definition information Correct typo 17 columns -> 18 columns for imaging mode data Field description improvements suggested by UM and IN included Updated example header parts in chapter 9 DL1A_002: add switch for vLOS correction to AUX_PAR_1A DL1A_003: gyro angles in L1A product PF1B_019: add DCO pixel usage parameters to AUX_PAR_1B PF1B_021: add sun elevation angle at DEM intersection to L1A & L1B GEO DS DL1B_WVM_003: add new output of spot energetic centroid and std dev for wind mode and RRC DL1B_IRC_002: add cubic correction lower and upper threshold to AUX_PAR_1B DL1B_IRC_008: updated field descriptions for some fields with potentially misleading field names. DL1B_IRC_008: add new parameter to AUX_MRC_1B frequency step data statistics and update some field descriptions DL1B_ISR_003: new parameter for energy correction; channel A and B now separated. DL1B_DCMZ_004: add parameter Dude_DEU_Detection_Mode to AUX_PAR_1A PF1B_DCMZ_006: new parameters for background dark current rates in DCMZ_1B product; deleted some and added new parameters in PAR_1B for DCMZ processing AEDIPF-7: add parameter Min_Num_BRC to AUX_PAR_1A

ISSUE	DATE	PAGE(S)	DESCRIPTION
4/14	December 11, 2020	xvi, xviii to xxii, xxiv to xxxviii, 1-2, 1-3, 1-8, 5-11, 5-20, 6-6, 6-12, 6-14, 6-22, 6-23 to 6-25, 6-51, 7-26, 7-27, 7-29, 7-30, 7-34 to 7-36, 7-45, 7-54, 7-56, 7-57, 7-64, 7-85 to 7-91, 8-41, 8-44, 8-46, 8-47, 8-54 to 8-56, 8-62, 8-64, 9-1 to 9-3	Fourth Issue, Fourtenth Revision dL1B_027: write negative signal counts to Mie spectral data dL1B_IRC_005: write ground bin & DEM info in AUX_MRC/RRC file dL1B_019: remove obsolete parameters for DCO pre-processing from PAR_1B and ALD_U_N_1B dL1B_ISR_004: Energy drift correction for Mie channel dL1B_026: add AOCS flags to ALD_U_N_1A and ALD_U_N_1B dL1B_IDC_002: add AUX_TEL temperatures to AUX_IDC_1B dL1B_LBM_001: Update the operational processor to post FMB commissioning prototype dL1B_WVM_007: Switch for internal reference usage
4/15	June 11, 2021	xvi, xix, xx, xxiv to xxxviii, 1-2 to 1-4, 2-3, 4-2, 5-2, 5-3, 5-8 to 5-10, 5-14, 6-2, 6-6, 6-8 to 6-11, 6-13 to 6-15, 6-51, 7-19, 7-25, 7-29, 7-36, 7-41, 7-54, 7-59, 7-67, 7-76 to 7-80, 7-82, 8-3, 8-39, 8-45, 8-51, 8-59, 9-1 to 9-3	Fourth Issue, 15th Revision dL1B_ISR_004: Energy drift correction for Mie channel, switch to enable/disable energy correction dL1B_028: Define a SNR related to the total signal for the Mie channel in the L1B Added clarification to altitude and latitude parameters. Updated SPH description of AUX_IDC_1B for Mie parameters. dL1B_031: Updated description of SPH parameters as check on saturated pixels now implemented for IDC, DCC, LBM, and DCMZ dL1B_DCMZ_006: Updated parameters for DCMZ_1B product and PAR_1B file Updated Format Definition Table

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ACRONYMS AND ABBREVIATIONS

Acronyms and Abbreviations used in this document but not found in this list will be listed in the latest release of Document A-14.

ACCD	Accumulation Charge Coupled Device
ACE	Altimeter Corrected Elevation
ADS	Annotated Data Set
ADSR	Annotated Data Set Record
AISP	Annotated Instrument Source Packet
ALADIN	Atmospheric Laser Doppler Instrument
AOCS	Attitude and Orbit Control System
ASCII	American Standard Code for Information Interchange
ASTRIUM	EADS Astrium Ltd.
BRC	Basic Repeat Cycle
CCD	Charge Coupled Device
CRC	Cyclic Redundancy Check
DB	Data Block
DCC	Dark Current Calibration
DCMZ	Dark Current in Memory Zone
DEM	Digital Elevation Model
DS	Data Set
DSD	Data Set Descriptor
DSR	Data Set Record
EGM96	Earth Gravity Model 1996
ESA	European Space Agency
FEP	Front End Processor
FH	Fixed Header
FWHM	Full-Width Half-Maximum
GADS	Global Annotation Data Set
GHz	GigaHertz
HBE	Harmonic Bias Estimation
HK	Housekeeping
HLOS	Horizontal line of sight
IAT	Instrument Auto Test

ICD	Interface Control Document
ID	Identifier
IDC	Instrument Defocus Calibration
IRC	Instrument Response Calibration
ISP	Instrument Source Packet
ISR	Instrument Spectral Registration
KVT	Key-Value-Terminator
L1bP	Level 1b Processor
LBM	Laser Beam Monitoring
LDT	Laser Diode Temperature Adjustment
LiDAR	Light Detecting And Ranging
LCP	Laser Chopper Phase
LOS	Line-of-Sight
MAD	Master Algorithm Document
MDA	MacDonald Dettwiler
MDS	Measurement Data Set
MDSR	Measurement Data Set Record
MHz	Megahertz
MJD	Modified Julian Time
MPH	Main Product Header
MRC	Mie Response Calibration
MSS	Mean Sea Surface
NOP	No Operation
NWP	Numerical Weather Prediction
OWV	Offline Wind Velocity Measurement
PCD	Product Confidence Data
PDR	Preliminary Design Review
RDB	Range Dependent Bias
RRC	Rayleigh Response Calibration
SBT	Satellite Binary Time
SID	Structure Identifier
SOOBS	Start of Observation
SP	Source Packet

SPH	Specific Product Header
SRTM30	Shuttle Radar Topography Mission 30m resolution
TC	Thermocouple
TM	Telemetry
TMC	Period of Master Clock
UDM	User Defined Mode
UTC	Co-ordinated Universal Time
VCDU	Virtual Channel Data Unit
VH	Variable Header
WVM	Wind Velocity Measurement
XML	eXtensible Markup Language
ZWC	Zero Wind Calibration

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1 INTRODUCTION

1.1 Purpose of the Document

This document presents the interface specification for data files input to and output from the Aeolus Level 1b Processor (L1bP) to be installed in the Aeolus Ground Segment. The input/output files required for the L1bP and their purpose are described in Document R-1. The content and format of the input/output files are based on Documents A-5, A-21, A-22 and A-35.

1.2 Scope of the Document

The initial Draft release of this Interface Control Document (ICD) was for review at the Aeolus L1B Preliminary Design Review (PDR).

The 1/0 release of this document was for review at the Aeolus E2S Critical Design Review (CDR).

The 2/0 release of this document was for review at the Aeolus L1B CDR, and contained updates based on comments raised at previous review meetings, as well as updates related to development of the L1bP Architecture Design and Detailed Processing Model Documents (R-1 and R-2 respectively).

The 2/1 release of this document contains updates resulting from comments raised at the Aeolus L1B CDR.

The 3/0 release of this document contains updates resulting from MAD Issue 4.0 updates and Aeolus Product Modifications for Implementation in L1bP Code V2 (A-31).

The 3/1 release of this document includes updates according to the comments raised during CCN4 FAT.

The 4/07 release of this document includes updates corresponding to L1B release 7.00.

The 4/10 release of this document includes updates corresponding to L1B release 7.06, which includes mainly the new hot pixel correction.

The 4/11 release of this document includes updates corresponding to L1B release 7.07, which includes changes in the PAR_1A, PAR_1B, IDC_1B, DCMZ1B, and ALD_U_N_1B Measurement ADS and Calibration & Characterization GADS.

The 4/12 release of this document includes updates corresponding to L1B release 7.08, which includes changes in the PAR_1B, all binary 1A, MRC_1B, RRC_1B, and the ALD_U_N_1B product.

The 4/13 release of this document includes updates corresponding to L1B release 7.09, which includes changes in the PAR_1A, PAR_1B, all binary 1A, DCMZ1B, MRC_1B, RRC_1B, OWV_1B, and the ALD_U_N_1B product.

The 4/14 release of this document includes updates corresponding to L1B release 7.10, which includes changes in the ALD_U_N_1A, all auxiliary 1A, PAR_1B, MRC_1B, RRC_1B, IDC_1B, LBM_1B, OWV_1B, and the ALD_U_N_1B product.

The 4/15 release of this document includes updates corresponding to L1B release 7.11, which includes changes in the DCMZ_1B, PAR_1B, OWV_1B, and the ALD_U_N_1B product.

1.3 Format Definition Relation

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

1. **File Type** denotes the specific sub-string of the product name that identifies the product.
2. **Format Version** denotes the product format version that is also used to identify the proper xmlns version.
3. **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.
4. **Modified** is a field used to specify if a certain product has been modified with the current document version
5. **Processor** denotes the software version at which the specific format version is introduced

Table 1-1 Format Definition Table

File Type	Format Version	REF_DOC	Modified	Processor
ALD_U_N_0_	04.09	521666_IODD_4_09	N	07.05

ALD_U_N_1A	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
ALD_U_N_1B	04.15	SD-DoRIT-L1B-006 v4.15	Y	07.11
AUX_CHAR	04.09	521666_IODD_4_09	N	07.05
AUX_HBE_1B	04.09	521666_IODD_4_09	N	07.05
AUX_RDB_1B	04.09	521666_IODD_4_09	N	07.05
AUX_IRC_1A	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_NOU_1A	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_ISR_1A	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_IAT_1A	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_DCC_1A	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_IDC_1A	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_OWV_1A	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_DCMZ1A	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_LBM_1A	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_ISR_1B	04.09	521666_IODD_4_09	N	07.05
AUX_IAT_1B	04.09	521666_IODD_4_09	N	07.05
AUX_DCC_1B	04.09	521666_IODD_4_09	N	07.05
AUX_IDC_1B	04.11	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_OWV_1B	04.15	SD-DoRIT-L1B-006 v4.15	Y	07.11
AUX_DCMZ1B	04.15	SD-DoRIT-L1B-006 v4.15	Y	07.11
AUX_LBM_1B	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_MRC_1B	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_RRC_1B	04.14	SD-DoRIT-L1B-006 v4.14	N	07.10
AUX_ZWC_1B	04.09	521666_IODD_4_09	N	07.05
AUX_PAR_0	04.09	521666_IODD_4_09	N	07.05

AUX_PAR_1A	04.13	SD-DoRIT-L1B-006 v4.13	N	07.09
AUX_PAR_1B	04.15	SD-DoRIT-L1B-006 v4.15	Y	07.11

The file types AUX_DCMZ1A, AUX_DCMZ1B, AUX_HBE_1B, and AUX_RDB_1B are introduced with L1B version 6.04.

The file types AUX_LBM_1A, AUX_LBM_1B are introduced with L1B version 6.06.

The file types AUX_LCP_1A, AUX_LCP_1B, AUX_LDT_1A, and AUX_LDT_1B have been deleted with L1B version 7.07.

1.4 Relationship of Input/Output Data Definition Files

Table 1-2 summarises the Input/Output Data Definition Files defined in this Interface Control Document.

The L1bP software consists of three distinct processors, the L0, the L1A, and the L1B processing step. For any input file to one of these processing steps, the table below provides the classification static/dynamic. For files that are only output of one of these processing steps but not input to another of these three processing steps, classification of static/dynamic is out of scope of this document. Nevertheless some information has been copied over from R-8; information copied from R-8 is put into brackets.

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

File Type Identifier	File Type	Description	Created By	Used By	s/d
	Level 0 Product File				
ALD_U_N_0_	Level 0 Product File	Section 4	Level 0 Processor	Level 1A Processor	d
	Level 1A Product and Auxiliary Files				
ALD_U_N_1A	Level 1A Wind Measurement Product	Section 5	Level 1A Processor	Level 1B Processor	d
AUX_NOU_1A	Level 1A ‘No Operation’ (NOP) or ‘User Defined Mode’ (UDM) data	Section 5	Level 1A Processor		
AUX_ISR_1A	Level 1A Instrument Spectral Registration (ISR)	Section 5	Level 1A Processor	Level 1B Processor	d
AUX_IAT_1A	Level 1A Instrument Auto Test (IAT)	Section 5	Level 1A Processor	Level 1B Processor	d
AUX_DCC_1A	Level 1A Dark Current Calibration (DCC)	Section 5	Level 1A Processor	Level 1B Processor	d
AUX_IDC_1A	Level 1A Instrument Defocus Characterisation (IDC)	Section 5	Level 1A Processor	Level 1B Processor	d

File Type Identifier	File Type	Description	Created By	Used By	s/d
AUX_IRC_1A	Level 1A Instrument Response Calibration (IRC)	Section 5	Level 1A Processor	Level 1B Processor	d
AUX_OWV_1A	Level 1A Off-Line Wind Velocity Measurement (OWV)	Section 5	Level 1A Processor	Level 1B Processor	d
AUX_DCMZ1A	Level 1A Dark Current in Memory Zone (DCMZ)	Section 5	Level 1A Processor	Level 1B Processor	d
AUX_LBM_1A	Level 1A Laser Beam Monitoring (LBM)	Section 5	Level 1A Processor	Level 1B Processor	d
	Level 1B Product and Auxiliary Calibration Files				
ALD_U_N_1B	Level 1B Wind Measurement	Section 6	Level 1B Processor	PDS	
AUX_ISR_1B	Level 1B Instrument Spectral Registration (ISR)	Section 7.1	Level 1B Processor	PDS	(s)
AUX_IAT_1B	Level 1B Instrument Auto Test (IAT)	Section 7.3	Level 1B Processor	PDS	
AUX_DCC_1B	Level 1B Dark Current Calibration (DCC)	Section 7.4	Level 1B Processor	PDS	
AUX_IDC_1B	Level 1B Instrument Defocus Characterisation (IDC)	Section 7.5	Level 1B Processor	PDS	(s)
AUX_MRC_1B	Level 1B Mie Response Calibration (MRC)	Section 7.7	Level 1B Processor	Level 1B Processor & PDS	s
AUX_RRC_1B	Level 1B Rayleigh Response Calibration (RRC)	Section 7.8	Level 1B Processor	Level 1B Processor & PDS	s
AUX_OWV_1B	Level 1B Offline Wind Velocity Measurement (OWV)	Section 7.10	Level 1B Processor	PDS	
AUX_ZWC_1B	Level 1B Zero Wind Calibration (ZWC)	Section 7.11	Level 1B Processor	Level 1B Processor & PDS	s
AUX_DCMZ1B	Level 1B Dark Current in Memory Zone (DCMZ)	Section 7.12	Level 1B Processor	Level 1B Processor & PDS	d
AUX_LBM_1B	Level 1B Laser Beam Monitoring (LBM)	Section 7.13	Level 1B Processor	PDS	
	Input Auxiliary Files				
AUX_CHAR___	Satellite Characterisation	Section 8.1	L1bP HMI component or external tool	Level 0 Processor Level 1A Processor Level 1B Processor	s
AUX_PAR_0_	Level 0 Processing Parameters	Section 8.2	L1bP HMI component or external tool	Level 0 Processor	s

File Type Identifier	File Type	Description	Created By	Used By	s/d
AUX_PAR_1A	Level 1A Processing Parameters	Section 8.3	L1bP HMI component or external tool	Level 1A Processor	s
AUX_PAR_1B	Level 1B Processing Parameters	Section 8.4	L1bP HMI component or external tool	Level 1B Processor	s
MPL_ORBSCT	Orbit Scenario File	Section 8.5	L1bP HMI component or external tool	Level 0 Processor Level 1A Processor Level 1B Processor	s
*ACE2 *GETASSE_flag	Digital Elevation Data	Section 8.6	External	Level 1A Processor Level 1B Processor	s
AUX_PRR_1B	Predicted Rayleigh Response	Section 8.7	Calibration Software	Level 1B Processor	s
AUX_HBE_1B	Harmonic Bias Estimation Parameters	Section 8.8	L1bP HMI component or external tool	Level 1B Processor	s
AUX_RDB_1B	Range Dependent Bias Parameters	Section 8.9	L1bP HMI component or external tool	Level 1B Processor	s

The relationship and normal process flow between the various files passed to and from the Level 1b Processor software tasks is illustrated in .

The AUX_PRR_1B file is an alternative input file replacing the AUX_RRC_1B file. The format of AUX_PRR_1B and AUX_RRC_1B are identical, but the AUX_PRR_1B file is generated by the Calibration Software, see 8.7.

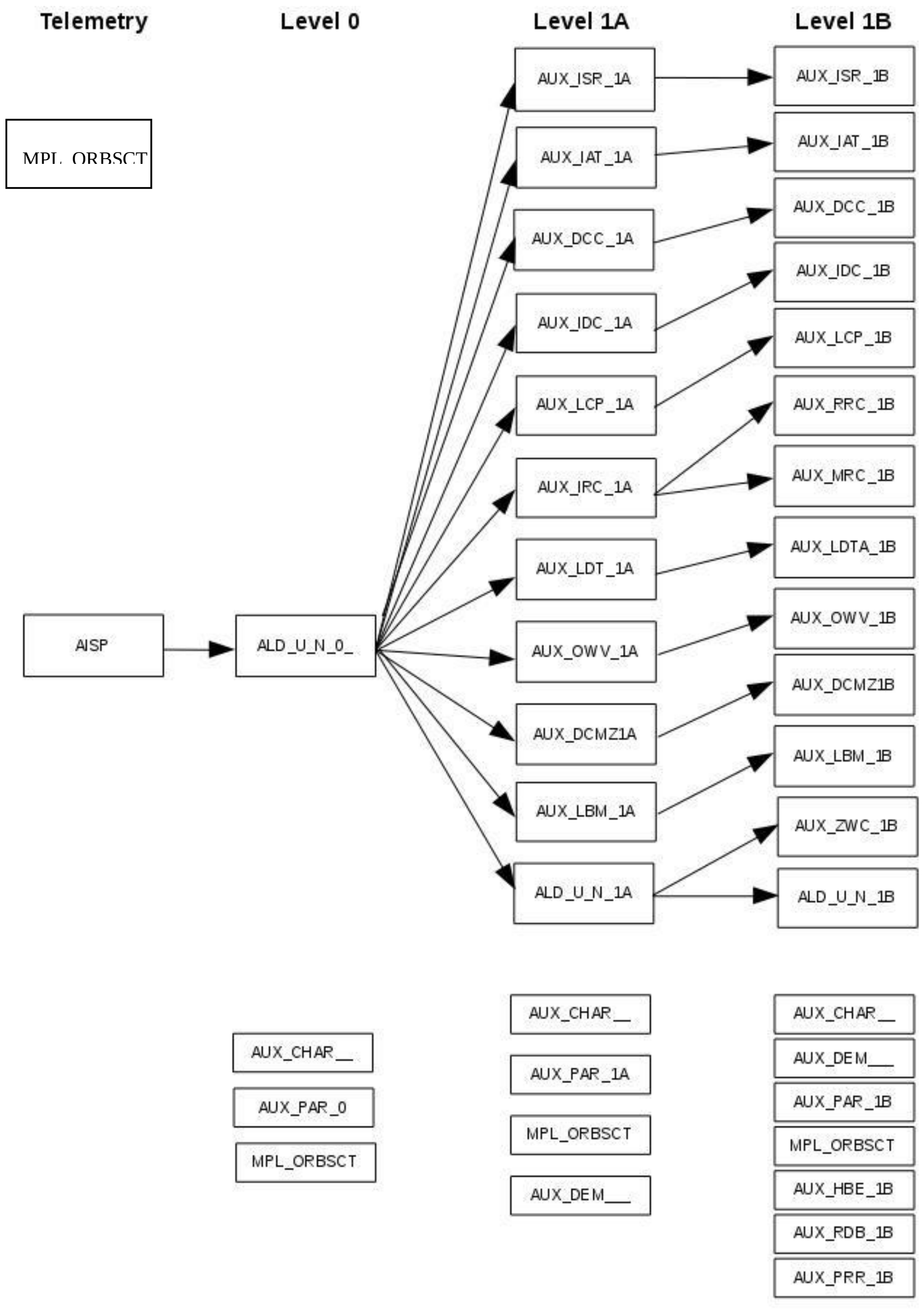

Figure 1-1 Relationship of Input/Output Files

The AISP is the file received from the satellite downlink transmission by the L1b Processor. This file contains instrument source packets with annotation added by the telemetry processor at the ground station. The AISP file is identified in this figure for completeness but its format and content is defined in A-35.

The Level 0 file is created by the Aeolus L1bP Level 0 Processor task. The file contains downlink data sorted into measurement data sets, one for each of the eleven wind measurement and calibration modes supported by the ALADIN instrument. Each measurement data set (MDS) contains data set records (DSR) containing all 34 source packets received during one Basic Repetition Cycle (BRC).

Level 1A output files contain data from one ALADIN instrument operation mode in each file. There can be up to eleven different operating modes therefore there can be from one to eleven Level 1A files, depending on the operating modes contained in the input Level 0 file.

Level 1B output files include one ALADIN instrument operation mode in each file. The Level 1B processor may be commanded to input and process only wind measurement mode data, or only the calibration modes data, or all modes. Therefore the Level 1B processor may output from one to eleven Level 1B output files corresponding to the ten possible input Level 1A files. (AUX_NOU_1A products are not further processed, but AUX _IRC_1A products result in two different L1B products, the AUX_RRC_1B and the AUX_MRC_1B.) In Wind Measurement mode the L1bP generates both a Wind Measurement product file as well as a Zero Wind Calibration file.

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2 DOCUMENTS

2.1 Applicable Documents

A-1	AE.CO.ASU.GS.005	Level 1B processor and End to End Simulator Contract Issue E, Feb. 2004.
A-2	AE-SW-ASU-GS-011	Statement of Work. Issue E2.
A-3	AE-RS-ASU-GS-022	Requirement Specification. Issue E2.
A-4	AE-SW-ASU-GS-023	Aeolus Master Algorithm Document. Issue 10, Apr. 2018.
A-5	ESA-ID-ACS-GS-0001	PDF-IPF ICD Generic Interface Guidelines. Issue 2.2, August 2, 2006.
A-6	AE-RS-ASU-PA-001	Product Assurance Requirements for Subcontractors. Issue 3.
A-7	AE-RS-ASG-PA-002	Software Product Assurance Requirements. Issue 2A.
A-8	AE-SW-ASU-MA-001	Subcontractor Project Management. Issue H.
A-9	AE-RS-ASU-GS-023	Level 1B and End to End Simulator Document Contents Guidelines. Issue B.
A-10	ECSS-E-40B	Space Engineering Software – Part 1: Principles and Requirements. Draft, July 28, 2000.
A-11	ECSS-Q-80B	Space Product Assurance, Software Product Assurance. Issue B, October 10, 2004.
A-12	AE-TN-ASF-AL-00101	Aladin, Design Report, (Extract Chapter 4, Overall ALADIN Architecture). Issue 2.

A-13	AE-TN-ASF-AL-0086	Aladin, Frequency Measurement Performance Budget (Extract Section 4.2 Recall of Intermediate Budgets). Issue 2.
A-14	AE-LI-ASU-SY-001	Acronyms and Abbreviations. Issue 2.
A-15	AE-TN-ASU-SY-006	Background Document for Contractors. Issue B.
A-16	AE-ST-ASG-SY-001	Aeolus Packet Utilisation Standards. Issue 8.3, 24.07.2009.
A-17	AE-RS-ASU-GS-041	Removed
A-18	AE-IF-ASF-AL-00006	ALADIN Instrument FM TM/TC ICD. Issue 15, 29/11/10.
A-19		<replaced by updated A-4>
A-20	AE-TN-ASF-AL-0097	ALADIN Instrument SNR Mathematical Model Description. Issue 1.
A-21	AE-TN-ESA-SY-007	ADM-Aeolus Engineering Data Products Guidelines. Issue 1B.
A-22	PE-TN-ESA-GS-0001	Earth Explorer Ground Segment File Format Standard, Issue 2.0.
A-23	AE-RS-ASU-SY-006	Aeolus Satellite to Ground Segment ICD. Issue C.
A-24	CS-NA-DMS-GS-001	Earth Explorer Mission Conventions Document. Issue 1.3.
A-25	AE-TN-ASF-AL-00044	ALADIN Instrument Operation Definition. Issue 3.
A-26	ADM-SY-DSS-FR-004	Final Report ADM Ground Segment Definition and Design Report. 2000, Issue 1.1.
A-27	AE-TN-ESA-GS-004	Aeolus Ground Segment Concepts Document. Issue 1A.
A-28		<Removed>
A-29	EXPCFI-NOTE-012	Reference Orbit Scenario File Format Description. Issue 1.0
A-30	AE.TN.DLR.ACS-L1B.121205	Additional Computational Steps ADM-Aeolus L1B
A-31	AE.TN.DLR.APM-L1B.150206	Aeolus Product Modifications for Implementation in L1bP Code V2

A-32	AE.CR.ASU.GS.00147	Contract Change Notice (CCN4)
A-33	AE.CR.ASU.GS.00187	Contract Change Notice (CCN6)
A-34	AE.CO.ASU.GS.00026	CONTRACT LEVEL 1B PROCESSOR AND END TO END SYSTEM SIMULATOR
A-35	XADM-GSEG-EOPG-TN-04-0024	ADM-AEOLUS ANNOTATED SOURCE PACKET FILES FORMAT DESCRIPTION TECHNICAL NOTE
A-36	XADM-GSEG-EOPG-IC-14-0007	ADM-Aeolus PDGS AS-APF Interface Control Document, Iss. 1, Rev. 2, 06/04/2016

2.2 Reference Documents

R-1	AED-SD-DoRIT-L1B-012	Aeolus L1B Processor Architecture Design. MacDonald Dettwiler, Issue 3/6, Jun. 12, 2020
R-2	AED-SD-DoRIT-L1B-007	Aeolus L1B Processor Detailed Processing Model, MacDonald Dettwiler, Issue 3/14, Jun. 11, 2021
R-3	AE-TN-MFG-L2P-CAL-003	Generation and update of AUX_CSR, Version 3.2, 15 December 2015
R-4	GETASSEE30_v2	Global EarthTopography and Sea Surface Elevation at 30 arc second resolution, 11/03/2008
R-5	CS-MA-DMS-GS-0003	Mission Cfi Software CONVENTIONS DOCMENT, Issue 4.12, 03/11/2016
R-6	AE.TN.ASF.AL.0624	Location of thermal hardware on Aladin FM instrument, Issues 2, May 2017
R-7	E2_MoM_WM058_ARB	MoM of ARB held on 02.10.2019
R-8	AED-IC-SER-GEN-003	Software and Auxiliary delivery ICD
R-9	EO-MA-DMS-GS-0007	EO Data Handling, Software Users Manual, 4.12, 03/11/2016

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3 GENERAL INPUT/OUTPUT FILE FORMAT

3.1 File Naming Conventions

The file naming conventions to be applied for Aeolus data files and products are in line with the Earth Explorer File Format Standard, Document A-22. 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]. The L1B processor allows any four uppercase letters/digits. But in A-22 and A-36 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]

<instance ID> is the file instance ID [variable length, ≤ 41 letters/digits/ underscores], where the <instance ID> string will include sensing period/duration/orbit or validity period information, in case of data products and auxiliary files, respectively, as well as size information.

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

- ‘EEF’ if header and data block are contained in a single file
- ‘HDR’ in case of a header file
- ‘DBL’ in case of a data block file

For Data Products and Level 1A Auxiliary Data:

'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> = "0_" for a Level 0 product, "1A" for a Level 1A product, "1B" for a Level 1B product

<instance ID> = yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvv

with yyyymmddThhmmsszzz: start time of sensing (date/time string with precision to 1 ms – see Table 3-7)

uuuuuuuuu: duration/sensing period (derived from start and stop time of sensing – seeTable 3-7, unit: ms)

oooooo: start absolute orbit number (see Table 3-7)

vvvv: file version number (see file version in Table 3-4)

For Level 1B Auxiliary Data:

'TTTTTTTTTT' = AUX_*PPPPPP*

'AUX' denotes auxiliary file

'PPPPPP' = CHAR__ for characterisation file

= yyyyxx for calibration files (yyyy denotes the specific type of calibration file and xx denotes that the file is generated by the "1A" or "1B" processing level)

= PAR_xx for parameter file (xx denotes that the file is generated by the "0_", "1A" or "1B" processing level)

<instance ID> = yyyymmddThhmmss_yyyymmddThhmmss_vvvv

yyyymmddThhmmss: date/time strings of validity interval start and stop time (see Table 3-4 and Table 3-5).

vvvv: file version number, four digits starting with 0001 (see file version in Table 3-4)

3.2 Format Conventions

3.2.1 XML Format

The following table shows the different field formats used for XML structures. The conventions used for ASCII representations can be found in Document A-22, Section 6.2.

Table 3-1 XML Formats Description

Format	Description	Size	Example
DateTime	Any UTC time uses the "standard with reference" format 'UTC=*yyyy-mm-ddThh:mm:ss*', where: • *yyyy* is a 4 digits integer representing the year • *mm* is a 2 digits integer representing the month • *dd* is a 2 digits integer representing the day • *hh* is a 2 digits integer representing the hour • *mm* is a 2 digits integer representing the minutes • *ss* is a 2 digits integer representing the seconds • In some cases, the time will be expressed with microseconds resolution, with the format 'UTC=*yyyy-mm-ddThh:mm:ss.uuuuuu*'	23 (seconds resolution) or 30 (microseconds resolution)	UTC=2005-03-31T12:00:00
String	array of characters	variable	A_STRING
Enum	array of characters with a fixed number of valid values	variable	A_STRING
Boolean	TRUE or FALSE	5	FALSE
IntAuc	unsigned char integer	Variable	221
IntAc	signed char integer	variable	-221
IntAus	unsigned short integer	variable	92828
IntAs	signed short integer	variable	-92828
IntAul	unsigned long integer	variable	1010000000
IntAl	signed long integer	variable	-1010000000
IntAd	long long integer	variable	240000000
FAdo*xy*	float with x digits before the decimal point and y digits after	variable	034.8399
Spare	Array of characters filled with blank characters	variable	

Due to the flexibility of the XML format, file sizes will vary and field sizes may only be approximate. For estimates of XML field sizes, estimates consist of three parts:

<opening tag size>+<value size>+<closing tag size>

where

- <*opening tag size*> is the tag name size including the <…>

- <*value size*> is field content size. These sizes may vary, so the size estimated may be an approximation
- <*closing tag size*> is the tag name size including the </…>, plus the terminator marking the end of the line.

Note that, for the purposes of size estimates in this document, the size of attributes and extra formatting such as tab characters are not included.

3.2.2 Key-Value-Terminator Format

The following table shows the different field formats used for KVT structures.

Table 3-2 KVT Formats Description

Format	Description	Size (bytes)	Example
DateTime	Any UTC time uses the "Envisat with microseconds" format '*dd-mmm-yyyy hh:mm:ss.uuuuuu'*, where: • *dd* is a 2 digits integer representing the day • *mmm* is a 3 characters string representing the month, e.g., JAN, FEB, etc. • *yyyy* is a 4 digits integer representing the year • *hh* is a 2 digits integer representing the hour • *mm* is a 2 digits integer representing the minutes • *ss* is a 2 digits integer representing the seconds • *uuuuuu* is a 6 digits integer representing the microseconds	27	09-OCT-2007 11:21:32.210146
String	String written with quotes before and after. The text is left justified, e.g., any added blanks should appear at the end of the field string.	variable	"A_STRING"
Enum	String without quotes	variable	A_STRING
Boolean	0 (for FALSE) or 1 (for TRUE)	1	0
IntAuc	Unsigned char integer, written with a '+' at the beginning	4	+221
IntAc	Signed char integer, written with the sign at the beginning	4	-221
IntAus	Unsigned short integer	6	+65535
IntAs	Signed short integer, written with the sign at the beginning	6	-92828
IntAul	Unsigned long integer, written with a '+' at the beginning	11	+1010000000
IntAl	Signed long integer, written with the sign at the beginning	11	-1010000000
IntAd	Long long integer, written with the sign at the beginning	21	+00000000000240000000
FAdo*xy*	Float with x digits before the decimal point and y digits after, written with the sign at the beginning	x+y+2	+034.8399 (FAdo34)

Format	Description	Size (bytes)	Example
Spare	Array of characters filled with space characters	variable	

For estimates of KVT field sizes, estimates are shown as a sum of three parts:

<key size>+<value size>+<terminator size>

where

- <*key size*> is the tag name size, which also includes the '=' character and opening quotes if applicable
- <*value size*> is field content size, including any field-specific formatting, such as the '+' or '-' characters
- <*terminator size*> is the size of closing quotes if applicable, and may include the size of the unit (written in the format '<unit>') if one is provided, plus the terminator marking the end of the line.

When the KVT format is used, field names are always written in capital letters.

3.2.3 Binary Format

The following table shows the different field formats used for Binary structures. The conventions used can be found in Document A-22, Section 6.3.

Table 3-3 Binary Formats Description

Format	Description	Size (bytes)	Example
DateTime	Any UTC time uses the Modified Julian Date 2000 (MJD2000) format, as described in Document A-24 Section 4.2. In binary format, an MJD2000 time is represented by the format <*days*>.<*seconds*><*microseconds*>, where: • <*days*> is a 4 byte signed long integer representing the number of days since January 1st 2000 at 0:0 hour (which may be negative) • <*seconds*> is a 4 byte unsigned long integer representing the number of seconds elapsed since the beginning of the day. The number of seconds shall not exceed 86400. • <*microseconds*> is a 4 byte unsigned long integer representing the number of microseconds elapsed since the last second. The number of microseconds shall not exceed 999999.	12	
String	Array of characters	variable	A_STRING
Enum	A set of fixed values	1	A_STRING
Boolean	0 (for FALSE) or 1 (for TRUE)	1	0

Format	Description	Size (bytes)	Example
IntAuc	Unsigned char integer	1	[0, +255]
IntAc	Signed char integer	1	[-128, +127]
IntAus	Unsigned short integer	2	[0, +65,535]
IntAs	Signed short integer	2	[-32 768, +32 767]
IntAul	Unsigned long integer	4	[0, +4 294 967 295]
IntAl	Signed long integer	4	[-2 147 483 648, +2 147 483 647]
IntAd	Long long integer	8	[-9 223 372 0368 54 775 808, +9 223 372 036 854 775 807]
FAdo*xy*	Double precision floating point (See Document A-22)	8	[-1.79e+308, 1.79e+308], [-2.22e-308, 2.22e-308]
Spare	Array of characters filled with space (ASCII 32) characters	variable	

- For estimates of binary field sizes, estimates are based on the sizes shown for the formats in the previous two sections.

3.2.4 Non-Standard Units

3.2.4.1 ACCD counts

ACCD counts is the unit that defines the electron count of the individual pixel, as seen by the spacecraft.

3.2.4.2 ACCD pixel index

The ACCD pixel index is the unit that defines a certain position on the ACCD that ranges from pixel index 0.5 to 16.5, thus specifying 16 columns of width 1.

3.2.4.3 ACCD pixel

The ACCD pixel is the unit that defines a width in terms of ACCD columns that ranges from 0 to 16.

3.2.4.4 TMC

1 TMC defines the period of a master clock tic.

3.2.5 Bit and Byte Ordering

The Aeolus project System Requirements Document (Document A-3) requires that "For external interfaces bit 0 shall be the most significant bit, byte 0 shall be the most significant byte". All Input/Output Data Definition files are considered external interfaces and therefore will comply with this specification, even though it differs from the specification in Document A-22, Section 6.3.

3.2.6 Specific Field Details

3.2.6.1 Quality Flags

In the different products 1 byte Intc data or 2 byte Ints data is used for bit flag quality fields. In these quality fields bit 1 refers to the most significant bit whereas bit 8 or bit 16 refer to the least significant bit.

3.2.6.2 Longitude/Latitude

Longitude values are reported with the unit 10-6DegE, where the values range between 0° and 360°.

Latitude values are reported with the unit 10-6DegN, where the values range between -90.0° (south pole) and + 90.0° (north pole).

3.2.6.3 Date Time

DateTime fields are represented in two different formats,

1. ASCII format in file headers (see Table 3-1, Table 3-2)
2. Transport format in binary data (see Table 3-3)

In case of a leap second, for the

1. ASCII format 60 seconds may occur in the time stamp: UTC=2010-12-31T23:59:60.
2. Transport format, the second byte may have the value of 86400.

3.3 General File Structure

All the Aeolus files comply with the Earth Explorer Ground Segment File Format Standard DocumentA-22, including auxiliary and non-product files; exceptions are listed in section 3.3.6.

The Aeolus L1bP outputs follow a generalised structure containing:

- A Fixed Header (FH) written using the XML standard. This header is identical for all files and is described in Section 3.3.3.

- A Variable Header (VH), which varies from one file type to another and consists of:
  - A Main Product Header (MPH) written using the XML standard. This header is identical for all files and is described in Section 3.3.4.1.
  - A Specific Product Header (SPH) written using the XML standard. This header varies for each product type, and the SPH for each product type is described in the applicable product type sections.

    All SPH structures will include one or more Data Set Descriptors (DSD) which describe the format/structure of individual Data Sets in the Data Block portion of the product. The DSD structure is described in Section 3.3.5.
- A Data Block (DB) containing one or more Data Sets (DS), each consisting of one or more Data Set Records (DSR). Each product will contain different types of DSs, which are described in the various product type sections. Data sets in the Data Block can be of three different types: Measurement Data Sets (MDS), Annotation Data Sets (ADS), or Global Annotation Data Sets (GADS)

3.3.1 Small Data Volume

For small data volume, the 3 components are stored in the same physical file and the data block is written using the XML standard. 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.

3.3.2 Large Data Volume

For large data volume, the Data Block is stored in a separate file and has an ASCII header containing a copy of the MPH and SPH (which includes DSDs) written using the KVT format used for the Envisat mission. 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 are used (see also examples in chapter 9).

Example : XML format Acquisition_Station vs. KVT format ACQUISITION_STATION.

Spare fields have been introduced the MPH in order to allow late without product changes. Spare field tags (Spare_1, Spare_2 etc., see

This definition of large data volumes is not compliant with the Earth Explorer Ground Segment File Format Standard A-22, see section 3.3.6.

An example of a MPH in KVT format is provided in Annex 9.

Figure 3-1 shows these relationships pictorially.

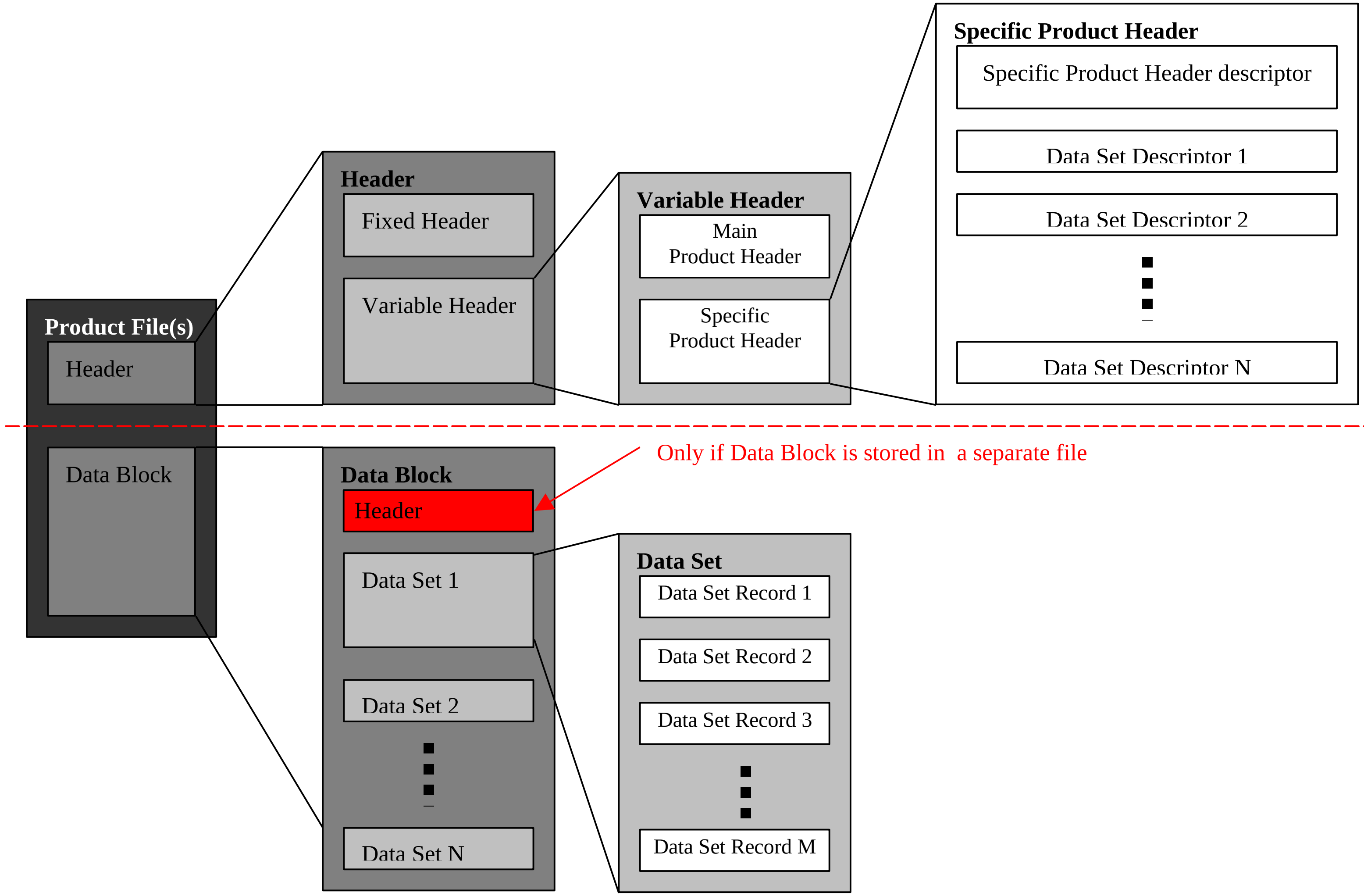

Figure 3-1 Aeolus Products General File Structure

The small data volume single XML files contain all three components separated with the following top level tags. The FH, VH and DB structures described throughout this document assume this top level structure.

1. “Earth_Explorer_File” delimiting the file contents
2. “Earth_Explorer_Header” delimiting the header section (fixed and variable header)
3. “Data_Block” delimiting the data block

The high level layout of these files is shown below:

```
<?xml version=”1.0” ?>
<Earth_Explorer_File>
    <Earth_Explorer_Header>
        <Fixed_Header>
            Fixed Header contents
        </Fixed_Header>
        <Variable_Header>
            Variable Header contents
        </Variable_Header>
    </Earth_Explorer_Header>
    <Data_Block>
        <data_set_1_root_tag>
            <List_of_Data_Set_Records count=”N”>
                <Data_Set_Record>
                    Data Set 1 Record Contents
                </Data_Set_Record>
                ...
            </List_of_Data_Set_Records>
        </data_set_1_root_tag>
        <data_set_2_root_tag>
            <List_of_Data_Set_Records count=”N”>
                <Data_Set_Record>
                    Data Set 2 Record Contents
                </Data_Set_Record>
                ...
            </List_of_Data_Set_Records>
        </data_set_2_root_tag>
        ...
        <data_set_N_root_tag>
            <List_of_Data_Set_Records count=”N”>
                <Data_Set_Record>
                    Data Set N Contents
                </Data_Set_Record>
                ...
            </List_of_Data_Set_Records>
        </data_set_N_root_tag>
    </Data_Block>
</Earth_Explorer_File>
```

The large data volume files with separate header and data block files contain the tag "Earth_Explorer_Header" delimiting the header section, as described below.

```
<?xml version="1.0" ?>
<Earth_Explorer_Header>
        <Fixed_Header>
                Fixed Header contents
        </Fixed_Header>
        <Variable_Header>
                Variable Header contents
        </Variable_Header>
</Earth_Explorer_Header>
```

3.3.3 Fixed Header

The Fixed Header (FH) structure is the same for all Earth Explorer mission files, and hence all Aeolus files, and is described in Document A-22. It is always in XML format, and is described in Table 3-4. The size of the XML fixed header will not necessarily be fixed, so the sizes given are only rough approximations.

Table 3-4 Fixed Header Content Description

Tag Name	Content Description	Unit	Type	Size
Fixed_Header	Root tag.		Structure	29
File_Name	Logical file name, i.e., file name excluding the extension		String	49
File_Description	One line description of the file		String	63
Notes	Multi-lines free text		String	41
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	45
File_Class	"TEST" if the test flag is turned on in the job order. Otherwise, it is equal to the order type in the Job Order. This order type is a 4 character string. Currently the additional order types "OPER", "RPRO" and "OFFL" are defined. The list of order types may be expanded or modified depending on operational needs.		String	51
File_Type	Repetition of the File Type element of the file name		String	49
Validity_Period	See **Table 3-5** for structure description and A-35 for further information.		Structure	142
File_Version	Four digits used to distinguish between versions of a file having the same validity period		Integer	55
Source	See Table 3-6 for structure description		Structure	216

Tag Name	Content Description	Unit	Type	Size
Total size for XML FH in bytes:				740

Table 3-5 Fixed Header Validity_Period Content Description

Tag Name	Content Description	Unit	Type	Size
Validity_Start	The validity of a file is managed by the PDGS environment istself, see A-35. Omitting the micro seconds, Validity_Start time equals Sensing_Start of Table 3-7. To indicate the end of the mission, the special value: 'UTC=9999-12-31T23:59:59' can be used.		DateTime	57
Validity_Stop	The validity of a file is managed by the PDGS environment istself, see A-35. Omitting the micro seconds,Validity_Stop time equals Sensing_Stop of Table 3-7. To indicate the end of the mission, the special value: 'UTC=9999-12-31T23:59:59' can be used.		DateTime	55
Total size for XML Structure in bytes:				112

Table 3-6 Fixed Header Source Content Description

Tag Name	Content Description	Unit	Type	Size
System	Name of the ground segment element creating the file		String	43
Creator	Name of the tool, within the ground segment element, used to create the file		String	45
Creator_Version	Version of the tool		String	61
Creation_Date	File creation date (UTC)		DateTime	55
Total size for XML Structure in bytes:				204

3.3.4 Variable Header

3.3.4.1 Main Product Header

The Main Product Header (MPH) identifies the product and its main characteristics. It is of fixed length and format for all products, and is based on the MPH established for the Envisat mission. The MPH structure is described in Table 3-7. The size of the XML variable header will not necessarily be fixed, so the sizes given are only rough approximations.

Table 3-7 Main Product Header Content Description

Tag Name	Content Description	Unit	Type	Size (KVT)	Size (XML)
Main_Product_Header	Root tag for XML format only.		Structure	N/A	43
Product	Logical file name, i.e., file name excluding the extension		String	11+62	45
Proc_Stage	Processing stage flag: 'N' for "Normal Processing", 'R' for Reprocessing, 'B' for Backlog Processing, default value 'X'		Enum	12+1	27
Ref_Doc	Reference document describing the product		String	11+23	45
Spare_1			Spare	40+1	20
Acquisition_Station	Acquisition station ID (copied from the AISP xml header System field		String	23+20	69
Proc_Center	Processing centre ID		String	15+6	53
Proc_Time	Time of processing (UTC)		DateTime	13+27	56
Software_Ver	Software version number of processing software. Format: name of processing software(up to 10 characters)/version number(4 characters)		String	16+14	55
Baseline	Baseline identifier (as provided by the Job Order File)		String	10+29+2	51
Sensing_Start	Start time of sensing of the first BRC of the product. (Start_of_Observation_Time, e.g. Table 4-3, Table 5-3, Table 6-18)		DateTime	17+27	65
Sensing_Stop	Start time of sensing of the last BRC of the product.		DateTime	16+27	63
Spare_3			Spare	40+1	20
Phase	Phase number. Possible values are '0' to '9' and 'A' to 'Z'. Currently 'X' is used to indicate that the phase number field is not used. Other values from 'A' to 'Z' are spare values.		Enum	7+1	17
Cycle	Cycle number		Intc	7+4	17
Rel_Orbit	Start relative orbit number		IntAs	11+6	26
Abs_Orbit	Start absolute orbit number		IntAus	11+6	26
State_Vector_Time	Time of state vector		DateTime	21+27	73
Delta_UT1	Delta_UT1 = UT1-UTC	s	FAdo06	11+8+3	63
X_Position	X position in Earth-fixed reference	m	FAdo73	12+12+3	63
Y_Position	Y position in Earth-fixed reference	m	FAdo73	12+12+3	63
Z_Position	Z position in Earth-fixed reference	m	FAdo73	12+12+3	63
X_Velocity	X velocity in Earth-fixed reference	m/s	FAdo46	12+12+5	63

Tag Name	Content Description	Unit	Type	Size (KVT)	Size (XML)
Y_Velocity	Y velocity in Earth-fixed reference	m/s	FAdo46	12+12+5	63
Z_Velocity	Z velocity in Earth-fixed reference	m/s	FAdo46	12+12+5	63
Vector_Source	Source of orbit vectors, expected value “GP”.		String	17+2	57
Spare_4			Spare	40+1	20
Utc_Sbt_Time	Time corresponding to SBT below (not used by ADM-Aeolus)		DateTime	16+27	63
Sat_Binary_Time	Satellite Binary Time (not used by ADM-Aeolus)		IntAul	17+11	40
Clock_Step	Clock step size (not used by ADM-Aeolus)	ps	IntAul	12+11+4	30
Spare_5			Spare	32+1	20
Leap_Utc	Time of occurrence of the leap second		DateTime	12+27	54
Gps_Utc_Time_Difference	Seconds of GPS UTC time difference before time of occurrence of the leap seoncd		IntAc	25+4	54
Leap_Sign	Leap second sign (+001 if positive leap second, -001 if negative)		IntAc	11+4	25
Leap_Err	Leap second error. ‘1’ (‘TRUE’ in XML) if leap second error occurs during processing segment, ‘0’ otherwise (‘FALSE’ in XML)		Boolean	10+1	23
Spare_6			Spare	11+1	20
Product_Err	‘1’ or ‘0’ (respectively ‘TRUE’ and ‘FALSE’ in XML). If ‘1’, errors have been reported in the product. User should then refer to the SPH or summary quality ADS of the product for details of the error condition		Boolean	13+1	29
Tot_Size	Total size of product (#bytes DSR+SPH+MPH) If the structure has a variable size (as is the case for XML), this field is set to –1.	bytes	IntAd	10+21+7	30
Sph_Size	Length of SPH (#bytes in SPH) If the structure has a variable size (as is the case for XML), this field is set to –1.	bytes	IntAl	10+11+7	26
Num_Dsd	Number of DSDs		IntAl	9+11	24
Dsd_Size	Length of each DSDs (#bytes for each DSD), all DSDs shall have the same length If the structure has a variable size (as is the case for XML), this field is set to –1.	bytes	IntAl	10+11+7	26
Num_Data_Sets	Number of DSs attached (not all DSDs have a DS attached)		IntAl	15+11	36
Spare_7			Spare	40+1	20
Total Size for KVT and XML MPH in bytes:				1247	1751

3.3.5 Data Set Descriptor

Data Set Descriptors (DSD) contain information on the structure and size of a data set in the Data Block. This structure is described in Table 3-8. Note: if the DSD is describing a reference data set, the following fields will be set to zero: Ds_Size, Num_Dsr, Dsr_Size and Dsr_Offset. The size of the XML DSD will not necessarily be fixed, so the sizes given are only rough approximations.

Table 3-8 Data Set Descriptor Content Description

Tag Name	Content Description	Unit	Type	Size (KVT)	Size (XML)
Dsd	Root tag for XML format only.		Structure	N/A	11
Ds_Name	DS descriptor ASCII string describing the data set		String	9+28+2	45
Ds_Type	Type of DS. ‘M’ if Measurement DS, ‘A’ if Annotation DS, ‘G’ if Global ADS and ‘R’ if Reference DS (no DS attached)		Enum	8+1+1	21
Filename	If Ds_Type=’R’, this field contains the name of external file used to process the current product. Otherwise, this field is left blank or has the value “unused”		String	10+62+2	47
Ds_Offset	Offset in bytes from beginning of file. If there are data sets of variable size in the file (as is the case with Xml) this field is set to -1.	bytes	IntAd	10+21+8	32
Ds_Size	Size of Data Set. If the data set has a variabl size (as is the case with Xml) this field is set to -1.	bytes	IntAl	8+11+8	24
Num_Dsr	Number of Data Set Records in Data Set		IntAl	8+11+1	24
Dsr_Size	Size of Data Set Record, -1 if DSRs have variable sizes (as is the case with Xml).	bytes	IntAl	9+11+8	26
Byte_Order	"3210" for binary DS’s to designate byte order is most significant byte first. See Table 7.2.2-1 of Document A-22.		String	12+4+2	51
Spare_1			Spare	32+1	20
Total Size for KVT and XML DSD in bytes:				288	301

3.3.6 Exceptions to Earth Explorer File Format Standard

For large data volumes a copy of the main product header in KVT format preceeds the binary data block, see also section 3.3.2. This is not compliant with the standard established in A-22 but has been accepted by ESA for Aeolus products.

4 LEVEL 0 PRODUCT

The ground station receives the X-Band serial bit stream from the Aeolus satellite. The ground station telemetry processor extracts the Telemetry Transfer Frames from the downlink data stream, performs frame synchronisation, Transfer Frame error detection and correction, extraction and assembly of source packets from the transfer frames and annotation of each source packet with reception time and data quality flags. The ground station outputs the full pass Annotated Instrument Source Packet (AISP) product to the Aeolus Processing Facility.

The LiDAR instrument can be operated in nominal Wind Measurement mode as well as in eight different calibration modes. Each Level 0 product contains nine MDSs, one to hold the data for each possible instrument mode. If some modes are not present in an AISP file then the Data Set Descriptor for that Measurement Data Set will indicate a blank data set.

Each MDS is composed of DSRs with each record holding all source packets for one Basic Repeat Cycle. The BRCs and the source packets within the BRCs are time ordered, validated sequence of source packets of instrument data as received from the Front End Processor (FEP). Missing source packets are detected, correct length fill is inserted and annotated (see also section 4.3.1) so that each DSR is the same length and each source packet has a fixed location within the DSR.

The Aeolus Level 0 data product contains all AISP data received during a single station pass, and thus can have a variable length. On average, they contain data from one orbit, or about 470 observations.

For some calibration measurements the signal from the atmosphere is not required and only the individual laser pulse signal is needed for ground processing. However the BRC and source packet data format for the calibration modes does not differ from the nominal format.

4.1 Product Structure

The Level 0 product conforms to the product structure described in Section 3.3.

4.1.1 File Name

The Level 0 file name has the format defined in Section 3.1:

AE_CCCC_ALD_<u/c flag>_N_0__ yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvv

The Level 0 product is contained in two files:

- Header file containing Fixed Header, MPH, and SPH with DSDs in XML format. The Header file has a file extension ‘HDR’.
- Data Block file with a copy of the MPH and SPH in KVT format followed by the Measurement Data Set in binary format. The Data Block file has a file extension ‘DBL’.

The product duration *uuuuuuuuu* is calculated as the difference between the Sensing_Stop and Sensing_Start of the MPH fields Table 3-7. File Structure

The Header File contains a Fixed Header and Variable Header, which includes the Main Product Header as described in Section 3.1 and Specific Product Header. The Specific Product Header with Data Set Descriptors is described below.

4.2 Specific Product Header

Table 4-1 Level 0 Specific Product Header Content Description

Tag Name	Content Description	Unit	Type	Size (KVT)	Size (XML)
Specific_Product_Header	Root tag for XML format only.		Structure	N/A	51
Sph_Descriptor	“AEOLUS_L0__SPECIFIC_HEADER" (SPH descriptor ASCII string describing the product.)		String	16+28+2	59
Start_Lat	WGS84 geodetic latitude of first satellite nadir point at the sensing start time of the MPH (positive North)	10-6DegN	IntAl	10+11+11	28
Start_Long	WGS84 geodetic longitude of first satellite nadir point at the sensing start time of the MPH (positive East, 0=Greenwich)	10-6DegE	IntAl	11+11+11	30
Stop_Lat	WGS84 geodetic latitude of first satellite nadir point at the sensing stop time of the MPH (positive North)	10-6DegN	IntAl	9+11+11	26
Stop_Long	WGS84 geodetic longitude of first satellite nadir point at the sensing stop time of the MPH (positive East, 0=Greenwich)	10-6DegE	IntAl	10+11+11	28

Tag Name	Content Description	Unit	Type	Size (KVT)	Size (XML)
Sat_Track	Sub-satellite track heading (nadir) at the sensing start time in the MPH	deg	FAdo76	10+15+6	28
Spare_1			Spare	50+1	70
Isp_TF_CRC_Errors_Significant	1 or 0. 1 if number of ISPs with CRC errors in Transfer Frames reported by FEP exceeds threshold		Boolean	30+1+1	89
Missing_ISPs_Significant	1 or 0. 1 if number of missing ISPs exceeds threshold		Boolean	25+1+1	79
ISP_CRC_Errors_Significant	1 or 0. 1 if number of ISPs with CRC errors in SP exceeds threshold		Boolean	27+1+1	83
Rs_Corrections_Significant	1 or 0. 1 if number of ISPs with Reed Solomon corrections exceeds threshold		Boolean	27+1+1	83
Spare_2			Spare	50+1	70
Num_TF_CRC_Error_Isps	Number of ISPs containing Transfer Frames with CRC errors as reported by the FEP		IntAl	22+11+1	52
TF_CRC_Error_Isps_Thresh	Threshold at which number of ISPs containing Transfer Frame CRC errors is considered significant (in percent)	%	FAdo76	25+15+4	52
Number_Missing_Isps	Number of missing ISPs, as determined by header counters		IntAl	20+11+1	48
Missing_Isps_Thresh	Threshold at which number of ISPs missing is considered significant	%	FAdo76	20+15+4	48
Num_ISP_CRC_Errors	Number of ISPs with SP CRC errors or incorrect SP length or errors in key header fields		IntAl	19+11+1	46
ISP_CRC_Thresh	Threshold at which SP CRC or header errors is considered significant	%	FAdo76	15+15+4	46
Num_Rs_Isps	Number of ISPs with Transfer Frame Reed Solomon corrections as reported by FEP		IntAl	12+11+1	32
Rs_Thresh	Threshold at which number of ISPs with Reed Solomon corrections is considered significant	%	FAdo76	10+15+4	32
Spare_3			Spare	100+1	120
List_Of_Dsds	See Table 4-2 for list of Data Sets in product.		List of 16 Structures	288*16	4847
Total size for KVT and XML SPH in bytes:				5400	6047

4.2.1 Data Set Descriptors

The Data Sets listed in Table 4-2 appear in Aeolus Level 0 products, each described by a DSD in the SPH. A description of the “Data Set Type” can be found in Section 3.3.5, Table 3-8.

Note: Number of Laser_Diode_Temperature_MDS and Phase_Adjustment_MDS in L0 products will always be 0 (Num_Dsr set to 0 in the corresponding DSD), as this type of measurements is no longer forseen. Thus also description of LDT and LCP products on level 1A and 1B have been deleted from the IODD. But the L0 product header remains unmodified to support easy integration of the L1bP new processor into the ACMF. Cleaning of the L0 header will follow at a later stage, see also R-7.

Table 4-2 Level 0 Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	Wind_Velocity_MDS	DSD structure for MDS of Wind Measurement AISPs	M	1 DSR per WVM BRC
2	Laser_Diode_Temperature_MDS	DSD structure for MDS of Laser Diode Temperature Adjustment AISPs	M	1 DSR per LDT BRC
3	Instr_Response_Cal_MDS	DSD structure for MDS of Instrument Response Calibration AISPs	M	1 DSR per IRC BRC
4	Instr_Spec_Reg_MDS	DSD structure for MDS of Instrument Spectral Registration AISPs	M	1 DSR per ISR BRC
5	Instr_Auto_Test_MDS	DSD structure for MDS of Instrument Auto Test AISPs	M	1 DSR per IAT BRC
6	Dark_Current_Cal_MDS	DSD structure for MDS of Dark Current Calibration AISPs	M	1 DSR per DCC BRC
7	Instr_Defocus_Cal_MDS	DSD structure for MDS of Instrument Defocus AISPs	M	1 DSR per IDC BRC
8	Phase_Adjustment_MDS	DSD structure for MDS of Laser Chopper Mechanism Phase Adjustment AISPs	M	1 DSR per LCP BRC
9	Offline_Wind_Velocity_MDS	DSD structure for MDS of Offline Wind Velocity Measurement AISPs	M	1 DSR per OWV BRC
10	NOP_UDM_MDS	DSD structure for MDS of NOP and UDM AISPs	M	1 DSR per NOP/UDM BRC
11	Dark_Current_Mem_Zone_MDS	DSD structure for MDS of DCMZ AISPs	M	1 DSR per DCMZ BRC
12	Laser_Beam_Monitoring_MDS	DSD structure for MDS of DCMZ AISPs	M	1 DSR per LBM BRC
13	Aeolus_Source_Packets	DSD for input AISP product	R	No DS
14	Level_0_Proc_Params	DSD for Level 0 Processing Parameters Auxiliary File	R	No DS
15	Satellite_Characterisation	DSD for Satellite Characterisation Auxiliary File	R	No DS
16	Orbit_Scenario_File	DSD for Orbit Scenario Auxiliary File	R	No DS

4.3 Data Sets

4.3.1 Wind Measurement MDS

Each of the data sets containing downlink data has the same structure. Within each DS each DSR contains all 34 source packets from one BRC of downlink data.

All the DSRs are of the same fixed size as the collection of all source packets in each BRC are the same size. Annotation is removed from the start of each AISP source packet and is included at the start of the DSR. Where a source packet is lost or is of incorrect length the L0 product includes a dummy source packet, to maintain a constant DSR length, and flags in the annotation words that the source packet is invalid. See Table 4-3 and Table 4-4 for more details.

Table 4-3 Level 0 MDSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_Of_Observation_Time	MJD of sensing time of start of observation as extracted from AISP (UTC)		DateTime	12
Gs_Ref_Time	Ground station reference time (MJD format) of first SP in observation (UTC)		DateTime	12
List_Of_Source_Packet_Infos	List containing information on each of the 34 source packets in a BRC. See **Table 4-4** for structure definition		List of 34 Structures	340
Spare_1			Spare	142
Source_Packets	Set of 34 Aeolus Source Packets that forms a complete BRC, with all FEP annotation information removed. If any packet is missing, the space it would have occupied is padded with zeros (0x00) except for the SID number.		Binary	126298
Total size for binary MDSR in bytes:				126804

Table 4-4 Level 0 MDSR
Source_Packet_Info Content Description

Tag Name	Content Description	Unit	Type	Size
Num_TF_With_Crc_Error	Number of Transfer Frames in Source Packet which contain a CRC error. For missing packets the invalid indicator value 9999 is used.		IntAul	4
Num_TF_With_Rs_Correction	Number of Transfer Frames in source packet for which an RS correction was performed. For missing packets the invalid indicator value 9999 is used.		IntAul	4
Sp_Missing	Source packet missing flag: 0=Present, 1=Missing		Boolean	1
Sp_Invalid	Source packet error flag (SP CRC O.K., Header fields correct, and SP length correct): 0=valid, 1=invalid		Boolean	1
Total size for binary structure in bytes:				10

4.3.2 Instrument Spectral Registration MDS

The Instrument Spectral Registration MDS has the same structure as the Wind Measurement MDS, as described in Section 4.3.1.

4.3.3 Instrument Response Calibration MDS

The Instrument Response Calibration MDS has the same structure as the Wind Measurement MDS, as described in Section 4.3.1.

4.3.4 Instrument Auto Test MDS

The Instrument Auto Test MDS has the same structure as the Wind Measurement MDS, as described in Section 4.3.1.

4.3.5 Dark Current Calibration MDS

The Dark Current Calibration MDS has the same structure as the Wind Measurement MDS, as described in Section 4.3.1.

4.3.6 Instrument Defocus Calibration MDS

The Instrument Defocus Calibration MDS has the same structure as the Wind Measurement MDS, as described in Section 4.3.1.

4.3.7 Laser Chopper Mechanism Phase Adjustment MDS

Deleted.

4.3.8 Laser Diode Temperature Adjustment Calibration MDS

Deleted.

4.3.9 Offline Wind Velocity Measurement Mode MDS

The Offline Wind Velocity Measurement Mode MDS has the same structure as the Wind Measurement MDS, as described in Section 4.3.1.

4.3.10 Dark Current in Memory Zone Calibration Mode MDS

The Dark Current in Memory Zone Calibration Mode MDS has the same structure as the Wind Measurement MDS, as described in Section 4.3.1.

4.3.11 No Operation and User Defined Mode MDS

The No Operation and User Defined Mode MDS have the same structure as the Wind Measurement MDS, as described in Section 4.3.1.

4.3.12 Laser Beam Monitoring MDS

The Lasr Beam Monitoring Calibration Mode MDS has the same structure as the Wind Measurement MDS, as described in Section 4.3.1.

4.4 File Size

Table 4-5 summarises the typical product size for Aeolus Level 0 products. The size of the XML header will not necessarily be fixed, contrary to the KVT header, so the sizes given are only rough approximations. The binary Data file size assumes an orbit contains 200 observations, and that all DS's have the same size regardless to the mode of the instrument.

Table 4-5 Level 0 Typical Product Size

Structure	Product Size
FH (XML)	~740 bytes
MPH (XML)	~1697 bytes
Level 0 SPH (XML)	~6047 bytes

Structure	Product Size
Header File total size:	~ 8484 bytes
MPH (KVT)	1247 bytes
Level 0 SPH (KVT)	5400 bytes
Some combination MDSRs (binary) from: Wind Measurement Data MDS + Instrument Response Measurement Data MDS + Instrument Spectral Registration Measurement Data MDS + Instrument Auto Test Measurement Data MDS + Dark Current Calibration Measurement Data MMD + Instrument Defocus Measurement Data MDS + Laser Chopper Phase Adjustment Data MDS + Laser Diode Temperature Adjustment Measurement Data MDS + OfflineWind Measurement MDS + No Operation and User Defined Mode MDS + Dark Current in memory Zone MDS + Laser Beam Monitoring MDS	~470 DSRs * 126804 bytes
Data File (Binary Format)	~59,6Mbytes

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5 LEVEL 1A PRODUCT

The Level 1A data is formatted into one or more files, each containing data for a specific ALADIN instrument mode found in the input Level 0 product data file.

The Level 1A files are intermediate products containing reconstructed instrument measurement data and processed HK information. Within each mode-specific file the observational data are not processed but the spectrometer read-out data are formatted into measurement data sets. The reference pulse data is extracted and put in a data set. The HK data required for Level 1B processing is processed and converted into physical units. The navigation/AOCS data is interpolated to each measurement timestamp, effectively providing a set of data for each individual ACCD accumulation. Instrument health parameters and other product confidence data are provided as annotation data.

5.1 Product Structure

The Level 1A products conform to the product structure described in Section 3.3.

5.1.1 File Name

Each Level 1A file name has the format defined in Section 3.1. One file is generated for each ALADIN instrument operating mode found in the Level 0 input data. The following file names are used:

AE_CCCC_ALD_<u/c flag>_N_1A_ yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvv

AE_CCCC_AUX_ISR_1A_ yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvv

AE_CCCC_AUX_IAT_1A_ yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvv

AE_CCCC_AUX_DCC_1A_ yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvv

AE_CCCC_AUX_IDC_1A_ yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvv

AE_CCCC_AUX_IRC_1A_ yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvv

AE_CCCC_AUX_OWV_1A_ yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvv

AE_CCCC_AUX_DCMZ1A_ yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvv

AE_CCCC_AUX_LBM_1A_ yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvv

The Level 1A products each contain two files:

- Header file containing Fixed Header, MPH, and SPH with DSDs, XML format. The Header file has a file extension 'HDR'.
- Data Block file with a copy of the MPH and SPH in KVT format followed by the Data Sets in binary format. The Data Block file has a file extension 'DBL'.

The product duration *uuuuuuuuu* is calculated as the difference between the Sensing_Stop and Sensing_Start of the MPH fields see Table 3-7.

5.1.2 File Structure

All Level 1A files have the same structure. The Header File contains Fixed Header and Variable Header that includes the Main Product Header as described in Section 3.1 and Specific Product Header. The Specific Product Header with Data Set Descriptors is described below.

5.2 Specific Product Header

The specific product header for the L1A product is copied from the level 0 one to keep the statistical error information that it contains.

Table 5-1 Level 1A Specific Product Header Content Description

Tag Name	Content Description	Unit	Type	Size (KVT)	Size (XML)
Specific_Product_Header	Root tag for XML format only.		Structure	N/A	51
Sph_Descriptor	SPH descriptor ASCII string describing the product. Possible string values: AEOLUS_WVM_SPECIFIC_HEADER AEOLUS_ISR_SPECIFIC_HEADER AEOLUS_IAT_SPECIFIC_HEADER AEOLUS_DCC_SPECIFIC_HEADER AEOLUS_IDC_SPECIFIC_HEADER AEOLUS_IRC_SPECIFIC_HEADER AEOLUS_OWV_SPECIFIC_HEADER AEOLUS_NOU_SPECIFIC_HEADER AEOLUS_DCMZ_SPECIFIC_HEADER AEOLUS_LBM_SPECIFIC_HEADER		String	16+28+2	59
Intersect_Start_Lat	Geodetic 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	48

Tag Name	Content Description	Unit	Type	Size (KVT)	Size (XML)
Intersect_Start_Long	Geodetic 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	50
Intersect_Stop_Lat	Geodetic 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	46
Intersect_Stop_Long	Geodetic 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	48
Sat_Track	Sub-satellite track heading (nadir) at the sensing start time in the MPH	deg	FAdo76	10+15+6	48
Base_Laser_Frequency	Base Laser Transmit Frequency	GHz	Fado76	21+15+6	54
Spare_1			Spare	50+1	70
Total_Num_of_Observations	Number of observations in the product		IntAl	26+11+1	60
Num_Valid_Observations	Number of valid observations in the product		IntAl	23+11+1	60
N_Max	The maximum number of measurements per BRC in the output Level 1A product. Note the measurement array dimension in the L1A product is a constant value, N = 30.		IntAl	6+11+1	20
Spare_2			Spare	50+1	70
Total_Num_of_Measurements	Number of measurements in the product (sum of all N over the all the BRCs)		IntAl	26+11+1	60
Num_Measurement_Data_Present	Number of measurements present (= number of measurement SIDs NOT missing)		IntAl	29+11+1	72
Num_Mie_Measurement_Sp_Valid	Number of Valid Mie Measurement Source Packets		IntAl	29+11+1	72
Num_Rayleigh_Measurement_Sp_Valid	Number of Valid Rayleigh Measurement Source Packets		IntAl	34+11+1	82
Num_Measurement_Valid	Number of measurements for which the number of corresponding valid pulses is over Meas_Cavity_Lock_Status_Thresh and pulse is valid		IntAl	22+11+1	58
Num_Measurement_Sat_on_Target	Number of measurements with satellite on target status		IntAl	30+11+1	74
Spare_3			Spare	100+1	70
Total_Num_of_Reference_Pulses	Number of reference pulses in the product (sum of all P over the all the BRCs)		IntAl	30+11+1	68
Num_Mie_Reference_Pulses_Present	Number of Mie Reference Pulses present in the product (= number of SID3 not missing)		IntAl	33+11+1	80

Tag Name	Content Description	Unit	Type	Size (KVT)	Size (XML)
Num_Rayleigh_Reference_Pulses_Present	Number of Rayleigh Reference Pulses present in BRC (= number of SID4 not missing)		IntAl	38+11+1	90
Num_Mie_Reference_Pulse_Sp_Valid	Number of valid Mie Reference Pulse Source Packets		IntAl	33+11+1	80
Num_Rayleigh_Reference_Pulse_Sp_Valid	Number of validRayleigh Reference Pulse Source Packets		IntAl	38+11+1	90
Num_Reference_Pulse_Valid	Number of reference pulses with valid status		IntAl	26+11+1	66
Spare_4			Spare	100+1	120
List_Of_Dsds	See Table 5-2 for list of Data Sets in product		List of 12 Structures	288*12	3612
Total size for KVT and XML SPH in bytes:				4650	5405

5.2.1 Data Set Descriptors

The Data Sets listed in Table 5-2 appear in Aeolus Level 1A products, each described by a DSD in the SPH. A description of the "Data Set Type" can be found in Section 3.3.5, Table 3-8.

Table 5-2 Level 1A Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	Geolocation_ADS	DSD structure for Geolocation information ADS (contains information per BRC and per Measurement)	A	1 DSR per BRC
2	Data_Quality_ADS	DSD structure for Data Quality ADS (contains information per BRC and per Measurement)	A	1 DSR per BRC
3	Reference_Pulse_ADS	DSD structure for Reference Pulse ADS	A	1 DSR per BRC
4	Housekeeping_ADS	DSD structure for Housekeeping Data ADS	A	1 DSR per BRC
5	Mie_Measurement_MDS	DSD structure for Mie Channel Measurement Data MDS	M	1 DSR per BRC
6	Rayleigh_Measurement_MDS	DSD structure for Rayleigh Channel Measurement Data MDS	M	1 DSR per BRC
7	Aeolus_Level_0_Product	DSD for input Aeolus Level 0 Product	R	No DS
8	Level_1A_Proc_Params	DSD for Level 1A Processing Parameters Auxiliary File	R	No DS
9	Satellite_Characterisation	DSD for Satellite Characterisation Auxiliary File	R	No DS
10	Orbit_Scenario_File	DSD for Orbit Scenario Auxiliary File	R	No DS

11	Digital_Elevation_Model	DSD for Digital Elevation Model Definition File	R	No DS
12	Geoid_Model	DSD for Geoid Model File EGM96	R	No DS

5.3 Data Sets

This section details the content of the DSR for each DS.

Each data set contains a start of observation time (Start_Of_Observation_Time). It is the time of the first laser pulse of one observation and is used to identify to which BRC the ADS/MDS belongs.

5.3.1 Geolocation ADS

The Geolocation ADS contains a series of DSRs where each specifies time and geolocation information for each measurement in a BRC and the overall observation for that BRC.

- Geolocation is with reference to centre of measurement and observation, respectively. “Centre of measurement” is where the reference is the mean time of first/last shot in measurement; “centre of observation” (or observation centroid time) is where the reference is determined by offsetting the SOOBS time by adding (0.5*number of measurements*number of pulses*time of a low rate clock, i.e.0.01s). For both “centre of measurement” and “centre of observation” all measurements are taken into account regardless if measurement data are valid or not (the only conditions that are necessary are that a valid time and that AOCS data are available in input source packets). Geolocation of line-of-sight target (intersection with atmospheric layer boundaries and Earth surface, digital elevation model taken into account for intersection LOS-to-surface, not for layers higher up) and viewing direction in topocentric coordinates for each measurement and overall observation.
- The reference height for reporting altitudes of range bins is the height of the range bin boundary above WGS84 earth ellipsoid. Also the altitude of DEM intersection is reported wrt the WGS84 earth ellipsoid.
- Measurement AOCS values are already interpolated to centre of measurement positions.

Table 5-3 Level 1A Geolocation ADSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_of_Observation_Time	Satellite time at start of BRC (UTC)		DateTime	12
Raw_Instrument_Function	Raw instrument function (binary value in the telemetry)		IntAus	2
Observation_AOCS	See Table 5-4 for structure description		Structure	92
List_of_Measurement_AOCSs	List of Measurement AOCS structures. See **Table 5-5** for Measurement AOCS structure description		List of 30 Structures	2760
Observation_Geolocation	See Table 5-6 for structure description		Structure	2152
List_of_Measurement_Geolocations	List of Measurement Geolocation structures. See **Table 5-11** for Measurement Geolocation structure description		List of 30 Structures	37320
Total size for binary ADSR in bytes:				42338

Table 5-4 Level 1A Geolocation Observation_AOCS Content Description

Tag Name	Content Description	Unit	Type	Size
Observation_Centroid_Time	Observation Centroid Time (UTC)		DateTime	12
X_Position	X position in Earth-fixed reference	m	FAdoxy	8
Y_Position	Y position in Earth-fixed reference	m	FAdoxy	8
Z_Position	Z position in Earth-fixed reference	m	FAdoxy	8
X_Velocity	X velocity in Earth-fixed reference	m/s	FAdoxy	8
Y_Velocity	Y velocity in Earth-fixed reference	m/s	FAdoxy	8
Z_Velocity	Z velocity in Earth-fixed reference	m/s	FAdoxy	8
Roll_Angle	Roll angle in satellite reference	deg	FAdoxy	8
Pitch_Angle	Pitch angle in satellite reference	deg	FAdoxy	8
Yaw_Angle	Yaw angle in satellite reference	deg	FAdoxy	8
Spare_1			Spare	8
Total size for binary structure in bytes:				92

Table 5-5 Level 1A Geolocation Measurement_AOCS Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Centroid_Time	Measurement Centroid Time (UTC)		DateTime	12
X_Position	X position in Earth-fixed reference	m	FAdoxy	8
Y_Position	Y position in Earth-fixed reference	m	FAdoxy	8
Z_Position	Z position in Earth-fixed reference	m	FAdoxy	8

Tag Name	Content Description	Unit	Type	Size
X_Velocity	X velocity in Earth-fixed reference	m/s	FAdoxy	8
Y_Velocity	Y velocity in Earth-fixed reference	m/s	FAdoxy	8
Z_Velocity	Z velocity in Earth-fixed reference	m/s	FAdoxy	8
Roll_Angle	Roll angle in satellite reference	deg	FAdoxy	8
Pitch_Angle	Pitch angle in satellite reference	deg	FAdoxy	8
Yaw_Angle	Yaw angle in satellite reference	deg	FAdoxy	8
Spare_2			Spare	8
Total size for binary structure in bytes:				92

Table 5-6 Level 1A Geolocation Observation_Geolocation Content Description

Tag Name	Content Description	Unit	Type	Size
Observation_Mie_Geolocation	See Table 5-7 for structure description		Structure	1050
Observation_Rayleigh_Geolocation	See Table 5-8 for structure description		Structure	1050
Geolocation_of_DEM_Intersection	Geolocation of the intersection of DEM and the line-of-sight. See **Table 5-10** for structure description		Structure	28
Line_of_Sight_Velocity	Velocity along the line of sight at the DEM intersection	m/s	FAdoxy	8
Geoid_ Separation	Height of geoid above WGS84 ellipsoid	m	FAdoxy	8
Spare_3			Spare	8
Total size for binary structure in bytes:				2152

Table 5-7 Level 1A Geolocation Observation_Mie_Geolocation Content Description

Tag Name	Content Description	Unit	Type	Size
List_of_Observation_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 the each height bin. (bin 1~24). See Table 5-9 for structure description.		List of 25 Structures	1050

Table 5-8 Level 1A Geolocation Observation_Rayleigh_Geolocation Content Description

Tag Name	Content Description	Unit	Type	Size
List_of_ Observation_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 the each height bin. (bin 1~24). See Table 5-9 for structure description.		List of 25 Structures	1050

Table 5-9 Level 1A Geolocation Observation_Geolocation_of_Height_Bin Content Description

Tag Name	Content Description	Unit	Type	Size
Longitude_of_Height_Bin	Geodetic longitude of the upper or lower edge (see Table 5-7, Table 5-8 List_of_Observation_Geolocation_of_Height_Bins description) of the height bin along the line-of-sight	10-6DegE	IntAl	4
Latitude_of_Height_Bin	Geodetic latitude of the upper or lower edge (see Table 5-7, Table 5-8 List_of_Observation_Geolocation_of_Height_Bins description) of the height bin along the line-of-sight	10-6DegN	IntAl	4
Altitude_of_Height_Bin	Geodetic height above WGS84 ellipsoid of the upper or lower edge (see Table 5-7, Table 5-8 List_of_Observation_Geolocation_of_Height_Bins description) of the height bin along the line-of-sight.	m	FAdoxy	8
Topocentric_Azimuth_of_Height_Bin	Azimuth of target-to-satellite topocentric (horizontal reference frame) pointing vector of the height bin. Topocentric_Azimuth_of_Height_Bin ranges from 0 deg to 360 deg and is measured from North over East. (See R-5).	deg	FAdoxy	8
Topocentric_Elevation_of_ Height_Bin	Elevation of target-to-satellite topocentric (horizontal reference frame) pointing vector of the height bin. Topocentric_Elevation_of_Height_Bin ranges from -90 deg to +90 deg and is measured positive from the North-East plane towards Zenith (See R-5).	deg	FAdoxy	8
Target_to_Sun_Visibility_Flag	Value set to '-1' if sun eclipsed by earth; value set to '+1' if sun (center) visible.		IntAs	2
Satellite_Range_of_Height_ Bin	Distance along the LOS between the instrument and the lower edge of the height bin.	m	FAdoxy	8
Total size for binary structure in bytes:				42

Table 5-10 Level 1A Geolocation Geolocation_of_DEM_Intersection Content Description

Tag Name	Content Description	Unit	Type	Size
Latitude_of_DEM_Intersection	Geodeticlatitude of the intersection of DEM and the line-of-sight	10-6DegN	IntAl	4
Longitude_of_DEM_Intersection	Geodetic longitude of the intersection of DEM and the line-of-sight	10-6DegE	IntAl	4
Altitude_of_DEM_Intersection	Geodetic height above WGS84 ellipsoid of the intersection of DEM and the line-of-sight	m	FAdoxy	8
Argument_of_Latitude_ DEM_Intersection	Argument of geodetic latitude of the intersection of DEM and the line-of-sight	10-6DegN	IntAl	4
Sun_Elevation_at_DEM_Intersection	Sun elevation angle at DEM intersection	deg	FAdoxy	8
Total size for binary structure in bytes:				28

Table 5-11 Level 1A Geolocation Measurement_Geolocation Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Geolocation	See Table 5-12 for structure description		Structure	600
Rayleigh_Geolocation	See Table 5-13 for structure description		Structure	600
Geolocation_of_DEM_Intersection	Geolocation of the intersection of DEM and the line-of-sight See **Table 5-10** for structure description		Structure	28
AOCS_LOS_Velocity	Velocity along the line of sight at the DEM intersection.	m/s	FAdoxy	8
Spare_4			Spare	8
Total size for binary structure in bytes:				1244

Table 5-12 Level 1A Geolocation Mie_Geolocation Content Description

Tag Name	Content Description	Unit	Type	Size
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 the each height bin. (bin 1~24). See **Table 5-14** for structure description.		List of 25 Structures	600

Table 5-13 Level 1A Geolocation Rayleigh Geolocation Content Description

Tag Name	Content Description	Unit	Type	Size
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 the each height bin. (bin 1~24). See **Table 5-14** for structure description		List of 25 Structures	600

Table 5-14 Level 1A Geolocation Geolocation_of_Height_Bin Content Description

Tag Name	Content Description	Unit	Type	Size
Longitude_of_Height_Bin	Geodetic longitude of the upper or lower edge (see Table 5-12, Table 5-13, List_of_Geolocation_of_Height_Bins description)of the height bin along the line-of-sight	10-6DegE	IntAl	4
Latitude_of_Height_Bin	Geodetic latitude of the upper or lower edge (see Table 5-12, Table 5-13, List_of_Geolocation_of_Height_Bins description) of the height bin along the line-of-sight	10-6DegN	IntAl	4
Altitude_of_Height_Bin	Geodetic height above WGS84 ellipsoid of the upper or lower edge (see Table 5-12, Table 5-13, List_of_Geolocation_of_Height_Bins description) of the height bin along the line-of-sight.	m	FAdoxy	8
Sattelite_Range_of_Height_Bin	Range of satellite to the upper or lower edge (see Table 5-12, Table 5-13, List_of_Geolocation_of_Height_Bins description) of the height bin along the line-of-sight	m	FAdoxy	8
Total size for binary structure in bytes:				24

5.3.2 Data Quality ADS

Each DSR contains Data Quality information for each measurement within a BRC and the overall quality of the BRC.

Table 5-15 Level 1A Data Quality ADSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_of_Observation_Time	Satellite time at start of BRC (UTC)		DateTime	12
Observation_Validity_Indicator	TRUE = some critical BRC source packets invalid, FALSE = All critical BRC SP invalid		Boolean	1

Tag Name	Content Description	Unit	Type	Size
List_of_Measurement_Validity_Indicators	Array of flags and variances indicating usability/quality for each potential measurement from n = 1 to 30. See **Table 5-16** for structure description		List of 30 Structures	660
Reference_Pulse_Validity_Indicators	A structure indicating quality of the reference pulses See **Table 5-17** for structure description		Structure	621
Total size for binary structure in bytes:				1294

Table 5-16 Level 1A Data Quality Measurement_Validity_Indicator Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Data_Present	TRUE = Measurement data is present in BRC. FALSE = SID (measurement index + 4) missing		Boolean	1
Mie_Measurement_Sp_Valid	TRUE = Mie Measurement Source Packet Valid		Boolean	1
Rayleigh_Measurement_Sp_Valid	TRUE = Rayleigh Measurement Source Packet Valid		Boolean	1
Measurement_Valid	TRUE = if number of corresponding valid pulses is over Meas_Cavity_Lock_Status_Thresh (from processing parameters file); FALSE = otherwise		Boolean	1
Moon_Blinding_Status	Moon Blinding Status as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
Ground_Intervention_Status	Ground_Intervention_Status as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
Reconfiguration_Status	Reconfiguration_Status as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
Eclipse_Status	Eclipse_Status as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
GPS_Status	GPS_Status as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
Star_Tracker_Status	Star_Tracker_Status as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
Spacecraft_Attitude_On_Target	TRUE = AOCS status indicates the spacecraft was in a stable state during any part of the measurement, as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
Velocity_of_Attitude_Uncertainty_Error	Velocity of attitude uncertainty error.	m/s	FAdoxy	8
Spare_1			Spare	3
Total size for binary structure in bytes:				22

Table 5-17 Level 1A Data Quality Reference_Pulse_Validity_Indicator Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Reference_Pulses_Present	TRUE = Mie Reference Pulses are present in BRC. FALSE = SID3 is missing		Boolean	1
Rayleigh_Reference_Pulses_Present	TRUE = Rayleigh Reference Pulses are present in BRC. FALSE = SID4 is missing		Boolean	1
Mie_Reference_Pulse_Sp_Valid	TRUE = Mie Reference Pulse Source Packet Valid		Boolean	1
Rayleigh_Reference_Pulse_Sp_Valid	TRUE = Rayleigh Reference Pulse Source Packet Valid		Boolean	1
List_of_Pulse_Validity_Status_Flags	Array of pulse validity flags for each reference pulse (maximum 600 flags). See Table 5-18 for structure description		List of 600 Structures	600
Spare_2			Spare	17
Total size for binary structure in bytes:				621

Table 5-18 Level 1A Data Quality Pulse_Validity_Status_Flag Content Description

Tag Name	Content Description	Unit	Type	Size
Pulse_Validity_Status_Flag	TRUE = Valid pulse status		Boolean	1

5.3.3 Reference Pulse ADS

Each Reference Pulse ADS DSR contains arrays of counts from the Mie and Rayleigh Spectrometers for each reference pulses (INT(j,n)) and (INT(j,k)) in one BRC. The DSR also contains arrays with the sum of all pulses in each measurement.

Table 5-19 Level 1A Reference Pulse ADSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_of_Observation_Time	Satellite time at start of BRC (UTC)		DateTime	12
Num_Reference_Pulses	P = Number of Reference Pulses per BRC, where P ranges from 3 to 600.		IntAul	4
Mie_Reference_Pulse	List of Mie Reference Pulses for the BRC. See Table 5-20 for structure description		List of 600 Structures	24000
Rayleigh_Reference_Pulse	List of Rayleigh Reference Pulses for the BRC. See Table 5-21 for structure description		List of 600 Structures	24000
Spare_1			Spare	4

Tag Name	Content Description	Unit	Type	Size
Total size for binary ADSR in bytes:				48020

Table 5-20 Level 1A Reference Pulse Mie_Reference_Pulse Content Description

Tag Name	Content Description	Unit	Type	Size
col	Mie Reference Pulse. Array of 20 pixel values where first 2 values are the pre-pixel of the ACCD. The 16 following pixels collects the useful signals, and the last two pixels are used to correct the offset of the detection chain.		IntAus	40

Table 5-21 Level 1A Reference Pulse Rayleigh_Reference_Pulse Content Description

Tag Name	Content Description	Unit	Type	Size
col	Rayleigh Reference Pulse. Array of 20 pixel values where first 2 values are the pre-pixel of the ACCD. The 16 following pixels collects the useful signals, and the last two pixels are used to correct the offset of the detection chain.		IntAus	40

5.3.4 Housekeeping Data ADS

The Housekeeping Data ADS contains instrument operational parameters and other engineering parameters extracted from source packets SID 2, 3 and 4 and converted to engineering values. Some of the extracted values are key to current and later stages of level 1A and Level 1B processing. Other engineering parameters and not required by the L1bP itself but may be of use by other subsystems monitoring the detailed operation of the ALADIN instrument.

Table 5-22 Level 1A Housekeeping Data ADSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_of_Observation_Time	Satellite time at start of BRC (UTC)		DateTime	12
Instrument_Mode	Instrument mode, also called Operational Mode or DEV Sub-mode: laser burst warm up, measurement, calibration slow, calibration fast 1, calibration fast 2. See R-2 for possible codes.		IntAuc	1
P	Number of pulses per measurement		IntAuc	1
N	Number of measurements per BRC		IntAuc	1
Spare_1			Spare	13
Laser_Pulse_Attributes	Laser pulse attributes See Table 5-23 for structure definition		Structure	10232

Tag Name	Content Description	Unit	Type	Size
Pulse_Time_Delays	Pulse delays are counts. See Table 5-25 for structure definition		Structure	148
Mie_Time_Delays	Mie time delay values See Table 5-27 for structure definition		Structure	100
Rayleigh_Time_Delays	Rayleigh time delay values See Table 5-28 for structure definition		Structure	100
Height_Rayleigh_Bin_1	Commanded geodetic height above WGS84 ellipsoid of top of Rayleigh bin 1	km	IntAl	4
Avg_Mie_ACCD_Die_Temp	Average of 10 Mie ACCD die temperatures	C	FAdoxy	8
Avg_Rayleigh_ACCD_Die_Temp	Average of 10 Rayleigh ACCD die temperatures	C	FAdoxy	8
Spare_2			Spare	16
DEU_Temp	Average of DEU temperature	C	FAdoxy	8
RSP_Etalon_Temp	Average of RSP Etalon temperature	C	FAdoxy	8
MSPA_Etalon_Temp	Average of MSPA Etalon temperature	C	FAdoxy	8
M1_Temp	Average of Aht 22, Aht 23, Aht 24, Aht 25, Aht 26 and Aht 27 M1 temperatures	C	FAdoxy	8
Aht_22_Tel_M1	Average of Aht 22 M1 temperatures	C	FAdoxy	8
Aht_23_Tel_M1	Average of Aht 23 M1 temperatures	C	FAdoxy	8
Aht_24_Tel_M1	Average of Aht 24 M1 temperatures	C	FAdoxy	8
Aht_25_Tel_M1	Average of Aht 25 M1 temperatures	C	FAdoxy	8
Aht_26_Tel_M1	Average of Aht 26 M1 temperatures	C	FAdoxy	8
Aht_27_Tel_M1	Average of Aht 27 M1 temperatures	C	FAdoxy	8
M1_TC_Temp	Average of TC 18, TC 19, TC 20, and TC 21 M1 TC temperatures	C	FAdoxy	8
Tc_18_Tel_M11	Average of TC 18 Tel M1-1 temperatures	C	FAdoxy	8
Tc_19_Tel_M12	Average of TC 19 Tel M1-2 temperatures	C	FAdoxy	8
Tc_20_Tel_M13	Average of TC 20 Tel M1-3 temperatures	C	FAdoxy	8
Tc_21_Tel_M14	Average of TC 21 Tel M1-4 temperatures	C	FAdoxy	8
Tc_25_Tm15_Ths1Y	Average of TC 25 TM15 Ths1-Y temperatures	C	FAdoxy	8
Tc_27_Tm16_Ths1Y	Average of TC 27 TM16 Ths1-Y temperatures	C	FAdoxy	8
Tc_29_Ths2	Average of TC 29 Ths2 temperatures	C	FAdoxy	8
Tc_23_Ths1	Average of TC 23 Ths1 temperatures	C	FAdoxy	8
Tc_32_Ths3	Average of TC 32 Ths3 temperatures	C	FAdoxy	8
Struts_Temp_Pxpy	Average of Struts temperature +X+Y	C	FAdoxy	8
Struts_Temp_Mxpy	Average of Struts temperature -X+Y	C	FAdoxy	8
Struts_Temp_My	Average of Struts temperature -Y	C	FAdoxy	8
M2_TC_Temp	Average of M2 TC temperature	C	FAdoxy	8

Tag Name	Content Description	Unit	Type	Size
RLH_Frequency	Average of 10 RLH Frequency	GHz	FAdoxy	8
PLH_UV_Energy	Average of 10 PLH UV Energy	mJ	FAdoxy	8
MO_LD1_Temp	Average of 10 MO LD1 temperature	C	FAdoxy	8
MO_LD2_Temp	Average of 10 MO LD2 temperature	C	FAdoxy	8
Preamp_LD_SideA_Temp	Average of 10 Preamp LD Side A temperature	C	FAdoxy	8
Preamp_LD_SideB_Temp	Average of 10 Preamp LD Side B temperature	C	FAdoxy	8
Amp_LD_SideA_Temp	Average of 10 Amp LD Side A temperature	C	FAdoxy	8
Amp_LD_SideB_Temp	Average of 10 Amp LD Side B temperature	C	FAdoxy	8
RLH_ULE_Cavity_Temp	Average of 10 RLH ULE Cavity temperature	C	FAdoxy	8
TLE_LV_Temp	Average of 10 TLE LV temperature	C	FAdoxy	8
TLE_HV_Temp	Average of 10 TLE HV temperature	C	FAdoxy	8
Multimode_Ratio	Average of 10 Multimode Ratio		FAdoxy	8
List_of_Etalon_Temperatures	RSP Etalon temperatures for each sensor and each time sample in the BRC. See Table 5-30 for structure definition.		List of 6 structures	192
List_of_RSPT_Temperatures	RSPT temperatures for each sensor and each time sample in the BRC. See Table 5-31 for structure definition.		List of 6 structures	192
OBA_Temperature	OBA RAY temperatures for sensors, AHT5, AHT6, AHT7, AHT8. See Table 5-32 for structure definition.		Structure	32
TXA_Frequency	TXA frequency		FAdoxy	8
List_of_Gyro_Anlges	Gyro angles 1 to 4. See Table 5-33 for structure definition.		List of 96 structures	3072
Total size for binary ADSR in bytes:				14428

Table 5-23 Level 1A Housekeeping Data Laser_Pulse_Attributes Content Description

Tag Name	Content Description	Unit	Type	Size
Avg_Laser_Frequency_Offset	Average laser Frequency Offset	GHz	FAdoxy	8
Avg_UV_Energy	Average laser pulse UV energy of N * (P – 1) pulses, regardless of the UV_Energy_OK_Status.	mJ	FAdoxy	8
Laser_Frequency_Offset_Std_Dev	Laser frequency Offset standard deviation	GHz	FAdoxy	8
UV_Energy_Std_Dev	Laser pulse UV energy standard deviation of N * (P – 1) pulses, regardless of the UV_Energy_OK_Status.	mJ	FAdoxy	8
List_of_Pulse_Attributes	List of pulse attributes. See Table 5-24 for structure definition.		List of 600 Structures	10200
Total size for binary ADSR in bytes:				10232

Table 5-24 Level 1A Housekeeping Data Pulse_Attribute Content Description

Tag Name	Content Description	Unit	Type	Size
Laser_Frequency_Offset	Laser Frequency Offset at each laser shot	GHz	FAdoxy	8
UV_Energy_Per_Pulse	Ultraviolet energy at each pulse	mJ	FAdoxy	8
UV_Energy_OK_Status	Flag showing the UV Energy OK Status		Boolean	1
Total size for binary structure in bytes:				17

Table 5-25 Level 1A Housekeeping Data Pulse_Time_Delays Content Description

Tag Name	Content Description	Unit	Type	Size
Dt1	dt1 pulse delay constant for BRC	TMC	IntAul	4
Dt2	dt2 pulse delay constant for BRC	TMC	IntAul	4
Dt3_Fixed	Fixed dt3 pulse delay constant for BRC	TMC	IntAul	4
Dt4	dt4 pulse delay constant for BRC	TMC	IntAul	4
Dt5	dt5 pulse delay constant for BRC	TMC	IntAul	4
DEU_Imaging_Integration_Time	DEU Imaging Integration Time for the IDC mode	TMC	IntAul	4
Td_Ray_Mie	Td_Ray_Mie	TMC	IntAul	4
List_of_Dt3_Variables	Array of dt3_variable time delays for each measurement with n= 1 to 30. See Table 5-26 for structure definition		List of 30 Structures	120

Table 5-26 Level 1A Housekeeping Data Dt3_Variable Content Description

Tag Name	Content Description	Unit	Type	Size
Dt3_Variable	Time delays for each measurement. Variable time delay element for each measurement due to satellite height variation	TMC	IntAul	4

Table 5-27 Level 1A Housekeeping Data Mie_Time_Delays Content Description

Tag Name	Content Description	Unit	Type	Size
List_of_Bin_Layer_Integration_Times	Time delays for each layer (24 bins). See Table 5-29 for structure definition		List of 24 Structures	96
Background_Integration_Time	Duration of background integration time	TMC	IntAl	4
Total size for binary structure in bytes:				100

Table 5-28 Level 1A Housekeeping Data Rayleigh_Time_Delays Content Description

Tag Name	Content Description	Unit	Type	Size
List_of_Bin_Layer_Integration_Times	Time delays for each layer (24 bins). See Table 5-29 for structure definition		List of 24 Structures	96
Background_Integration_Time	Duration of background integration time	TMC	IntAl	4
Total size for binary structure in bytes:				100

Table 5-29 Level 1A Housekeeping Data Bin_Layer_Integration_Time Content Description

Tag Name	Content Description	Unit	Type	Size
Bin_Layer_Integration_Time	Individual time delay for each layer (bin).	TMC	IntAl	4

Table 5-30 Level 1A Housekeeping Data Etalon_Temperature Content Description

Tag Name	Content Description	Unit	Type	Size
Aht_9_Rsp_E	Sensor RSP etalon temperature	C	FAdoxy	8
Aht_10_Rsp_E	Sensor RSP etalon temperature	C	FAdoxy	8
Aht_11_Rsp_E	Sensor RSP etalon temperature	C	FAdoxy	8
Spare				8
Total size for binary structure in bytes:				32

Table 5-31 Level 1A Housekeeping Data RSPT_Temperature Content Description

Tag Name	Content Description	Unit	Type	Size
TC_8_RSPT_1	Sensor RSPT temperature	C	FAdoxy	8
TC_9_RSPT_2	Sensor RSPT temperature	C	FAdoxy	8
TC_10_RSPT_3	Sensor RSPT temperature	C	FAdoxy	8
TC_11_RSPT_4	Sensor RSPT temperature	C	FAdoxy	8
Total size for binary structure in bytes:				32

Table 5-32 Level 1A Housekeeping Data OBA_Temperature Content Description

Tag Name	Content Description	Unit	Type	Size
Aht_5_OBRay	Sensor OBA Temperature	C	FAdoxy	8
Aht_6_OBRay	Sensor OBA Temperature	C	FAdoxy	8
Aht_7_OBRay	Sensor OBA Temperature	C	FAdoxy	8
Aht_8_OBRay	Sensor OBA Temperature	C	FAdoxy	8
Total size for binary structure in bytes:				32

Table 5-33 Level 1A Housekeeping Data Gyro_Angles Content Description

Tag Name	Content Description	Unit	Type	Size
Gyro_Angle_1	Gyro angle 1 value	rad	FAdoxy	8
Gyro_Angle_2	Gyro angle 2 value	rad	FAdoxy	8
Gyro_Angle_3	Gyro angle 3 value	rad	FAdoxy	8
Gyro_Angle_4	Gyro angle 4 value	rad	FAdoxy	8
Total size for binary structure in bytes:				32

5.3.5 Mie Channel Measurement Data MDS

The Mie Channel Measurement Data MDS contains one DSR for each BRC. Each DSR contains 30 matrices of measurement Mie channel data.

Table 5-34 Level 1A Mie Channel MDSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_Of_Observation_Time	Satellite time at start of BRC. (UTC)		DateTime	12
Num_Measurements	Number of measurements		IntAus	2
Num_Height_Bins	Number of height bins		IntAus	2
Num_Accd_Columns	Number of ACCD columns		IntAus	2
Mie_Measurement_Data	In LiDAR mode, array of Mie spectrometer counts by 25 rows representing 24 atmospheric layers and one background radiation sample, by N measurements up to a maximum of 30 measurements. In Imaging mode, array of Mie spectrometer counts by 16 rows of CCD output, by 15 measurements in each BRC. See Table 5-35 for structure definition.		Structure	30000
Total size for binary MDSR in bytes:				30018

Table 5-35 Level 1A Mie Channel Measurement Mie_Measurement_Data Content Description

Tag Name	Content Description	Unit	Type	Size
col	In LiDAR mode, array of Mie spectrometer counts by 20 columns representing spectral indices In Imaging mode, array of Mie spectrometer counts by 18 columns		IntAus	40

5.3.6 Rayleigh Channel Measurement Data MDS

The Rayleigh Channel Measurement Data MDS contains one DSR for each BRC. Each DSR contains 30 matrices of measurement Rayleigh channel data.

Table 5-36 Level 1A Rayleigh Channel MDSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_Of_Observation_Time	Satellite time at start of BRC. (UTC)		DateTime	12
Num_Measurements	Number of measurements		IntAus	2
Num_Height_Bins	Number of height bins		IntAus	2
Num_Accd_Columns	Number of ACCD columns		IntAus	2
Rayleigh_Measurement_Data	In LiDAR mode, array of Rayleigh spectrometer counts by 25 rows representing 24 atmospheric layers and one background radiation sample, by N measurements up to a maximum of 30 measurements. In Imaging mode, array of Rayleigh spectrometer counts by 16 rows of CCD output, by 15 measurements in each BRC. See Table 5-37 for structure definition.		Structure	30000
Total size for binary MDSR in bytes:				30018

Table 5-37 Level 1A Rayleigh Channel Measurement Rayleigh_Measurement_Data Content Description

Tag Name	Content Description	Unit	Type	Size
col	In LiDAR mode, array of Rayleigh spectrometer counts by 20 columns representing spectral indices In Imaging mode, array of Rayleigh spectrometer counts by 18 columns		IntAus	40

5.4 File Size

Table 5-38 summarises the typical product size for Aeolus Level 1A products. The size of the XML header will not necessarily be fixed, contrary to the KVT header, so the sizes given are only rough approximations. The binary Data file size assumes an orbit contains 470 observations, and that all DS's have the same size regardless to the mode of the instrument.

Table 5-38 Level 1A Typical Product Size

Structure	Product Size
FH (XML)	~740 bytes
MPH (XML)	~16 bytes
Level 1A SPH (XML)	~5455 bytes
Header File total size:	~ 7.9 kbytes
MPH (KVT)	~1247 bytes
Level 1A SPH (KVT)	~4674 bytes
Geolocation ADSRs	~470 DSRs * 42338 bytes
Data Quality ADSRs	~470 DSRs * 1294 bytes
Reference Pulse ADSRs	~470 DSRs * 48020 bytes
Housekeeping ADSRs	~470 DSRs * 14428 bytes
Mie Channel MDSRs	~470 DSRs * 30018 bytes
Rayleigh Channel MDSRs	~470 DSRs * 30018 bytes
Data File (Binary Format)	~ 78,1Mbytes

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6 LEVEL 1B WIND MEASUREMENT PRODUCT

The level 1B wind measurement product contains vertical profiles of HLOS-wind at measurement intervals as well as for observations (average of measurements within one BRC), as well as error estimates and reliability data for each data set. These profiles are fully geo-located, indicating latitude, longitude and altitude above the earth ellipsoid of the point of intersection between LOS and each atmosphere layer, HLOS winds are derived independently from Rayleigh and Mie spectrometers. The quality of each observation profile is assessed using such factors: as number of measurements combined to form an observation, the signal to noise ratio of the return measurement signal. The quality of each measurement is assessed using such factors: variance of the transmitter frequency, variance of the return signal strength, stability of AOCS data.

The Aeolus Level 1B data products are generated using the Level 1A Wind Measurement product as input to the Level 1B processing step. Each Level 1B Wind Measurement product can contain a variable amount of data. On average they contain data from one orbit, or about 470 observations, but may contain up to 7 orbits of wind measurement data (due to on-board storage of downlink data or on-ground consolidation of Level 0 data sets.

6.1 Product Structure

The Level 1B product conforms to the product structure described in Section 3.3.

6.1.1 File Name

The Level 1B Wind Measurement Product file name has the format defined in Section 3.1.

AE_CCCC_ALD_<u/c flag>_N_1B_ yyyymmddThhmmsszzz_uuuuuuuuu_oooooo_vvvvv

The Level 1B product contains two files:

- Header file containing Fixed Header, MPH, and SPH with DSDs, XML format. The Header file has a file extension ‘HDR’.
- Data Block file with a copy of the MPH and SPH in KVT format followed by the Data Sets in binary format. The Data Block file has a file extension ‘DBL’.

The product duration *uuuuuuuuu* is calculated as the difference between the Sensing_Stop and Sensing_Start of the MPH fields, see Table 3-7. This difference is then increased by 12 seconds to include all measurements of the last BRC.

6.1.2 File Structure

The Header File contains a Fixed Header and Variable Header that includes the Main Product Header as described in Section 3.3.3 and 0 respectively and Specific Product Header. The Specific Product Header with Data Set Descriptors is described below.

6.2 Specific Product Header

Table 6-1 Level 1B Specific Product Header Content Description

Tag Name	Content Description	Unit	Type	Size (KVT)	Size (XML)
Specific_Product_Header	Root tag for XML format only.	-	Structure	N/A	51
Sph_Descriptor	SPH descriptor ASCII string describing the product. Possible string values: AEOLUS_WVM_SPECIFIC_HEADER AEOLUS_OWV_SPECIFIC_HEADER		String	16+28+2	59
Intersect_Start_Lat	Geodetic 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	48
Intersect_Start_Long	Geodetic 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	50
Intersect_Stop_Lat	Geodetic 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	46
Intersect_Stop_Long	Geodetic 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	48
Sat_Track	Sub-satellite track heading (nadir) at the sensing start time in the MPH	deg	Fado76	10+15+6	32
Spare_1			Spare	50+1	70
Base_Laser_Frequency	Base Laser Transmit Frequency	GHz	Fado76	21+15+6	54
N_Max	Measurement array size of the output L1B product. This value is the maximum number of measurements per BRC in the input Level 1A data.		IntAl	6+11+1	20

Tag Name	Content Description	Unit	Type	Size (KVT)	Size (XML)
N_Max_Actual	Actual maximum number of measurements per BRC in Level 1B output product		IntAl	13+11+1	34
Total_Num_of_Observations	Total number of L1A input observations		IntAl	26+11+1	60
Total_Num_of_Measurements	Number of total measurements		IntAl	26+11+1	60
Total_Num_of_Reference_Pulses	Number of total reference pulses		IntAl	30+11+1	68
Spare_2			Spare	50+1	70
Num_Mie_Observations_Used	Number of observations used for Mie wind velocity estimates (24 estimates, one per altitude bin)		IntAl	26+11+1	66
Num_Rayleigh_Observations_Used	Number of observations used for Rayleigh wind velocity estimates (24 estimates, one per altitude bin)		IntAl	31+11+1	76
Num_Mie_Measurements_Used	Number of measurements used for Mie wind velocity estimates (24 estimates, one per altitude bin)		IntAl	26+11+1	66
Num_Rayleigh_Measurements_Used	Number of Rayleigh measurements used for Rayleigh wind velocity estimates (24 estimates, one per altitude bin)		IntAl	31+11+1	76
Num_Mie_Reference_Pulses_Used	Number of Mie reference pulses used		IntAl	30+11+1	74
Num_Rayleigh_Reference_Pulses_Used	Number of Rayleigh reference pulses used		IntAl	35+11+1	84
Spare_3			Spare	100+1	70
Num_Mie_Zero_Wind_Detected	Number of observations in which Mie zero wind is detected(a new ground correction factor calculated)		IntAl	27+11+1	68
Num_Rayleigh_Zero_Wind_Detected	Number of observations containing Rayleigh zero wind is detected (a new ground correction factor calculated)		IntAl	32+11+1	78
Num_Mie_Measurements_Ground_Echo_Detected	Total number of Mie measurements where ground wind bins were detected.		IntAl	42+11+1	98
Num_Rayleigh_Measurements_Ground _Echo_Detected	Total number of Rayleigh measurements where ground wind bins were detected.		IntAl	47+11+1	110
Spare_4			Spare	100+1	70
Total_Num_of_Measurement_Invalid	Total number of measurements for which the number of corresponding valid pulses is below Meas_Cavity_Lock_Status_Thresh		IntAl	33+11+1	72
Total_Num_of_Pulse_Validity_Status_Flag_False	Total number of reference pulses with Pulse_Validity_Status_Flag set to false.		IntAl	46+11+1	100
Total_Num_of_Sat_Not_on_Target_Measurements	Total number of measurements with satellite not on target status		IntAl	44+11+1	96

Tag Name	Content Description	Unit	Type	Size (KVT)	Size (XML)
Total_Num_of_Corrupt_Mie_Measurement_Bins	The total number of Mie measurement bins found to be flagged invalid or missing in the L1A product. For this field, the use of 'Corrupt' in the fieldname is misleading, as the parameter does not refer to the output of the 'corrupted data detection' algorithm, see section 14.3 of R-2.		IntAl	42+11+1	92
Total_Num_of_Corrupt_Rayleigh_Measurement_Bins	The total number of Rayleigh measurement bins found to be flagged invalid or missing in the L1A product. For this field, the use of 'Corrupt' in the fieldname is misleading, as the parameter does not refer to the output of the 'corrupted data detection' algorithm, see section 14.3 of R-2.		IntAl	47+11+1	102
Total_Num_of_Corrupt_Mie_Reference_Pulses	The total number of Mie reference pulses found to be flagged invalid or missing in the L1A product. For this field, the use of 'Corrupt' in the fieldname is misleading, as the parameter does not refer to the output of the 'corrupted data detection' algorithm, see section 14.3 of R-2.		IntAl	42+11+1	92
Total_Num_of_Corrupt_Rayleigh_Reference_Pulses	The total number of Rayleigh reference pulses found to be flagged invalid or missing in the L1A product. For this field, the use of 'Corrupt' in the fieldname is misleading, as the parameter does not refer to the output of the 'corrupted data detection' algorithm, see section 14.3 of R-2.		IntAl	47+11+1	102
NF_Order	Number of Fourier terms used in the Harmonic Bias Estimation		IntAl	9+11+1	26
Spare_5			Spare	100+1	70
List_of_Dsds	See Table 6-2 for list of Data Sets in product		List of 20 Structures	288*20	6056
Total size for KVT and XML SPH in bytes:				7466	8514

6.2.1 Data Set Descriptors

The Data Sets listed in Table 6-2 appear in Aeolus Level 1B products, each described by a DSD in the SPH. A description of "Data Set Type" can be found in Section 3.3.5, Table 3-8

Table 6-2 Level 1B Wind Measurement Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	Geolocation_ADS	DSD structure for Geolocation information ADS (contains information per BRC and per Measurement)	A	1 DSR per BRC
2	Product_Confidence_Data_ADS	DSD structure for Product Confidence ADS	A	1 DSR per BRC

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
3	Ground_Wind_Detection_ADS	DSD structure for Ground Wind Detection ADS	A	1 DSR per BRC
4	Measurement_ADS	DSD structure for Mie & Rayleigh channel L1A data ADS	A	1 DSR per BRC
5	Mie_Core_Params_GADS	DSD structure for L1B Mie core parameters that shall be used also for the L2B processing GADS	G	1 DSR
6	Calibration_Char_GADS	DSD structure for L1B Characterisation data and L2B processing parameters and setting GADS	G	1 DSR
7	Useful_Signal_MDS	DSD structure for Useful Signal ADS	M	1 DSR per BRC
8	Wind_Velocity_MDS	DSD structure for Wind Velocity Data MDS	M	1 DSR per BRC
9	Aeolus_Level_1A_Product	DSD for input Aeolus Level 1A Product	R	No DS
10	Aeolus_MRC	DSD for input Aeolus Mie Response Calibration Auxiliary product	R	No DS
11	Aeolus_RRC	DSD for input Aeolus Rayleigh Response Calibration Auxiliary product	R	No DS
12	Aeolus_ZWC	DSD for input Aeolus Zero Wind Calibration Auxiliary product	R	No DS
13	Level_1B_Proc_Params	DSD for Level 1B Processing Parameters Auxiliary File	R	No DS
14	Satellite_Characterisation	DSD for Satellite Characterisation Auxiliary File	R	No DS
15	Orbit_Scenario_File	DSD for Orbit Scenario Auxiliary File	R	No DS
16	Digital_Elevation_Model	DSD for Digital Elevation Model Definition File	R	No DS
17	Geoid_Model	DSD for Geoid Model file EGM96	R	No DS
18	Harmonic_Bias_Estimation	DSD for the input Aeolus Harmonic Bias Estimation Auxiliary product	R	No DS
19	Range_Dependent_Bias	DSD for the input Aeolus Range Dependent Bias Auxiliary product	R	No DS
20	Dark_Current_Memory_Zone	DSD for the input Aeolus Dark Current in Memory Zone	R	No DS

6.3 Data Sets

This section details the content of the DSR for each DS.

6.3.1 Geolocation ADS

The Level 1B Geolocation ADSR is a copy of the Level 1A Geolocation ADSR, which is described in Section 5.3.1, with the number of observations N (30) replaced by a variable number of observations N_Max (N_Max<=30).

6.3.2 Product Confidence Data ADS

The Level 1B Product Confidence Data ADS contains product confidence data regarding the Level 1B wind measurement data. Each DSR contains information for one BRC. This DS contains product confidence information on individual wind speeds, profile measurements and observations.

Additional health information about the Aeolus satellite and or ALADIN instrument is found in the Level 1A product.

Table 6-3 Level 1B Product Confidence Data ADSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_of_Observation_Time	Satellite time at start of BRC (UTC)		DateTime	12
N	Number of measurements		IntAs	2
P	Number of pulses		IntAs	2
Spare_1			Spare	8
Observation_PCD	Observation product confidence data See Table 6-4 for structure definition		Structure	5568
List_of_Measurement_PCDs	List of Measurement PCDs for the observation. The size of this list is N_Max. (See L1B SPH for N_Max) See **Table 6-9** for structure definition		List of N_Max (<=30) Structures	80370
Spare_2			Spare	8
Total size for binary ADSR in bytes:				85970

Table 6-4 Level 1B Product Confidence Data Observation_PCD Content Description

Tag Name	Content Description	Unit	Type	Size
Num_Measurement_Invalid	The number of measurements for which the number of corresponding valid pulses is below Meas_Cavity_Lock_Status_Thresh		IntAl	4
Num_Reference_Pulse_Invalid	The number of reference pulses with invalid status		IntAl	4
Num_Sat_Not_on_Target_Measurements	The number of measurements with satellite not on target status		IntAl	4
Num_Corrupt_Mie_Measurements	The number of Mie measurements found to be flagged invalid or missing in the L1A product. For this field, the use of ‘Corrupt’ in the fieldname is misleading, as the parameter does not refer to the output of the ‘corrupted data detection’ algorithm, see section 14.3 of R-2.		IntAl	4

Tag Name	Content Description	Unit	Type	Size
Num_Corrupt_Rayleigh_Measurements	The number of Rayleigh measurements found to be flagged invalid or missing in the L1A product. For this field, the use of 'Corrupt' in the fieldname is misleading, as the parameter does not refer to the output of the 'corrupted data detection' algorithm, see section 14.3 of R-2.		IntAl	4
Num_Corrupt_Mie_Reference_Pulses	The number of Mie reference pulses found to be flagged invalid or missing in the L1A product. For this field, the use of 'Corrupt' in the fieldname is misleading, as the parameter does not refer to the output of the 'corrupted data detection' algorithm, see section 14.3 of R-2.		IntAl	4
Num_Corrupt_Rayleigh_Reference_Pulses	The number of Rayleigh reference pulses found to be flagged invalid or missing in the L1A product. For this field, the use of 'Corrupt' in the fieldname is misleading, as the parameter does not refer to the output of the 'corrupted data detection' algorithm, see section 14.3 of R-2.		IntAl	4
Avg_Laser_Frequency_Offset	Average of commanded laser Frequency Offset	GHz	FAdoxy	8
Avg_UV_Energy	Average laser pulse UV energy of N * (P – 1) pulses, regardless of the UV_Energy_OK_Status.	mJ	FAdoxy	8
Laser_Frequency_Offset_Std_Dev	Laser frequency Offset standard deviation	GHz	FAdoxy	8
UV_Energy_Std_Dev	Laser pulse UV energy standard deviation of N * (P – 1) pulses, regardless of the UV_Energy_OK_Status.	mJ	FAdoxy	8
Mie_Ref_Pulse_Signal_to_Noise_Ratio	Mie signal to noise ratio for coadded valid pulses of the observation.		FAdoxy	8
Mie_Ref_Pulse_Refined_Signal_to_Noise_Ratio	Refined Mie signal to noise ratio for coadded valid pulses of the observation.		FAdoxy	8
Rayleigh_Ref_Pulse_Signal_to_Noise_Ratio_Channel_A	Rayleigh signal to noise ratio of channel A for the coadded valid pulses of the observation.		FAdoxy	8
Rayleigh_Ref_Pulse_Signal_to_Noise_Ratio_Channel_B	Rayleigh signal to noise ratio of channel B for the coadded valid pulses of the observation.		FAdoxy	8
ENC_Col_Ref_Pulse_Channel_A	Col value of the energetic centroid of the mean reference pulse of the observation for channel A. Value set to 0 if parameter couldn't be retrieved.	ACCD pixel index	FAdoxy	8
ENC_Col_Ref_Pulse_Channel_B	Col value of the energetic centroid of the mean reference pulse of the observation for channel A. Value set to 0 if parameter couldn't be retrieved.	ACCD pixel index	FAdoxy	8
ENC_Col_Std_Dev_Ref_Pulse_Channel_A	Energetic centroid column standard deviation for the mean reference pulse of channel A. Value set to 0 if parameter couldn't be retrieved.		FAdoxy	8

Tag Name	Content Description	Unit	Type	Size
ENC_Col_Std_Dev_Ref_Pulse_Channel_B	Energetic centroid column standard deviation for the mean reference pulse of channel B. Value set to 0 if parameter couldn't be retrieved.		FAdoxy	8
Num_Mie_Peak_Invalid	Number of invalid Mie bin due to invalid peak fit of the measurement data or reference pulse data		IntAl	4
Polynomial_Fit_Data_Used	Flag indicating if the polynomial fit data of the response errors was used for the conversion of the response into a frequency.		Boolean	1
Corrected_Mie_Reference_Pulse_Response	In case the Polynomial_Fit_Data_Used flag is set to 0, this field reports the corrected response of the accumulated Mie reference pulses. Otherwise parameter set to 0.0.		FAdoxy	8
Corrected_Rayleigh_Reference_Pulse_Response	In case the Polynomial_Fit_Data_Used flag is set to 0, this field reports the corrected response of the accumulated Rayleigh reference pulses. Otherwise parameter set to 0.0.		FAdoxy	8
List_of_Observation_Alt_Bin_PCDs	List of observation PCD information per altitude bin. See Table 6-5 for structure definition. There are 25 structures, for 25 rows representing 24 atmospheric layers and one background radiation sample.		List of 25 Structures	5050
Num_Mie_Invalid_Measurements	Number of Mie invalid measurement data over all bins due to source packet invalid, data corruption, number of corresponding valid pulses below Meas_Cavity_Lock_Status_Thresh, or spacecraft attitude not on target		IntAl	4
Num_Mie_Invalid_Reference_Pulse	Number of Mie invalid reference pulses due to source packet invalid, data corruption, or invalid pulse		IntAl	4
Num_Rayleigh_Invalid_Measurements	Number of Rayleigh invalid measurement data over all bins due to source packet invalid, data corruption, number of corresponding valid pulses below Meas_Cavity_Lock_Status_Thresh, or spacecraft attitude not on target		IntAl	4
Num_Rayleigh_Invalid_Reference_Pulse	Number of Rayleigh invalid reference pulses due to source packet invalid, data corruption, or invalid pulse		IntAl	4
Mie_Mean_Emitted_Frequency	Emitted responses calculated using - Equation 58 of R-2 for the reference pulses of the observation - Equation 60 of R-2 for the reference pulses of a measurement Emitted responses are then converted to emitted frequencies.	GHz	FAdoxy	8
Mie_Emitted_Frequency_Std_Dev	Emitted frequencies standard deviation.	GHz	FAdoxy	8

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Mean_Emitted_Frequency	Emitted responses calculated using - Equation 64 of R-2 for the reference pulses of the observation - Equation 66 of R-2 for the reference pulses of a measurement Emitted responses are then converted to emitted frequencies.	GHz	FAdoxy	8
Rayleigh_Emitted_Frequency_Std_Dev	Emitted frequencies standard deviation.	GHz	FAdoxy	8
MultiMode_Ratio_Quality_Flag	Flag that is set if the multimode ratio falls below the multimode ratio threshold for an observation		Boolean	1
TXA_Frequency	Mean of up to N*P values of the TXA frequency of valid pulses.		FAdoxy	8
List_of_RSPT_Temperatures	RSPT temperatures for each sensor and each time sample in the BRC. See Table 6-6 for structure definition.		List of 6 structures	192
M1_Temperatures	See Table 6-7 for structure definition.		Structure	120
Spare_3			Spare	4
Total size for binarstructure in bytes:				5568

Table 6-5 Level 1B Product Confidence Data Observation_Alt_Bin_PCD Content Description

Tag Name	Content Description	Unit	Type	Size
Error_Quantifier	See Table 6-8 for structure definition		Structure	32
Mie_Wind_Velocity_Std_Dev	Mie wind velocity standard deviation of the altitude bin	m/s	FAdoxy	8
Rayleigh_Wind_Velocity_Std_Dev	Rayleigh wind velocity standard deviation of the altitude bin	m/s	FAdoxy	8
Mie_Useful_Signal_Std_Dev	Mie useful signal standard deviation of the altitude bin		FAdoxy	8
Rayleigh_Useful_Signal_Channel_A_Std_Dev	Rayleigh channel A useful signal standard deviation of the altitude bin		FAdoxy	8
Rayleigh_Useful_Signal_Channel_B_Std_Dev	Rayleigh channel B useful signal standard deviation of the altitude bin		FAdoxy	8
Mie_Core_Characteristics	Output of the Downhill Simplex Mie Core algorithm for observation. See **Table 6-11** for structure definition.		Structure	42
Scattering_Ratio_Mie	Scattering ratio of the altitude bin. If the scattering ratio cannot be computed, this field is set to –1.0.		FAdoxy	8
Refined_Scattering_Ratio_Mie	Refined scattering ratio of the altitude bin using the Mie Core Downhill Simplex algorithm output. If the scattering ratio cannot be computed, the field is set to -1.0.		FAdoxy	8
Mie_Signal_to_Noise_Ratio	Mie Signal-to-Noise ratio of the altitude bin. If the Mie Signal-to-Noise ratio cannot be computed, this field is set to –1.0.		FAdoxy	8
Refined_Mie_Signal_to_Noise_Ratio	Refined Mie Signal-to-Noise ratio of the altitude bin using the Mie Core Downhill Simplex algorithm output. If the signal-to-noise ratio cannot be computed, the field is set to -1.0.		FAdoxy	8
Total_Mie_Signal_to_Noise_Ratio	Total Mie Signal-to-Noise ratio of the altitude bin using the Mie Core Downhill Simplex algorithm output. If the signal-to-noise ratio cannot be computed, the field is set to -1.0.		FAdoxy	8
Rayleigh_Signal_to_Noise_Ratio_Channel_A	Rayleigh channel A Signal-to-Noise ratio of the altitude bin. If the Rayleigh channel A Signal-to-Noise ratio cannot be computed, this field is set to –1.0.		FAdoxy	8
Rayleigh_Signal_to_Noise_Ratio_Channel_B	Rayleigh channel B Signal-to-Noise ratio of the altitude bin. If the Rayleigh channel B Signal-to-Noise ratio cannot be computed, this field is set to –1.0.		FAdoxy	8

Tag Name	Content Description	Unit	Type	Size
ENC_Col_Channel_A	Col value of the energetic centroid of the observation level altitude bin signal for channel A. Value set to 0 if parameter couldn't be retrieved.	ACCD pixel index	FAdoxy	8
ENC_Col_Channel_B	Col value of the energetic centroid of the observation level altitude bin signal for channel B. Value set to 0 if parameter couldn't be retrieved.	ACCD pixel index	FAdoxy	8
ENC_Col_Std_Dev_Channel_A	Energetic centroid column standard deviation value for channel A. Value set to 0 if parameter couldn't be retrieved.		FAdoxy	8
ENC_Col_Std_Dev_Channel_B	Energetic centroid column standard deviation value for channel B. Value set to 0 if parameter couldn't be retrieved.		FAdoxy	8
Total size for binary structure in bytes:				202

Table 6-6 Level 1B Product Confidence Data RSPT_Temperature Content Description

Tag Name	Content Description	Unit	Type	Size
TC_8_RSPT_1	Sensor RSPT temperature	C	FAdoxy	8
TC_9_RSPT_2	Sensor RSPT temperature	C	FAdoxy	8
TC_10_RSPT_3	Sensor RSPT temperature	C	FAdoxy	8
TC_11_RSPT_4	Sensor RSPT temperature	C	FAdoxy	8
Total size for binary structure in bytes:				32

Table 6-7 Level 1B Product Confidence Data M1_Temperatures Content Description

Tag Name	Content Description	Unit	Type	Size
Aht_22_Tel_M1	Average of Aht 22 M1 temperatures	C	FAdoxy	8
Aht_23_Tel_M1	Average of Aht 23 M1 temperatures	C	FAdoxy	8
Aht_24_Tel_M1	Average of Aht 24 M1 temperatures	C	FAdoxy	8
Aht_25_Tel_M1	Average of Aht 25 M1 temperatures	C	FAdoxy	8
Aht_26_Tel_M1	Average of Aht 26 M1 temperatures	C	FAdoxy	8
Aht_27_Tel_M1	Average of Aht 27 M1 temperatures	C	FAdoxy	8
Tc_18_Tel_M11	Average of TC 18 Tel M1-1 temperatures	C	FAdoxy	8
Tc_19_Tel_M12	Average of TC 19 Tel M1-2 temperatures	C	FAdoxy	8
Tc_20_Tel_M13	Average of TC 20 Tel M1-3 temperatures	C	FAdoxy	8
Tc_21_Tel_M14	Average of TC 21 Tel M1-4 temperatures	C	FAdoxy	8

Tag Name	Content Description	Unit	Type	Size
Tc_25_Tm15_Ths1Y	Average of TC 25 TM15 Ths1-Y temperatures	C	FAdoxy	8
Tc_27_Tm16_Ths1Y	Average of TC 27 TM16 Ths1-Y temperatures	C	FAdoxy	8
Tc_29_Ths2	Average of TC 29 Ths2 temperatures	C	FAdoxy	8
Tc_23_Ths1	Average of TC 23 Ths1 temperatures	C	FAdoxy	8
Tc_32_Ths3	Average of TC 32 Ths3 temperatures	C	FAdoxy	8
Total size for binary ADSR in bytes:				**120**

Table 6-8 Level 1B Product Confidence Data Error_Quantifier Content Description

Tag Name	Content Description	Unit	Type	Size
Error_Quantifier_Mie	Error quantifier for Mie	m/s	FAdoxy	8
Error_Quantifier_Rayleigh	Error quantifier for Rayleigh	m/s	FAdoxy	8
Error_Quantifier_Rayleigh_Channel_A	Error quantifier for Rayleigh channel A		FAdoxy	8
Error_Quantifier_Rayleigh_Channel_B	Error quantifier for Rayleigh channel B		FAdoxy	8
Total size for binary structure in bytes:				32

Table 6-9 Level 1B Product Confidence Data Measurement_PCD Content Description

Tag Name	Content Description	Unit	Type	Size
Num_Mie_Invalid_Reference_Pulse	Number of Mie invalid reference pulses due to source packet invalid, data corruption, or invalid pulse		IntAl	4
Num_Rayleigh_Invalid_Reference_Pulse	Number of Rayleigh invalid reference pulses due to source packet invalid, data corruption, or invalid pulse		IntAl	4
Avg_Laser_Frequency_Offset	Average laser Frequency Offset	GHz	FAdoxy	8
Avg_UV_Energy	Average laser pulse UV energy of (P – 1) pulses, regardless of the UV_Energy_OK_Status.	mJ	FAdoxy	8
Laser_Frequency_Offset_Std_Dev	Laser frequency Offset standard deviation	GHz	FAdoxy	8
UV_Energy_Std_Dev	Laser pulse UV energy standard deviation of (P – 1) pulses, regardless of the UV_Energy_OK_Status.	mJ	FAdoxy	8
Mie_Ref_Pulse_Signal_to_Noise_Ratio	Mie signal to noise ratio for coadded valid pulses of the measurement. If the signal to noise ratio cannot be computed, the field is set to -1.0.		FAdoxy	8

Tag Name	Content Description	Unit	Type	Size
Mie_Ref_Pulse_Refined_Signal_to_Noise_Ratio	Refined Mie signal to noise ratio for coadded valid pulses of the measurement. If the refined signal to noise ratio cannot be computed, the field is set to -1.0.		FAdoxy	8
Rayleigh_Ref_Pulse_Signal_to_Noise_Ratio_Channel_A	Rayleigh signal to noise ratio of channel A for the coadded valid pulses of the measurement. If the signal to noise ratio cannot be computed, the field is set to -1.0.		FAdoxy	8
Rayleigh_Ref_Pulse_Signal_to_Noise_Ratio_Channel_B	Rayleigh signal to noise ratio of channel B for the coadded valid pulses of the measurement. If the signal to noise ratio cannot be computed, the field is set to -1.0.		FAdoxy	8
List_of_Meas_Alt_Bin_PCDs	See Table 6-10 for structure definition. There are 25 structures, for 25 rows representing 24 atmospheric layers and one background radiation sample.		List of 25 Structures	2550
Velocity_of_Attitude_Uncertainty_Error	Velocity of attitude uncertainty error.	m/s	FAdoxy	8
Mie_Mean_Emitted_Frequency	Emitted responses calculated using: - Equation 60 of R-2 for the different reference pulses of a measurement - Emitted responses are then converted to emitted frequencies and averaged. See A-30.	GHz	FAdoxy	8
Mie_Emitted_Frequency_Std_Dev	Emitted frequency standard deviation	GHz	Fadoxy	8
Reference_Pulse_FWHM	FWHM calculated by the Mie-Core on the co-added reference pulse for the measurement.	ACCD pixel	FAdoxy	8
Rayleigh_Mean_Emitted_Frequency	Emitted responses calculated using - Equation 64 of R-2 for the reference pulses of the observation - Equation 66 of R-2 for the different reference pulses of a measurement - Emitted responses are then converted to emitted frequencies and averaged. See A-30.	GHz	FAdoxy	8
Rayleigh_Emitted_Frequency_Std_Dev	Emitted frequencies standard deviation.	GHz	FAdoxy	8
UV_Energy_Quality_Flag	Flag that shows the quality of the UV energy		Boolean	1
Spare_4			Spare	8
Total size for binary structure in bytes:				2679

Table 6-10 Level 1B Product Confidence Data Meas_Alt_Bin_PCD Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Measurement_Invalid	Invalid Mie measurement data for the current altitude bin due to source packet invalid, data corruption, number of corresponding valid pulses below Meas_Cavity_Lock_Status_Thresh, spacecraft attitude not on target, or bin below ground		Boolean	1
Rayleigh_Measurement_Invalid	Invalid Rayleigh measurement data for the current altitude bin due to source packet invalid, data corruption, number of corresponding valid pulses below Meas_Cavity_Lock_Status_Thresh, or spacecraft attitude not on target, or bin below ground		Boolean	1
Mie_Peak_Invalid	Invalid Mie bin due to invalid peak fit of the measurement data or reference pulse data		Boolean	1
Mie_Core_Characteristics	Output of the Downhill Simplex Mie Core algorithm for measurement. See **Table 6-11** for structure definition.		Structure	42
Scattering_Ratio_Mie	Scattering ratio of the altitude bin. If the scattering ratio cannot be computed, this field is set to –1.0.		FAdoxy	8
Refined_Scattering_Ratio_Mie	Refined scattering ratio of the altitude bin using the Mie Core Downhill Simplex algorithm output. If the scattering ratio cannot be computed, this field is set to -1.0.		FAdoxy	8
Mie_SR_Useful_Signal_Lower_Threshold_Met	Set to true, if the useful signal derived for the current bin is above the threshold Mie_SR_Useful_Signal_Lower_Threshold, seeTable 8-135. Set to false otherwise.		Boolean	1
Mie_Signal_to_Noise_Ratio	Mie Signal-to-Noise ratio of the altitude bin. If the Mie Signal-to-Noise ratio cannot be computed, this field is set to –1.0.		FAdoxy	8
Refined_Mie_Signal_to_Noise_Ratio	Refined Mie Signal-to-Noise ratio of the altitude bin using the Mie Core Downhill Simplex algorithm output. If the signal-to-noise ratio cannot be computed, this field is set to -1.0.		FAdoxy	8
Total_Mie_Signal_to_Noise_Ratio	Total Mie Signal-to-Noise ratio of the altitude bin using the Mie Core Downhill Simplex algorithm output. If the signal-to-noise ratio cannot be computed, the field is set to -1.0.		FAdoxy	8
Rayleigh_Signal_to_Noise_Ratio_Channel_A	Rayleigh channel A Signal-to-Noise ratio of the altitude bin. If the Rayleigh channel A Signal-to-Noise ratio cannot be computed, this field is set to –1.0.		FAdoxy	8

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Signal_to_Noise_Ratio_Channel_B	Rayleigh channel B Signal-to-Noise ratio of the altitude bin. If the Rayleigh channel B Signal-to-Noise ratio cannot be computed, this field is set to –1.0.		FAdoxy	8
Total size for binary structure in bytes:				102

Table 6-11 Level 1B Product Confidence Mie_Core_Characteristics Content Description

Tag Name	Content Description	Unit	Type	Size
Peak_Position	Calculated peak position of signal	ACCD pixel index	FAdoxy	8
FWHM	Calculated FWHM of signal	ACCD pixel	FAdoxy	8
Amplitude	Calculated amplitude of signal	ACCD counts	FAdoxy	8
Offset	Calculated offset of signal	ACCD counts	FAdoxy	8
Error_Flag	1 byte bit packed field. Bit 1: Overall validity, data invalid 1, otherwise 0 Bit 2 peak height lower threshold not met 1, otherwise 0 Bit 3: peak height upper threshold not met 1, otherwise 0 Bit 4: FWHM lower threshold not met 1, otherwise 0 Bit 5: FWHM upper threshold not met 1, otherwise 0 Bit 6: peak location threshold not met 1, otherwise 0 Bit 7: number of iterations in the Lorentz fit exceeds threshold 1, otherwise 0. Bit 8: SNR below threshold 1, otherwise 0 Field set to '10000000' in case the Mie Core algorithm was not invoked.		IntAuc	1
Residual_Error	Quadratic sum of differences between modelled and measured ACCD counts per pixel.		FAdoxy	8
Num_Iterations	Number of Lorentzian fit iterations reached, compare input parameter Max_Iterations_Lorentz_Fit of Table 8-150.		IntAuc	1
Total size for binary structure in bytes:				42

6.3.3 Ground Wind Detection ADS

Wind velocities provided in the Level 1B product have been corrected using data from the measurement AOCS data and from prior ground wind detection calibration data. The role of these correction factors is illustrated in the following high level equation expressing the calculation of wind velocity:

$$V_{Corrected} = V_{ALADIN} – V_{AOCS} – V_{GroundDetection}$$

The Wind Velocity MDS contains the corrected velocity values. This DS contains velocity correction parameters that are derived from the AOCS data valid for the measurement and from the latest ground wind detection calibration.

Satellite yaw steering control attempts to point the ALADIN LOS toward a zero velocity point on the surface of the earth. However, attitude control errors can result in a mispointing and will generate residual velocity errors (also referred to as “satellite-induced doppler shift”). The AOCS data received from the satellite is used to calculate the pointing direction and these residual satellite-ground differential velocity (V_{AOCS}) and it can then be applied to correct the ALADIN measured velocity.

Ground wind detection in a recent measurement allows the Level 1B ground processing to further correct for residual errors ($V_{GroundDetection}$) that were not included by the AOCS correction, described above. Ground Detection includes the contribution of two terms: the ground correction term using harmonic bias estimation and ground correction factor as described by Eq. 61 of A-4.

This DS contains the quantities of velocity correction applied by these two sources.

Table 6-12 Level 1B Ground Wind Detection ADSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_of_Observation_Time	Satellite time at start of BRC (UTC)		DateTime	12
Mie_Ground_Correction_Velocity	Mie ground correction velocity	m/s	FAdoxy	8
Rayleigh_Ground_Correction_Velocity	Rayleigh ground correction velocity	m/s	FAdoxy	8
Updated_Mie_Ground_Correction_Velocity	TRUE if Mie ground correction velocity is updated		Boolean	1
Updated_Rayleigh_Ground_Correction_Velocity	TRUE if Rayleigh ground correction velocity is updated		Boolean	1
Mie_Ground_FWHM	Mie Core 2 output FWHM when applied to observation level Mie ground signal. This value is filled in when ZWC_Result_Type is set to ZWC_Mie or ZWC_Both and the Mie Core 2 algorithm has been applied. In all other cases the value is set to 0.0.	ACCD pixel	FAdoxy	8
Mie_Ground_Useful_Signal	Useful signal of observation level Mie ground signal. This value is filled in when ZWC_Result_Type is set to ZWC_Mie or ZWC_Both. In all other cases the value is set to 0.0.	ACCD counts	FAdoxy	8

Tag Name	Content Description	Unit	Type	Size
Mie_Ground_Signal_to_Noise_Ratio	Signal to noise ratio of observation level Mie ground signal. This value is filled in when ZWC_Result_Type is set to ZWC_Mie or ZWC_Both. In all other cases the value is set to 0.0.		FAdoxy	8
Mie_Ground_Refined_Signal_to_Noise_Ratio	Refined signal to noise ratio of observation level Mie ground signal. This value is filled in when ZWC_Result_Type is set to ZWC_Mie or ZWC_Both. In all other cases the value is set to 0.0.		FAdoxy	8
Rayleigh_Ground_Useful_Signal	Useful signal of observation level Rayleigh ground signal. This value is filled in when ZWC_Result_Type is set to ZWC_Rayleigh or ZWC_Both. In all other cases the value is set to 0.0.	ACCD counts	FAdoxy	8
Rayleigh_Ground_Signal_to_Noise_Ratio	Signal to noise ratio of observation level Rayleigh ground signal. This value is filled in when ZWC_Result_Type is set to ZWC_Rayleigh or ZWC_Both. In all other cases the value is set to 0.0.		FAdoxy	8
Mie_Average_Ground_Wind_Bin_Thickness	Average of measurement ground wind bin altitudes for Mie	m	FAdoxy	8
Rayleigh_Average_Ground_Wind_Bin_Thickness	Average of measurement ground wind bin altitudes for Rayleigh	m	FAdoxy	8
Mie_Average_Ground_Wind_Bin_Thickness_Above_DEM	Average ground wind bin thickness (height of air column) above DEM intersection for Mie	m	FAdoxy	8
Rayleigh_Average_Ground_Wind_Bin_Thickness_Above_DEM	Average of ground wind bin thickness (height of air column) above DEM intersection for Rayleigh.	m	FAdoxy	8
Validation_Criteria	See Table 6-13 for structure definition		Structure	60
List_of_Measurement_Ground_Wind_Detections	List of measurement ground wind detection results. The size of this list is N_Max. (See L1B SPH for N_Max) See Table 6-14 for structure definition		List of N_Max (<= 30) Structures	10500
Mie_Ground_Correction_Weighting_Factor	Mie ground correction weighting factor		FAdoxy	8
Rayleigh_Ground_Correction_Weighting_Factor	Rayleigh ground correction weighting factor		FAdoxy	8
Rayleigh_Correction_With_Mie_Ground_Echo_Weighting_Factor	Weighting parameter for correction of Rayleigh with Mie ground echo		FAdoxy	8
Mie_Harmonic_Correction_Factor	Weighting parameter for Mie harmonic correction		FAdoxy	8
Rayleigh_Harmonic_Correction_Factor	Weighting parameter for Rayleigh harmonic correction		FAdoxy	8
Rayleigh_Correction_With_Mie_Harmonic_Weighting_Factor	Weighting parameter for correction of Rayleigh with Mie harmonic		FAdoxy	8

Tag Name	Content Description	Unit	Type	Size
Mie_Rayleigh_Ground_Correction_Offset	Offset between Mie and Rayleigh ground corrections	m/s	FAdoxy	8
HBE_Mie_Ground_Correction_Velocity	Mie ground correction velocity using harmonic bias estimation for the observation	m/s	FAdoxy	8
HBE_Rayleigh_Ground_Correction_Velocity	Rayleigh ground correction velocity using harmonic bias estimation for the observation	m/s	FAdoxy	8
Mie_Channel_Total_Zero_Wind_Correction	Mie channel total zero wind correction calculated for this observation		FAdoxy	8
Rayleigh_Channel_Total_Zero_Wind_Correction	Rayleigh channel total zero wind correction calculated for this observation		FAdoxy	8
Spare_1			Spare	16
Total size for binary ADSR in bytes:				10774

Table 6-13 Level 1B Ground Wind Detection Validation_Criteria Content Description

Tag Name	Content Description	Unit	Type	Size
Min_Num_of_Mie_Ground_Echo_Measurements	The minimum number of measurements with valid Mie ground bins detected in order to validate new ground correction factor.		IntAuc	1
Mie_Land_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates land surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	8
Mie_Water_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates water/sea ice surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	8
Mie_Max_Ground_Echo_Bin_Thickness_Above_DEM	Threshold applied to a bin identified as ground bin candidate. If the threshold is not met, the signal of the bin is not added to the sum of the ground signal on observation level.	m	FAdoxy	8
Min_Num_of_Rayleigh_Ground_Echo_Measurements	The minimum number of measurements with valid Rayleigh ground bins detected in order to validate new ground correction factor		IntAuc	1
Rayleigh_Land_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates land surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	8
Rayleigh_Water_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates water/sea ice surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	8
Rayleigh_Max_Ground_Echo_Bin_Thickness_Above_DEM	Threshold applied to a bin identified as ground bin candidate. If the threshold is not met, the signal of the bin is not added to the sum of the ground signal on observation level.	m	FAdoxy	8
Number_of_Mie_Ground_Bins	Number of Mie measurements containing ground wind bins		IntAuc	1
Number_of_Rayleigh_Ground_Bins	Number of Rayleigh measurements containing ground wind bins		IntAuc	1
Spare_2			Spare	8
Total size for binary structure in bytes:				60

Table 6-14 Level 1B Ground Wind Detection Measurement_Ground_Wind_Detection Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Measurement_Ground_Wind_Bin	Mie measurement ground wind detection results. See Table 6-15 for structure definition		Structure	175
Rayleigh_Measurement_Ground_Wind_Bin	Rayleigh measurement ground wind detection results See **Table 6-16** for structure definition		Structure	175
Total size for binary structure in bytes:				350

Table 6-15 Level 1B Ground Wind Detection Mie_Measurement_Ground_Bin Content Description

Tag Name	Content Description	Unit	Type	Size
Surface	The parameter holds five different values: 0 for ACE data, 1 for MSS data, 2 for EGM96 data, and 3 for SRTM30 data. Values 1 and 2 correspond to sea surface, see R-4 Value 4 is the default setting. Since in case an input L1A product holds BRCs with different numbers of measurements per BRC the L1B product will report the max number of measurements occurring in the L1A product for every L1B output BRC, thus BRCs contain measurements filled with default values.		IntAuc	1
Ground_Wind_Detected	TRUE=ground wind is detected in the current bin		Boolean	1
List_of_Ground_Bin_Properties	List of bins identified as ground. Maximum number of 5 bins allowed. See Table 6-17 for structure definition.		Structure	165
Ground_Bin_Thickness_Above_DEM	Ground bin thickness (air column height) above DEM intersection (= difference between the upper edge of the ground bin and DEM height). When there is no expected ground bin, this value is set to -9999. For the average ground wind bin thickness calculation, only the values with corresponding flag, Ground_Wind_Detected = TRUE are used.	m	FAdoxy	8
Total size for binary structure in bytes:				175

Table 6-16 Level 1B Ground Wind Detection Rayleigh_Measurement_Ground_Bin Content Description

Tag Name	Content Description	Unit	Type	Size
Surface	The parameter holds four different values: 0 for ACE data, 1 for MSS data, 2 for EGM96 data, and 3 for SRTM30 data. Values 1 and 2 correspond to sea surface, R-4. Value 4 is the default setting. Since in case an input L1A product holds BRCs with different numbers of measurements per BRC the L1B product will report the max number of measurements occurring in the L1A product for every L1B output BRC, thus BRCs contain measurements filled with default values.		IntAuc	1
Ground_Wind_Detected	TRUE=ground wind is detected in the current bin		Boolean	1
List_of_Ground_Bin_Properties	List of bins identified as ground. Maximum number of 5 bins allowed. See Table 6-17 for structure definition.		Structure	165
Ground_Bin_Thickness_Above_DEM	Ground bin thickness (air column height) above DEM intersection (= difference between the upper edge of the ground bin and DEM height). When expected ground bin is not detected as ground bin, this value is set to -9999. For the average ground wind bin thickness calculation, only the values with corresponding flag, Ground_Wind_Detected = TRUE are used.	m	FAdoxy	8
Total size for binary structure in bytes:				175

Table 6-17 Level 1B Ground Wind Detection Ground_Bin_Property

Tag Name	Content Description	Unit	Type	Size
Ground_Bin_Num	Number of ground bin detected.		IntAuc	1
Offset_DEM_Bin	Offset of ground bin centre height to expected ground bin centre height calculating DEM intersection.	m	FAdoxy	8
DEM_Weight	Weight assigned to signal of this ground bin, based on offset to DEM. Value between 0 and 1		FAdoxy	8
SNR_Weight	Weight assigned to signal of this ground bin based on the SNR. Value between 0 and 1		FAdoxy	8
FWHM_Weight	Weight assigned to signal of this ground bin based on the FWHM. Value between 0 and 1		FAdoxy	8
Total size for binary structure in bytes:				33

6.3.4 Measurement ADS

This ADS contains copies of information from the L1A Reference Pulse ADS, the L1A Mie Channel MDS, the L1A Housekeeping Data ADS, and the L1A Data Quality ADS.

Table 6-18 Level 1B Measurement ADSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_of_Observation_Time	Satellite time at start of BRC (UTC)		DateTime	12
Num_of_Reference_Pulses	P = Number of Reference Pulses per BRC, where P ranges from 3 to 700.		IntAul	4
Spare_1			Spare	4
List_of_Mie_Reference_Pulse	List of mean Mie reference pulses for the measurements. See Table 6-19 for structure description		List of N_Max (<=30) Structures	4800
List_of_Rayleigh_Reference_Pulse_A	List of coadded signal of Rayleigh reference pulses for channel A. See Table 6-20 for structure description. Idea: process Rayleigh reference pulses as far as Rayleigh signal and provide two figures one for channel A and one for channel B per measurement.		List of N_Max (<=30) Structures	240
List_of_Rayleigh_Reference_Pulse_B	List of coadded signal of Rayleigh reference pulses for channel B. See Table 6-21 for structure description		List of N_Max (<=30) Structures	240
List_of_Mie_Measurement_Data	List of Mie measurement data up to a maximum of 30 measurements. See Table 6-22 for structure definition.		List of N_Max (<=30) Structures	120000
Mie_Time_Delays	Mie time delay values. See Table 6-23 for structure definition		Structure	100
Rayleigh_Time_Delays	Rayleigh time delay values. See Table 6-24 for structure definition		Structure	100
List_Of_Measurement_Validity_Indicators	Array of flags indicating usability for each potential measurement from n = 1 to 30. See Table 6-26 for structure definition.		List of N_Max (<=30) Structures	330
Total size for binary ADSR in bytes:				125830

Table 6-19 Level 1B Measurement Mie_Reference_Pulse Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Reference_Pulse	Array of 20 pixel (8-byte-) values of the Mie reference pulse, spectrometer counts, mean over co-		Structure	160

	added valid L1A input pulses of a measurement. See Table 6-27 for structure definition.			

Table 6-20 Level 1B Measurement List_of_Rayleigh_Reference_Pulse_A Content Description

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Reference_Pulse_A	Reference pulses corrected for detection chain offset and co-added to measurement level. From equation 104 of (R-2), the quantity C3 (applicable for channel A)		FAdoxy	8

Table 6-21 Level 1B Measurement List_of_Rayleigh_Reference_Pulse_B Content Description

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Reference_Pulse_B	Reference pulses corrected for detection chain offset and co-added to measurement level. From equation 104 of (R-2), the quantity D3 (applicable for channel B)		FAdoxy	8

Table 6-22 Level 1B Measurement Mie_Measurement_Data Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Measurement_Data	Array of Mie spectrometer counts (8-byte values) for 20 columns representing spectral channel, for 25 rows representing 24 atmospheric layers and one background radiation sample. Data is DCO and DCMZ corrected. Up to L1B processor version 7.09 resulting negative values were set to 0.0. Starting with version 7.10 this is controlled by L1B auxiliary parameter Cut_Negative_Mie_Measurement_Data, which is set to FALSE, i.e. negative values are no longer set to 0.0.		FAdoxy	4000

Table 6-23 Level 1B Measurement Mie_Time_Delays Content Description

Tag Name	Content Description	Unit	Type	Size
List_Of_Bin_Layer_Integration_Times	Time delays for each layer (24 bins). See Table 6-25 for structure definition		List of 24 Structures	96
Background_Integration_Time	Duration of background integration time	TMC	IntAl	4
Total size for binary structure in bytes:				100

Table 6-24 Level 1B Measurement Rayleigh_Time_Delays Content Description

Tag Name	Content Description	Unit	Type	Size
List_Of_Bin_Layer_Integration_Times	Time delays for each layer (24 bins). See Table 6-25 for structure definition		List of 24 Structures	96
Background_Integration_Time	Duration of background integration time	TMC	IntAl	4
Total size for binary structure in bytes:				100

Table 6-25 Level 1B Measurement List_of_Bin_Layer_Integration_Time Content Description

Tag Name	Content Description	Unit	Type	Size
Bin_Layer_Integration_Time	Individual time delay for each layer (bin).	TMC	IntAl	4

Table 6-26 Level 1B Measurement List_of_Measurement_Validity_Indicator Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Data_Present	TRUE = Measurement data is present in BRC. FALSE = SID (measurement index + 4) missing		Boolean	1
Mie_Measurement_Sp_Valid	TRUE = Mie Measurement Source Packet Valid		Boolean	1
Rayleigh_Measurement_Sp_Valid	TRUE = Rayleigh Measurement Source Packet Valid		Boolean	1
Measurement_Valid	TRUE = if number of valid pulses is over Meas_Cavity_Lock_Status_Thresh; FALSE = otherwise		Boolean	1
Moon_Blinding_Status	Moon Blinding Status as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
Ground_Intervention_Status	Ground_Intervention_Status as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
Reconfiguration_Status	Reconfiguration_Status as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
Eclipse_Status	Eclipse_Status as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
GPS_Status	GPS_Status as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
Star_Tracker_Status	Star_Tracker_Status as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1
Spacecraft_Attitude_On_Target	TRUE = AOCS status indicates the spacecraft was in a stable state during any part of the measurement, as determined by AOCS status samples (SID1) falling within measurement interval		Boolean	1

Tag Name	Content Description	Unit	Type	Size
Total size for binary structure in bytes:				11

Table 6-27 Level 1B Measurement Mie_Reference_Pulse Content Description

Tag Name	Content Description	Unit	Type	Size
col	Mie Reference Pulse. Array of 20 pixel values where first 2 values are the pre-pixel of the ACCD. The 16 following pixels collects the useful signals, and the last two pixels are used to correct the offset of the detection chain.		FAdoxy	160

6.3.5 Mie Core Parameters GADS

The Mie Core parameters specified in the L1B auxiliary processing parameters file are reported as part of the binary L1B product to ensure that the L2B Mie Core uses the same settings.

Table 6-28 Level 1B Mie_Core_Parameters_GADS Content Description

Tag Name	Content Description	Unit	Type	Size
Gaussian_Width_A	Gaussian width a. This value should be approximately the fringe FWHM.		FAdoxy	8
Peak_Error_Threshold	Peak error threshold		FAdoxy	8
Peak_Error_Threshold_Reference_Pulse	Peak error threshold for internal reference path signal		FAdoxy	8
Max_Num_Iterations	Maximum number of gaussian iterations		IntAul	4
SNR_Threshold	Threshold to switch Mie-Core processing on/off.		FAdoxy	8
Start_FWHM	Starting value for FWHM	ACCD pixel	FAdoxy	8
Residual_Error_Threshold	Stop threshold for change of quadratic sum of differences between modeled and measured ACCD counts per pixel: if the difference between the quadratic sum from the previous to the next iteration loop is below this threshold, the iteration is stopped.		FAdoxy	8
Max_Iterations_Lorentz_Fit	Maximum number of iterations in Lorentz fit-loop		IntAuc	1
FWHM_Upper_Threshold	Upper threshold for FWHM of Lorentz function for quality check	ACCD pixel	FAdoxy	8
FWHM_Lower_Threshold	Lower threshold for FWHM of Lorentz function for quality check	ACCD pixel	FAdoxy	8

Tag Name	Content Description	Unit	Type	Size
Peak_Height_Upper_Threshold	Relative threshold for peak height of Lorentz function	ACCD counts	FAdoxy	8
Peak_Height_Lower_Threshold	Relative threshold for peak height of Lorentz function	ACCD counts	FAdoxy	8
Peak_Location_Threshold	Peak location threshold.	ACCD pixel	FAdoxy	8
Nonlinear_Optimization_Threshold	Stop threshold for Downhill Simplex algorithm merit function		FAdoxy	8
Max_Iterations_Nonlinear_Optimization	Maximum number of iterations of Downhill Simplex algorithm		IntAul	4
Num_Spectral_Sub_Samples	Number of functional evaluations of Lorentz fit function for one pixel		IntAul	4
SNR_Threshold_Reference_Pulse	Threshold to switch Mie-Core processing on/off for internal reference path signal.		FAdoxy	8
Start_FWHM_Reference_Pulse	Starting value for FWHM for internal reference path signal	ACCD pixel	FAdoxy	8
Residual_Error_Threshold_Reference_Pulse	Stop threshold for change of quadratic sum of differences between modeled and measured ACCD counts per pixel: if the difference between the quadratic sum from the previous to the next iteration loop is below this threshold, the iteration is stopped for internal reference path signal.		FAdoxy	8
Max_Iterations_Lorentz_Fit_Reference_Pulse	Maximum number of iterations in Lorentz fit-loop for internal reference path signal		IntAuc	1
FWHM_Upper_Threshold_Reference_Pulse	Upper threshold for FWHM of Lorentz function for quality check for internal reference path signal	ACCD pixel	FAdoxy	8
FWHM_Lower_Threshold_Reference_Pulse	Lower threshold for FWHM of Lorentz function for quality check for internal reference path signal	ACCD pixel	FAdoxy	8
Peak_Height_Upper_Threshold_Reference_Pulse	Relative threshold for peak height of Lorentz function for internal reference path signal	ACCD counts	FAdoxy	8
Peak_Height_Lower_Threshold_Reference_Pulse	Relative threshold for peak height of Lorentz function for internal reference path signal	ACCD counts	FAdoxy	8
Peak_Location_Threshold_Reference_Pulse	Peak location threshold for internal reference path signal.	ACCD pixel	FAdoxy	8
Nonlinear_Optimization_Threshold_Reference_Pulse	Stop threshold for Downhill Simplex algorithm merit function for internal reference path signal		FAdoxy	8
Max_Iterations_Nonlinear_Optimization_Reference_Pulse	Maximum number of iterations of Downhill Simplex algorithm for internal reference path signal		IntAul	4
Num_Spectral_Sub_Samples_Reference_Pulse	Number of functional evaluations of Lorentz fit function for one pixel for internal reference path signal		IntAul	4
DownHill_Simplex_On	Flag showing if the downhill simplex is on or off. If it is off (FALSE) a method using least squares minimization is used instead of DownHill Simplex.		Boolean	1

Tag Name	Content Description	Unit	Type	Size
Total size for binary structure in bytes:				191

6.3.6 Calibration & Characterisation Data GADS

New GADS for L1B related Characterisation data and L2B processing parameters. So far, this GADS reports parameters of the L1bP input auxiliary file 'Satellite Characterisation' and the L1bP output auxiliary files 'Mie Response Calibration' and 'Rayleigh Response Calibration. These parameters are reported here to resolve the dependency of the L2B processor on these files.

File sizes are provided here for the maximum number NF + 1 = 1024, N_Steps = 40 frequency steps, 6 error fit coefficients, 64 Num_Sampling_Points_Internal_Reference, and 61 Num_Sampling_Points_Atmosphere. Numbers in brackets are for NF + 1 = 2.

Table 6-29 Level 1B Calibration & Characterisation Data GADS Content Description

Tag Name	Content Description	Unit	Type	Size
MRC_First_Start_of_Observation_Time	Start of observation time for the first BRC in processed Mie calibration data. (UTC)		DateTime	12
MRC_Last_Start_of_Observation_Time	Start of observation time for the last BRC in processed Mie calibration data (UTC)		DateTime	12
RRC_First_Start_of_Observation_Time	Start of observation time for the first BRC in processed Rayleigh calibration data (UTC)		DateTime	12
RRC_Last_Start_of_Observation_Time	Start of observation time for the last BRC in processed Rayleigh calibration data(UTC)		DateTime	12
L1B_Characterisation_Data	Copy of parameters of auxiliary L1B data. See **Table 6-30** for structure definition.		Structure	42306 (9602)
Total size for binary structure in bytes:				42354 (9650)

Table 6-30 Level 1B Calibration & Characterisation Data L1B_Characterisation_Data Content Description

Tag Name	Content Description	Unit	Type	Size
Satellite_Characterisation_Data	Copy of parameters of auxiliary satellite characterisation data see Table 8-3. See **Table 6-31** for structure definition.		Structure	224
Hbe_Characterisation_Data	Copy of HBE parametersof input AUX_HBE_1B, see Table 8-158. See Table 6-32 for structure definition.		Structure	32772 (68)

Tag Name	Content Description	Unit	Type	Size
Rdb_Characterisation_Data	Copy of RDB parameters of input AUX_RDB_1B, see Table 8-165. See Table 6-33 for structure definition.		Structure	48
Mie_Response_Calibration_Data	Copy of parameters of auxiliary Mie response calibration data. See Table 6-38 for structure definition.		Structure	3075
Rayleigh_Response_Calibration_Data	Copy of parameters of auxiliary Rayleigh response calibration data. See Table 6-39 for structure definition.		Structure	4140
Mie_Fitted_Non_Linearities	Copy of part of the parameters of PAR_1B data see **Error! Reference source not found.**. See Table 6-57 for structure definition. Size calculated assuming Num_Sampling_Points_Internal_Reference = 64 and Num_Sampling_Points_Atmosphere = 61		Structure	2005
Mie_SR_Retrieval_Parameters	Copy of part of the parameters of PAR_1B data see also Table 8-147. For structure definition see Table 6-58.		Structure	42
Total size for binary structure in bytes:				42306 (9602)

Table 6-31 Level 1B Calibration & Characterisation Data Satellite_Characterisation_Data Content Description

Tag Name	Content Description	Unit	Type	Size
Laser_Wavelength	Laser wavelength.	nm	FAdoxy	8
Error_Quantifiers	See Table 6-34 for structure definition		Structure	56
List_of_Tripod_Obscuration_Corrections	Table listing the 16 Telescope Tripod Obscuration corrections. See Table 6-35 for structure definition		List of 16 Structures	128
Radiometric_Gain_Mie	Radiometric gain factor for the Mie signal.	ACCD pixel count /electron	FAdoxy	8
Radiometric_Gain_Rayleigh	Radiometric gain factor for the Rayleigh signal.	ACCD pixel count/electron	FAdoxy	8
Mie_Time_In_Memory_Zone	Time duration the signal remains in the memory zone for the Mie.	s	FAdoxy	8
Rayleigh_Time_In_Memory_Zone	Time duration the signal remains in the memory zone for the Rayleigh.	s	FAdoxy	8
Total size for binary structure in bytes:			224	

Table 6-32 Level 1B Calibration & Characterisation Data Hbe_Characetrisation_Data Content Description

Tag Name	Content Description	Unit	Type	Size
NF_Order	Number of Fourier terms used in the Harmonic Bias Estimation (NF). The A and B coefficient lists for both Mie and Rayleigh below must be NF_Order+1 elements in size.		IntAul	4
List_of_Mie_Harmonic_Bias_Coefficient_As	See Table 6-36 for structure definition. It should include at least NF+1 elements. NF represents the number of Fourier terms. The maximum size NF+1 of this array is 1024.		List of NF+1 Structures (0< NF+1 <1024)	8192 (16)
List_of_Mie_Harmonic_Bias_Coefficient_Bs	See Table 6-37 for structure definition. It should include at least NF+1 elements. NF represents the number of Fourier terms. The maximum size NF+1 of this array is 1024. Note that the first B coefficient in this array (i.e. b_0) is not used by the L1bP. This is done so that the A and B coefficient arrays are both the same size. Only the last NF coefficients are used in the B coefficient array (for A, all NF+1 coefficients are used).		List of NF+1 Structures (0< NF+1 <1024)	8192 (16)
List_of_Ray_Harmonic_Bias_Coefficient_As	See Table 6-36 for structure definition. It should include at least NF+1 elements. NF represents the number of Fourier terms. The maximum size NF+1 of this array is 1024.		List of NF+1 Structures (0< NF+1 <1024)	8192 (16)
List_of_Ray_Harmonic_Bias_Coefficient_Bs	See Table 6-37 for structure definition. It should include at least NF+1 elements. NF represents the number of Fourier terms. The maximum size NF+1 of this array is 1024. Note that the first B coefficient in this array (i.e. b_0) is not used by the L1bP. This is done so that the A and B coefficient arrays are both the same size. Only the last NF coefficients are used in the B coefficient array (for A, all NF+1 coefficients are used).		List of NF+1 Structures (0< NF+1 <1024)	8192 (16)
Total size for binary structure in bytes:			32772 (68)	

Table 6-33 Level 1B Calibration & Characterisation Data Rdb_Characterisation_Data Content Description

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Slope_OffNadir	Bias for the off-nadir Rayleigh measurements.	MHz/km	FAdoxy	8
Mie_Slope_OffNadir	Bias for the off-nadir Mie measurements.	MHz/km	FAdoxy	8

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Slope_Nadir	Bias for the nadir Rayleigh measurements.	MHz/km	FAdoxy	8
Mie_Slope_Nadir	Bias for the nadir Mie measurements.	MHz/km	FAdoxy	8
Zero_Reference_Range_OffNadir	Reference range with 0 MHz bias for off-nadir pointing measurements.	km	FAdoxy	8
Zero_Reference_Range_Nadir	Reference range with 0 MHz bias for nadir pointing measurements.	km	FAdoxy	8
Total size for binary structure in bytes:				48

Table 6-34 Level 1B Calibration & Characterisation Data Error_Quantifiers Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Error_Quantifier_K1	Mie error quantifier K1		FAdoxy	8
Mie_Error_Quantifier_K2	Mie error quantifier K2		FAdoxy	8
Mie_Error_Quantifier_K3	Mie error quantifier K3		FAdoxy	8
Rayleigh_Error_Quantifier_Ka2	Rayleigh error quantifier Ka2		FAdoxy	8
Rayleigh_Error_Quantifier_Ka3	Rayleigh error quantifier Ka3		FAdoxy	8
Rayleigh_Error_Quantifier_Kb2	Rayleigh error quantifier Kb2		FAdoxy	8
Rayleigh_Error_Quantifier_Kb3	Rayleigh error quantifier Kb3		FAdoxy	8
Total size for binary structure in bytes:				56

Table 6-35 Level 1B Calibration & Characterisation Data List_of_Tripod_Obscuration_Correction Content Description

Tag Name	Content Description	Unit	Type	Size
Tripod_Obscuration_Correction	Telescope Tripod Obscuration correction for one column.		FAdoxy	8

Table 6-36 Level 1B Calibration & Characterisation Data List_of_Mie/Rayleigh_Harmonic_Bias_Coefficient_As

Tag Name	Content Description	Unit	Type	Size
Harmonic_Bias_Coefficient_A	One element of vector A as described in Section 14.5 of A-4.		FAdoxy	8

Table 6-37 Level 1B Calibration & Characterisation Data List_of_Mie/Rayleigh_Harmonic_Bias_Coefficient_Bs

Tag Name	Content Description	Unit	Type	Size
Harmonic_Bias_Coefficient_B	One element of vector B as described in Section 14.5 of A-4.		FAdoxy	8

Table 6-38 Level 1B Calibration & Characterisation Data Mie_Response_Calibration_Data Content Description

Tag Name	Content Description	Unit	Type	Size
Calibration_Valid	TRUE = Mie Response Calibration is valid. Based on acceptable ranges of calibration results for measurement and reference pulse; and the number of valid frequencies.		Boolean	1
Num_Mie_Results	Number of Mie frequency step results.		IntAus	2
List_of_Mie_Frequency_Step_Results	List of channel response per frequency step. See Table 6-40 for structure definition.		List of N_Steps structures	3000
Mie_Measurement_Response_Calibration	See Table 6-46for structure definition.		Structure	32
Mie_Reference_Pulse_Response_Calibration	See Table 6-49 for structure definition.		Structure	32
Measurement_Calibration_Validity	See Table 6-51 for structure definition.		Structure	4
Reference_Pulse_Calibration_Validity	See Table 6-53for structure definition.		Structure	4
Total size for binary structure in bytes:				3075

Table 6-39 Level 1B Calibration & Characterisation Data Rayleigh_Response_Calibration_Data Content Description

Tag Name	Content Description	Unit	Type	Size
Calibration_Valid	TRUE = Rayleigh Response Calibration is valid. Based on acceptable ranges of calibration results for measurement and reference pulse; and the number of valid frequencies.		Boolean	1
Ground_Calibration_Valid	TRUE = Rayleigh Response Ground Calibration is valid. Based on acceptable ranges of calibration results for measurement and reference pulse; and the number of valid frequencies.		Boolean	1
Num_Rayleigh_Results	Number of Rayleigh frequency step results.		IntAus	2
Num_Rayleigh_Ground_Results	Number of Rayleigh ground frequency step results.		IntAus	2
List_of_Rayleigh_Frequency_Step_Results	List of channel response per frequency step. See Table 6-42 for structure definition.		List of N_Steps structures	3880
Num_Fit_Coefficients	Number of polynomial fit coefficients		IntAus	2
Rayleigh_Measurement_Response_Calibration	See Table 6-47 for structure definition.		Structure	80
Rayleigh_Ground_Measurement_Response_Calibration	See Table 6-48 for structure definition.		Structure	80
Rayleigh_Reference_Pulse_Response_Calibration	See Table 6-50 for structure definition.		Structure	80
Measurement_Calibration_Validity	See Table 6-51 for structure definition.		Structure	4
Ground_Measurement_Calibration_Validity	See Table 6-52 for structure definition.		Structure	4
Reference_Pulse_Calibration_Validity	See Table 6-53 for structure definition.		Structure	4
Total size for binary structure in bytes:				4140

Table 6-40 Level 1B Calibration &Characterization Data List_of_Mie_Frequency_Step Results

Tag Name	Content Description	Unit	Type	Size
Mie_Frequency_Step_Result	See Table 6-41 for structure definition.		Structure	75

Table 6-41 Level 1B Calibration & Characterisation Data Mie_Frequency_Step_Result Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Offset	Frequency offset	GHz	FAdoxy	8
Frequency_Valid	TRUE = Satisfied minimum number of valid measurements per frequency step.		Boolean	1
Measurement_Response_Valid	TRUE = Measurement response is valid		Boolean	1
Reference_Pulse_Response_Valid	TRUE = Reference pulse channel response is valid		Boolean	1
Measurement_Response	Measurement channel response	ACCD pixel index	FAdoxy	8
Measurement_Error_Mie_Response	Measurement Error_Mie_Response	ACCD pixel	FAdoxy	8
Reference_Pulse_Response	Reference pulse channel response	ACCD pixel index	FAdoxy	8
Reference_Pulse_Error_Mie_Response	Reference pulse Error_Mie_Response	ACCD pixel	FAdoxy	8
Mie_Frequency_Step_Data_Statistics	Frequency step product confidence data. See Table 6-44 for structure definition.		Structure	32
Total size for binary structure in bytes:				75

Table 6-42 Level 1B Calibration & Characterization Data List_of_Rayleigh_Frequency_Step_Results

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Frequency_Step_Result	See Table 6-43 for structure definition.		Structure	97

Table 6-43 Level 1B Calibration & Characterisation Data Rayleigh_Frequency_Step_Results Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Offset	Frequency offset	GHz	FAdoxy	8
Frequency_Valid	TRUE = Satisfied minimum number of valid measurements per frequency step.		Boolean	1
Ground_Frequency_Valid	TRUE = Satisfied minimum number of valid ground measurements per frequency step.		Boolean	1
Measurement_Response_Valid	TRUE = Measurement response is valid		Boolean	1
Ground_Measurement_Response_Valid	TRUE = Ground measurement response is valid		Boolean	1
Reference_Pulse_Response_Valid	TRUE = Reference pulse channel response is valid		Boolean	1
Measurement_Response	Measurement channel response	ACCD pixel index	FAdoxy	8
Measurement_Error_Rayleigh_Response	Measurement Error Rayleigh Response	ACCD pixel index	FAdoxy	8
Ground_Measurement_Response	Ground measurement channel response	ACCD pixel index	FAdoxy	8
Ground_Measurement_Error_Rayleigh_Response	Ground measurement Error_Rayleigh_Response	ACCD pixel index	FAdoxy	8
Reference_Pulse_Response	Reference pulse channel response	ACCD pixel index	FAdoxy	8
Reference_Pulse_Error_Rayleigh_Response	Reference pulse Error_Rayleigh_Response	ACCD pixel index	FAdoxy	8
Rayleigh_Frequency_Step_Data_Statistics	Frequency step product confidence data. See Table 6-45 for structure definition.		Structure	36
Total size for binary structure in bytes:				97

Table 6-44 Level 1B Calibration & Characterisation Data Mie_Frequency_Step_Data_Statistics Content Description

Tag Name	Content Description	Unit	Type	Size
Num_Valid_Measurements	A measurement is a valid measurement if it is usable, see Num_Measurements_Usable, and at least one ground echo bin was detected.		IntAl	4
Num_Measurements_Usable	Number of measurements usable. The measurement is usable if the spacecraft attitude is on target; the number of corresponding valid pulses is over		IntAl	4

Tag Name	Content Description	Unit	Type	Size
	Meas_Cavity_Lock_Status_Thresh, Mie measurement is not corrupted, and measurement data was acquired after laser frequency has settled.			
Num_Reference_Pulses_Usable	Number reference pulses usable. Reference pulse is usable when the pulse is valid, the data is not corrupted, and pulse data was acquired for a measurement after laser frequency has settled.		IntAl	4
Num_Measurement_Invalid	Number of measurements that are not counted for Num_Valid_Measurements AND not counted for Num_Measurements_Usable.		IntAl	4
Num_Pulse_Validity_Status_Flag_False	Number of reference pulses with Pulse_Validity_Status_Flag Table 5-18 set to false of all valid measurements (measurements where Measurement_Valid Table 5-16 set to true) that contain only pulses with a frequency offset of the current frequency step.		IntAl	4
Num_Sat_Not_on_Target_Measurements	Number of measurements with satellite not on target status.		IntAl	4
Num_Corrupt_Measurement_Bins	Total number of corrupt measurement bins.		IntAl	4
Num_Corrupt_Reference_Pulses	Total number of corrupt reference pulses		IntAl	4
Total size for binary structure in bytes:				32

Table 6-45 Level 1B Calibration & Characterisation Data Rayleigh_Frequency_Step_Data_Statistics Content Description

Tag Name	Content Description	Unit	Type	Size
Num_Valid_Measurements	A measurement is a valid measurement if it is usable, see Num_Measurements_Usable, the number of atmospheric height bins within the specified range is not 0, all range bins in the specified range are valid, and at least 1 corresponding reference pulse is valid.		IntAl	4
Num_Measurements_Usable	Number of measurements usable. The measurement is usable if the spacecraft attitude is on target; the number of corresponding valid pulses is over Meas_Cavity_Lock_Status_Thresh, Mie measurement is not corrupted, and measurement data was acquired after laser frequency has settled.		IntAl	4
Num_Measurements_Valid_Ground	Number of measurements of frequency step for which valid ground bins where identified.		IntAl	4
Num_Reference_Pulses_Usable	Number reference pulses usable. Reference pulse is usable when the pulse is valid, the data is not corrupted, and pulse data was acquired for a measurement after laser frequency has settled.		IntAl	4

Tag Name	Content Description	Unit	Type	Size
Num_Measurement_Invalid	Number of measurements that are not counted for Num_Valid_Measurements AND not counted for Num_Measurements_Usable.		IntAl	4
Num_Pulse_Validity_Status_Flag_False	Number of reference pulses with Pulse_Validity_Status_Flag Table 5-18 set to false of all valid measurements (measurements where Measurement_Valid Table 5-16 set to true) that contain only pulses with a frequency offset of the current frequency step.		IntAl	4
Num_Sat_Not_on_Target_Measurements	Number of measurements with satellite not on target status.		IntAl	4
Num_Corrupt_Measurement-Bins	Total number of corrupt measurement bins.		IntAl	4
Num_Corrupt_Reference_Pulses	Total number of corrupt reference pulses		IntAl	4
Total size for binary structure in bytes:				36

Table 6-46 Level 1B Calibration & Characterisation Data Mie_Measurement_Response_Calibration Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Mean_Sensitivity	Measurement mean sensitivity (slope of the best straight line of channel response)	ACCD pixel/ GHz	FAdoxy	8
Measurement_Zero_Frequency	Measurement zero frequency response (intercept of the best straight line of channel response)	ACCD pixel index	FAdoxy	8
Measurement_Error_Mie_Response_Std_Dev	Measurement Error_Mie_Response standard deviation		FAdoxy	8
Measurement_Offset_Frequency	Measurement zero response frequency (x-intercept of the best straight line of channel response)	GHz	FAdoxy	8
Total size for binary structure in bytes:				32

Table 6-47 Level 1B Calibration & Characterisation Data Rayleigh_Measurement_Response_Calibration Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Mean_Sensitivity	Measurement mean sensitivity (slope of the best straight line of channel response)	ACCD pixel index/ GHz	FAdoxy	8
Measurement_Zero_Frequency	Measurement zero frequency response (intercept of the best straight line of channel response)	ACCD pixel index	FAdoxy	8
Measurement_Error_Rayleigh_Response_Std_Dev	Measurement Error_Rayleigh_Response standard deviation		FAdoxy	8
Measurement_Offset_Frequency	Measurement zero response frequency (x-intercept of the best straight line of channel response)	GHz	FAdoxy	8
List_of_Measurement_Error_Fit_Coefficients	Fit coefficients of the polynimoal fit of the measurement response errors, see Table 6-54 for structure definition.		List of 6 structures	48
Total size for binary structure in bytes:				80

Table 6-48 Level 1B Calibration & Characterisation Data Rayleigh_Ground_Measurement_Response_Calibration Content Description

Tag Name	Content Description	Unit	Type	Size
Ground_Measurement_Mean_Sensitivity	Ground measurement mean sensitivity (slope of the best straight line of channel response)	ACCD pixel index/ GHz	FAdoxy	8
Ground_Measurement_Zero_Frequency	Ground measurement zero frequency response (intercept of the best straight line of channel response)	ACCD pixel index	FAdoxy	8
Ground_Measurement_Error_Rayleigh_Response_Std_Dev	Ground measurement Error_Rayleigh_Response standard deviation		FAdoxy	8
Ground_Measurement_Offset_Frequency	Ground measurement zero response frequency (x-intercept of the best straight line of channel response)	GHz	FAdoxy	8
List_of_Ground_Measurement_Error_Fit_Coefficients	Fit coefficients of the polynimoal fit of the ground measurement response errors, see Table 6-55 for structure definition.		List of 6 structures	48
Total size for binary structure in bytes:				80

Table 6-49 Level 1B Calibration & Characterisation Data Mie_Reference_Pulse_Response_Calibration Content Description

Tag Name	Content Description	Unit	Type	Size
Reference_Pulse_Mean_Sensitivity	Reference pulse mean sensitivity (slope of the best straight line of channel response)	ACCD pixel/ GHz	FAdoxy	8
Reference_Pulse_Zero_Frequency	Reference pulse zero frequency response(intercept of the best straight line of channel response)	ACCD pixel index	FAdoxy	8
Reference_Pulse_Error_Mie_Response_Std_Dev	Reference pulse Error_Mie_Response standard deviation.		FAdoxy	8
Reference_Pulse_Offset_Frequency	Reference pulse zero response frequency (x-intercept of the best straight line of channel response)	GHz	FAdoxy	8
Total size for binary structure in bytes:				80

Table 6-50 Level 1B Calibration & Characterisation Data Rayleigh_Reference_Pulse_Response_Calibration Content Description

Tag Name	Content Description	Unit	Type	Size
Reference_Pulse_Mean_Sensitivity	Reference pulse mean sensitivity (slope of the best straight line of channel response)	ACCD pixel index/ GHz	FAdoxy	8
Reference_Pulse_Zero_Frequency	Reference pulse zero frequency response (intercept of the best straight line of channel response)	ACCD pixel index	FAdoxy	8
Reference_Pulse_Error_Rayleigh_Response_Std_Dev	Reference pulse Error_Rayleigh_ Response standard deviation.		FAdoxy	8
Reference_Pulse_Offset_Frequency	Reference pulse zero response frequency (x-intercept of the best straight line of channel response)	GHz	FAdoxy	8
List_of_Reference_Pulse_Error_Fit_Coefficients	Fit coefficients of the polynimoal fit of the reference pulse response errors, see Table 6-56 for structure definition.		List of 6 structures	48
Total size for binary structure in bytes:				80

Table 6-51 Level 1B Calibration & Characterisation Data Measurement_Calibration_Validity Content Description

Tag Name	Content Description	Unit	Type	Size
Mean_Sensitivity_Valid	TRUE = Mean sensitivity within threshold range		Boolean	1
Error_Response_Std_Dev_Valid	TRUE = Error Response standard deviation within threshold range		Boolean	1
Zero_Freq_Response_Valid	TRUE = Zero frequency response within threshold range		Boolean	1
Data_Monotonic	TRUE = measurement data is monotonic		Boolean	1
Total size for binary structure in bytes:				4

Table 6-52 Level 1B Calibration & Characterisation Data Ground_Measurement_Calibration_Validity Content Description

Tag Name	Content Description	Unit	Type	Size
Mean_Sensitivity_Valid	TRUE = Mean sensitivity within threshold range		Boolean	1
Error_Response_Std_Dev_Valid	TRUE = Error Response standard deviation within threshold range		Boolean	1
Zero_Freq_Response_Valid	TRUE = Zero frequency response within threshold range		Boolean	1
Data_Monotonic	TRUE = measurement data is monotonic		Boolean	1
Total size for binary structure in bytes:				4

Table 6-53 Level 1B Calibration & Characterisation Data Reference_Pulse_Calibration_Validity Content Description

Tag Name	Content Description	Unit	Type	Size
Mean_Sensitivity_Valid	TRUE = Mean sensitivity within threshold range		Boolean	1
Error_Response_Std_Dev_Valid	TRUE = Error Response standard deviation within threshold range		Boolean	1
Zero_Freq_Response_Valid	TRUE = Zero frequency response within threshold range		Boolean	1
Data_Monotonic	TRUE = reference pulse data is monotonic		Boolean	1
Total size for binary structure in bytes:				4

Table 6-54 Level 1B Calibration & Characterization Data List_of_Measurement_Error_Fit_Coefficient Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Error_Fit_Coefficients	One fit coefficient of the polynomial fit of the measurement response errors.		FAdoxy	8
Total size for binary structure in bytes:				8

Table 6-55 Level 1B Calibration & Characterization Data List_of_Ground_Measurement_Error_Fit_Coefficient Content Description

Tag Name	Content Description	Unit	Type	Size
Ground_Measurement_Error_Fit_Coefficients	One fit coefficient of the polynomial fit of the ground measurement response errors.		FAdoxy	8
Total size for binary structure in bytes:				8

Table 6-56 Level 1B Calibration & Characterization Data List_of_Reference_Pulse_Error_Fit_Coefficient Content Description

Tag Name	Content Description	Unit	Type	Size
Reference_Pulse_Error_Fit_Coefficients	One fit coefficient of the polynomial fit of the reference pulse response errors.		FAdoxy	8
Total size for binary structure in bytes:				8

Table 6-57 Level 1B Calibration & Characterization Data Mie_Fitted_Non_Linearities Content Description

Tag Name	Content Description	Unit	Type	Size
Use_Fitted_Non_Linearities	TRUE=data has been use for the Mie wind processing		Boolean	1
Num_Sampling_Points_Internal_Reference	Number of sampling points for the Mie non-linearities for the internal path.		IntAus	2
Num_Sampling_Points_Atmosphere	Number of sampling points for the Mie non-linearities for the atmospheric path.		IntAus	2
Pixel_Positions_Internal_Reference	Num_Sampling_Points_Internal_Reference values of ACCD pixel positions. (For size calculations Num_Sampling_Points_Internal_Reference = 64 has been used.)	ACCD pixel index	Num_Sampling_Points_Internal_Reference* FAdoxy	512

Fitted_Reference_Pulse_Error_Mie_Response	Num_Sampling_Points_Internal_Reference values of ACCD pixel offsets from the linear fit of the internal reference responses. (For size calculations Num_Sampling_Points_Internal_Reference = 64 has been used.)	ACCD pixel	Num_Sampling_Points_Internal_Reference* FAdoxy	512
Pixel_Positions_Atmospheric_Path	Num_Sampling_Points_Atmosphere values of ACCD pixel positions. (For size calculations Num_Sampling_Points_Atmosphere = 61 has been used.)	ACCD pixel index	Num_Sampling_Points_Atmosphere * FAdoxy	488
Fitted_Measurement_Error_Mie_Response	Num_Sampling_Points_Atmosphere values of ACCD pixel offsets from the linear fit of the atmospheric responses. (For size calculations Num_Sampling_Points_Atmosphere = 61 has been used.)	ACCD pixel	Num_Sampling_Points_Atmosphere * FAdoxy	488
Total size for binary structure in bytes:				2005

Table 6-58 Level 1B Calibration & Characterization Data Mie_SR_Retrieval_Parameters Content Description

Tag Name	Content Description	Unit	Type	Size
Alpha_Correction	Correction factor for the calculation of the Mie SNR.		FAdoxy	8
Summation_Index	Summation index for calculation of SNR and backscatter ratio.		IntAus	2
SR_Cubic_A_x3	Coefficient for x^3 in cubic correction of refined SR calculation.		FAdoxy	8
SR_Cubic_B_x2	Coefficient for x^2 in cubic correction of refined SR calculation.		FAdoxy	8
SR_Cubic_C_x1	Coefficient for x^1 in cubic correction of refined SR calculation.		FAdoxy	8
SR_Cubic_D_x0	Coefficient for x^0 in cubic correction of refined SR calculation.		FAdoxy	8
Total size for XML structure in bytes:				42

6.3.7 Useful Signal MDS

The Useful Signal MDS contains the signal amplitude of the Mie and Rayleigh channel measurement data. For each channel, the useful signal is reported for each altitude bin for each measurement and for the observation. Each DSR contains useful signals for one BRC.

Table 6-59 Level 1B Useful Signal MDSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_of_Observation_Time	Satellite time at start of BRC (UTC)		DateTime	12
Observation_Useful_Signals	Collection of useful signal strength for the observation. See Table 6-60 for structure definition		Structure	650
Measurement_Useful_Signal	List of useful signal strength collection for each measurement. The size of this list is N_Max. (See L1B SPH for N_Max). Table 6-61 for structure definition		List of N_Max (<=30) Structures	19500
Total size for binary MDSR in bytes:				20162

Table 6-60 Level 1B Useful Signal Observation_Useful_Signals Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Altitude_Bin_Useful_Signal_Info	List of useful signal strength information for each Mie altitude bin. See Table 6-62 for structure definition. There are 25 structures, for 25 rows representing 24 atmospheric layers and one background radiation sample.		List of 25 Structures	225
Rayleigh_Altitude_Bin_Useful_Signal_Info	List of useful signal strength information for each Rayleigh altitude bins. See Table 6-63for structure definition. There are 25 structures, for 25 rows representing 24 atmospheric layers and one background radiation sample.		List of 25 Structures	425
Total size for binary structure in bytes				650

Table 6-61 Level 1B Useful Signal Measurement_Useful_Signals Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Altitude_Bin_Useful_Signal_Info	List of useful signal strength for each Mie altitude bin. See Table 6-62 for structure definition. There are 25 structures, for 25 rows representing 24 atmospheric layers and one background radiation sample.		List of 25 Structures	225
Rayleigh_Altitude_Bin_Useful_Signal_Info	List of useful signal strength for each Rayleigh altitude bins. See Table 6-63 for structure definition. There are 25 structures, for 25 rows representing 24 atmospheric layers and one background radiation sample.		List of 25 Structures	425
Total size for binary structure in bytes:				650

Table 6-62 Level 1B Useful Signal Mie_Altitude_Bin_Useful_Signal_Info Content Description

Tag Name	Content Description	Unit	Type	Size
Data_Quality_Flag	This field is a 1 byte, bit-packed field, where the first 4 bits represent the bin-level validity information, and the next 4 bits are the measurement-level validity information. When the data is valid, this field will be 0. Bit 1: Overall validity. Data invalid 1, otherwise 0 Bit 2: Set to 1 if signal-to-noise below SNR_Threshold, default 0. For the background row Bit 2 is always set to 0. Bit 3: Data saturation found 1, otherwise 0 Bit 4: Data spike found 1, otherwise 0 Bit 5: Measurement-level validity spare. Default 0 Bit 6: Source packet invalid 1, otherwise 0 Bit 7: Number of corresponding valid pulses is below Meas_Cavity_Lock_Status_Thresh 1, otherwise 0 Bit 8: Spacecraft attitude not on target 1, otherwise 0		IntAuc	1
Useful_Signal	Useful signal strength for a Mie altitude bin. If the Data_Quality_Flag is non-zero (data invalid), the useful signal value is set to 0. Useful signal strength for a Mie altitude bin as in R-2, Section 15, with the corrections up to Equation 82 applied.	ACCD counts	FAdoxy	8
Total size for binary structure in bytes:				9

Table 6-63 Level 1B Useful Signal Rayleigh_Altitude_Bin_Useful_Signal_Info Content Description

Tag Name	Content Description	Unit	Type	Size
Data_Quality_Flag	This field is a 1 byte, bit-packed field, where the first 4 bits represent the bin-level validity information, and the next 4 bits are the measurement-level validity information. When the data is valid, this field will be 0. Bit 1: Overall validity. Data invalid 1, otherwise 0 Bit 2: Set to 1 if signal-to-noise below SNR_Threshold, default 0. For the background row Bit 2 is always set to 0. Bit 3: Data saturation found 1, otherwise 0 Bit 4: Data spike found 1, otherwise 0 Bit 5: Measurement-level validity spare. Default 0 Bit 6: Source packet invalid 1, otherwise 0 Bit 7: Number of corresponding valid pulses is below Meas_Cavity_Lock_Status_Thresh 1, otherwise 0 Bit 8: Spacecraft attitude not on target 1, otherwise 0		IntAuc	1

Tag Name	Content Description	Unit	Type	Size
Useful_Signal_Channel_A	Useful signal strength for a Rayleigh altitude bin. If the Data_Quality_Flag is non-zero (data invalid), the useful signal value is set to 0. On observation level as in R-2, Section 16.3, with corrections up to equation 103 applied. On measurement level as in R-2, Section 16.3, with the corrections up to equation 101 applied.	ACCD counts	FAdoxy	8
Useful_Signal_Channel_B	Useful signal strength for a Rayleigh altitude bin. If the Data_Quality_Flag is non-zero (data invalid), the useful signal value is set to 0. On observation level as in R-2, Section 16.3, with corrections up to equation 103 applied. On measurement level as in R-2, Section 16.3, with the corrections up to equation 101 applied.	ACCD counts	FAdoxy	8
Total size for binary structure in bytes:				17

6.3.8 Wind Velocity MDS

The Wind Velocity MDS contains the calculated HLOS winds from both the Mie and Rayleigh channel for each vertical profile bin and for each measurement in the BRC. This MDS also contains the vertical profile winds for the overall observation. Each DSR contains wind information for one BRC.

Table 6-64 Level 1B Wind Velocity MDSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_of_Observation_Time	Satellite time at start of BRC (UTC)		DateTime	12
Line_Of_Sight_Wind_Flag	Flag indicating whether horizontal or line-of-sight wind is used. This enum uses the two 1 byte numerical values “0”, and “1”. A “1” value indicates that the line of sight wind velocity is computed, and a “0” value indicates that horizontal wind velocity is computed.		Enum	1
Observation_Wind_Profile	Observation wind profile See **Table 6-65** for structure definition		Structure	482
List_of_Measurement_Wind_Profiles	List of measurement wind profiles. The size of this list is N_Max. (See L1B SPH for N_Max). See **Table 6-66** for structure definition		List of N_Max (<=30) Structures	15060
Total size for binary MDSR in bytes:				15555

Table 6-65 Level 1B Wind Velocity Observation_Wind_Profile Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Reference_Pulse_Quality_Flag	Mie internal reference quality flag. This field is a 8-bit long, bit-packed field, of reference pulse validity information. When the data is valid, this field will be 0. Bit 1: Overall validity. Data invalid 1, otherwise 0 Bit 2: For Mie, peak not found 1, otherwise 0. For Rayleigh, this is always 0. Bit 3: All reference pulses corresponding to the current observation eliminated (source packet invalid, data corruption, or pulse invalid) 1, otherwise 0 Bit 4: Default 0 Bit 5: Default 0 Bit 6: Default 0 Bit 7: Default 0 Bit 8: Default 0		IntAuc	1
Rayleigh_Reference_Pulse_Quality_Flag	Rayleigh internal reference quality flag. This field is a 8-bit long, bit-packed field, of reference pulse validity information. When the data is valid, this field will be 0. Bit 1: Overall validity. Data invalid 1, otherwise 0 Bit 2: For Rayleigh, Rayleigh response not found 1, otherwise 0 Bit 3: All reference pulses corresponding to the current observation eliminated (source packet invalid, data corruption, orpulse invalid) 1, otherwise 0 Bit 4: Polynomial root selction in Newton iteration did not succeed 1, otherwise 0 Bit 5: Default 0 Bit 6: Default 0 Bit 7: Default 0 Bit 8: Default 0		IntAuc	1
List_of_Mie_Altitude_Bin_Wind_Infos	List of Mie altitude bin wind velocity information for each altitude. See **Table 6-67** for structure definition		List of 24 Structures	240
List_of_Rayleigh_Altitude_Bin_Wind_Infos	List of Rayleigh altitude bin wind velocity information for each altitude. See **Table 6-67** for structure definition		List of 24 Structures	240
Total size for binary structure in bytes				482

Table 6-66 Level 1B Wind Velocity Measurement_Wind_Profile Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Reference_Pulse_Quality_Flag	Mie internal reference quality flag. This field is a 8-bit long, bit-packed field, of reference pulse validity information. When the data is valid, this field will be 0. Bit 1: Overall validity. Data invalid 1, otherwise 0 Bit 2: For Mie, peak not found 1, otherwise 0. For Rayleigh, this is always 0 Bit 3: All reference pulses corresponding to the current measurement eliminated (source packet invalid, data corruption, or pulse invalid) 1, otherwise 0 Bit 4: Default 0 Bit 5: Default 0 Bit 6: Default 0 Bit 7: Default 0 Bit 8: Default 0		IntAuc	1
Rayleigh_Reference_Pulse_Quality_Flag	Rayleigh internal reference quality flag. This field is a 8-bit long, bit-packed field, of reference pulse validity information. When the data is valid, this field will be 0 (00000000). Bit 1: Overall validity. Data invalid 1, otherwise 0. Bit 2: For Rayleigh, Rayleigh response not found 1, otherwise 0 Bit 3: All reference pulses corresponding to the current measurement eliminated (source packet invalid, data corruption, or pulse invalid) 1, otherwise 0. Bit 4: Default 0 Bit 5: Default 0 Bit 6: Default 0 Bit 7: Default 0 Bit 8: Default 0		IntAuc	1
List_of_Mie_Altitude_Bin_Wind_Infos	List of Mie altitude bin wind velocity information for each altitude. See **Table 6-67** for structure definition		List of 24 Structures	240

Tag Name	Content Description	Unit	Type	Size
Mie_Ground_Quality_Flag	This field is a 2 byte, bit-packed field, where the first 4 bits contain bin-level validity information, and the next 4 bits measurement-level validity information, where bits 1 to 4 and 6 to 8 are a logical OR of copies of the useful signal Data_Quality_Flag of all ground bins. Bit 9 to 12 provide bin signal processing validity flags. When the data is valid, this field will be 0. Bit 1: Overall validity. Data invalid 1, otherwise 0 Bit 2: Set to 1 if signal-to-noise below SNR_Threshold, default 0 Bit 3: Data saturation found 1, otherwise 0 Bit 4: Data spike found 1, otherwise 0 Bit 5: Reference pulse invalid 1, otherwise 0 Bit 6: Source packet invalid 1, otherwise 0 Bit 7: Number of corresponding valid pulses is below Meas_Cavity_Lock_Status_Thresh 1, otherwise 0 Bit 8: Spacecraft attitude not on target 1, otherwise 0 Bit 9: For Mie, peak not found 1, otherwise 0. For Rayleigh, rayleigh response not found 1, otherwise 0 Bit 10: Set to 1 if the absolute wind velocity above Wind_Velocity_Threshold, default 0 Bit 11: For Rayleigh set to 1 if polynomial fit of errors responses was used but no valid root of the polynomial was found, otherwise 0. For Mie: spare, set to 0. Bit 12: No ground bin was detected in measurement , otherwise 0. Bit 13 to Bit 16: spare, set to 0.		IntAus	2
Mie_Ground_Wind_Velocity	LOS wind velocity for the accumulated signal of all ground bins. LOS value will be positive for a wind direction away from the spacecraft and negative for a wind toward the spacecraft.	m/s	FAdoxy	8
List_of_Rayleigh_Altitude_Bin_Wind_Infos	List of Rayleigh altitude bin wind velocity information for each altitude. See Table 6-67 for structure definition		List of 24 Structures	240

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Ground_Quality_Flag	This field is a 2 byte, bit-packed field, where the first 4 bits contain bin-level validity information, and the next 4 bits measurement-level validity information, where bits 1 to 4 and 6 to 8 are a logical OR of copies of the useful signal Data_Quality_Flag of all ground bins. Bit 9 to 12 provide bin signal processing validity flags. When the data is valid, this field will be 0. Bit 1: Overall validity. Data invalid 1, otherwise 0 Bit 2: Set to 1 if signal-to-noise below SNR_Threshold, default 0 Bit 3: Data saturation found 1, otherwise 0 Bit 4: Data spike found 1, otherwise 0 Bit 5: Reference pulse invalid 1, otherwise 0 Bit 6: Source packet invalid 1, otherwise 0 Bit 7: Number of corresponding valid pulses is below Meas_Cavity_Lock_Status_Thresh 1, otherwise 0 Bit 8: Spacecraft attitude not on target 1, otherwise 0 Bit 9: For Mie, peak not found 1, otherwise 0. For Rayleigh, rayleigh response not found 1, otherwise 0 Bit 10: Set to 1 if the absolute wind velocity above Wind_Velocity_Threshold, default 0 Bit 11: For Rayleigh set to 1 if polynomial fit of errors responses was used but no valid root of the polynomial was found, otherwise 0. For Mie: spare, set to 0. Bit 12: No ground bin was detected in measurement, , otherwise 0. Bit 13 to Bit 16: spare, set to 0.		IntAus	2
Rayleigh_Ground_Wind_Velocity	LOS wind velocity for the accumulated signal of all ground bins. LOS value will be positive for a wind direction away from the spacecraft and negative for a wind toward the spacecraft.	m/s	FAdoxy	8
Total size for binary structure in bytes:				502

Table 6-67 Level 1B Wind Velocity
Mie_Altitude_Bin_Wind_Info Content Description

Tag Name	Content Description	Unit	Type	Size
Bin_Quality_Flag	This field is a 2 byte, bit-packed field, where the first 4 bits represent contain the bin-level validity information, the next 4 bits are measurement-level validity information, and bits 9 to 16 provide bin signal processing validity flags. When the data is valid, this field will be 0. Bit 1: Overall validity. Data invalid 1, otherwise 0 Bit 2: Set to 1 if signal-to-noise below SNR_Threshold, default 0 Bit 3: Data saturation found 1, otherwise 0 Bit 4: Data spike found 1, otherwise 0 Bit 5: Reference pulse invalid 1, otherwise 0 Bit 6: Source packet invalid 1, otherwise 0 Bit 7: Number of corresponding valid pulses is below Meas_Cavity_Lock_Status_Thresh 1, otherwise 0 Bit 8: Spacecraft attitude not on target 1, otherwise 0 Bit 9: For Mie, peak not found 1, otherwise 0. For Rayleigh, rayleigh response not found 1, otherwise 0 Bit 10: Set to 1 if the absolute wind velocity above Wind_Velocity_Threshold, default 0 Bit 11: Spare, set to 0. Bit 12: Bin was detected as ground bin, otherwise 0. Bit 13: Bin was ground bin canidate but the thickness above DEM threshold was not met. Bit 14: Bin was ground bin candidate but useful signal threshold on sum of all ground bin candidates was not met. Bit 15: Bin was ground bin candidate but peak shift threshold on output peak location of MieCore applied to signal sum of all ground bin candidates was not met. Bit 16: Bin was ground bin candidate but FWHM threshold on output FWHM of MieCore applied to signal sum of all ground bin candidates was not met.		IntAus	2
Wind_Velocity	Wind velocity at the altitude bin. Value will be positive for a wind direction away from the spacecraft and negative for a wind toward the spacecraft.	m/s	FAdoxy	8
Total size for binary structure in bytes:				10

Table 6-68 Level 1B Wind Velocity Rayleigh_Altitude_Bin_Wind_Info Content Description

Tag Name	Content Description	Unit	Type	Size
Bin_Quality_Flag	This field is a 2 byte, bit-packed field, where the first 4 bits represent contain the bin-level validity information, the next 4 bits are measurement-level validity information, and bits 9 to 16 provide bin signal processing validity flags. When the data is valid, this field will be 0. Bit 1: Overall validity. Data invalid 1, otherwise 0 Bit 2: Set to 1 if signal-to-noise below SNR_Threshold, default 0 Bit 3: Data saturation found 1, otherwise 0 Bit 4: Data spike found 1, otherwise 0 Bit 5: Reference pulse invalid 1, otherwise 0 Bit 6: Source packet invalid 1, otherwise 0 Bit 7: Number of corresponding valid pulses is below Meas_Cavity_Lock_Status_Thresh 1, otherwise 0 Bit 8: Spacecraft attitude not on target 1, otherwise 0 Bit 9: For Mie, peak not found 1, otherwise 0. For Rayleigh, rayleigh response not found 1, otherwise 0 Bit 10: Set to 1 if the absolute wind velocity above Wind_Velocity_Threshold, default 0 Bit 11: Set to 1 if polynomial fit of error responses was used but no valid root of the polynomial was found, otherwise 0. Bit 12: Bin was detected as ground bin, otherwise 0. Bit 13: Bin was ground bin canidate but the thickness above DEM threshold was not met. Bit 14: Bin was ground bin candidate but useful signal threshold on sum of all ground bin candidates was not met. Bit 15: Bin was ground bin candidate but response shift threshold on output response calculated for signal sum of all ground bin candidates was not met. Bit 16: Spare, set to 0.		IntAus	2
Wind_Velocity	Wind velocity at the altitude bin. Value will be positive for a wind direction away from the spacecraft and negative for a wind toward the spacecraft.	m/s	FAdoxy	8
Total size for binary structure in bytes:				10

6.4 File Size

Table 6-69 summarises the typical product size for Aeolus Level 1B products. The size of the product will not necessarily be fixed, so the sizes given are only rough approximations. This assumes an orbit contains 470 observations, and N_Max = 30 measurements.

Table 6-69 Level 1B Wind Measurement Typical Product Size

Structure	Product Size N=30
FH (XML)	~740 bytes
MPH (XML)	~1697 bytes
Level 1B SPH (XML)	~8514 bytes
Header File total size:	~ 10.951 kbytes
MPH (KVT)	1247 bytes
Level 1B SPH (KVT)	7466 bytes
Geolocation ADS	~470 DSRs * 42338 bytes
Product Confidence Data ADS	~470 DSRs * 85970 bytes
Ground Wind Detection ADS	~470 DSRs * 10774 bytes
Measurement ADS	~470 DSRs * 125830 bytes
Mie Core Params GADS	~191 bytes
Calibration & Characterisation Data GADS	~42354 (9650) bytes
Useful Signal MDS	~470 DSRs * 20162 bytes
Wind Velocity MDS	~470 DSRs * 15555 bytes
Data File (Binary Format)	~ 140.8 MBytes

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7 OUTPUT AUXILIARY CALIBRATION FILES

7.1 Specific Product Header

The output auxiliary calibration products ISR, IAT, DCC, IDC, and DCMZ share a common specific product header format. The general fomat and size are describd here. Usage of the specific parameters are explained in the subsequent sections for these calibration auxiliary files. The specific product headers for the MRC, RRC, and ZWC auxiliary calibration products differ with respect to the referenced data sets. They are detailed in the corresponding sections.

Table 7-1 Output Auxiliary Calibration Products Specific Product Header Content Description

Tag Name	Content Description	Unit	Type	Size
Specific_Product_Header			Structure	51
Sph_Descriptor			String	59
Total_Num_of_Observations			IntAl	60
Total_Num_of_Measurements			IntAl	60
Total_Num_of_Reference_Pulses			IntAl	68
Base_Laser_Frequency		GHz	FAdoxy	54
Spare_1			Spare	20
Num_of_Mie_Observations_Used			IntAl	66
Num_of_Rayleigh_Observations_Used			IntAl	76
Num_of_Mie_Measurements_Used			IntAl	66
Num_of_Rayleigh_Measurements_Used			IntAl	76

Tag Name	Content Description	Unit	Type	Size
Num_of_Mie_Reference_Pulses_Used			IntAl	74
Num_of_Rayleigh_Reference_Pulses_Used			IntAl	84
Num_of_Valid_Mie_Calibration_Results			IntAl	82
Num_of_Valid_Rayleigh_Calibration_Results			IntAl	92
Spare_2			Spare	20
Total_Num_of_Measurement_Invalid			IntAl	97
Total_Num_of_Pulse_Validity_Status_Flag_False			IntAl	106
Total_Num_of_Sat_Not_on_Target_Measurements			IntAl	96
Total_Num_of_Corrupt_Mie_Measurement_Bins			IntAl	92
Total_Num_of_Corrupt_Rayleigh_Measurement_Bins			IntAl	102
Total_Num_of_Corrupt_Mie_Reference_Pulses			IntAl	92
Total_Num_of_Corrupt_Rayleigh_Reference_Pulses			IntAl	102
Spare_3			Spare	20
List_of_Dsds	See Table 7-4 for list of Data Sets in product		288*5	1726
Total size for XML structure in bytes:				3412

7.1.1.1 Data Set Descriptors

Data sets are organised as shown in Table 7-2. The Auxiliary Calibration GADS name is detailed in the sections below.

Table 7-2 Auxiliary Calibration Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	*_GADS	DSD structure for GADS (specific to Auxiliary Calibration Product Type)	G	1 DSR per product
2	Aeolus_Level_1A_Product	DSD for input Aeolus Level 1A Product	R	No DS
3	Level_1B_Proc_Params	DSD for Level 1B Processing Parameters Auxiliary File	R	No DS

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
4	Satellite_Characterisation	DSD for Satellite Characterisation Auxiliary File	R	No DS
5	Orbit_Scenario_File	DSD for Orbit Scenario Auxiliary File	R	No DS

7.2 Instrument Spectral Registration Calibration

7.2.1 Product Structure

The Instrument Spectral Registration (ISR) calibration auxiliary data conforms to the product structure described in Section 3. It is contained in one product file containing Fixed Header and Main Product Header as defined in Sections 3.3.3 and 3.3.4.1 respectively, as well as a Specific Product Header and a Data Set as described in the following subsections. All headers and data sets are in XML format.

7.2.1.1 File Name

The Instrument Spectral Registration calibration product file name has the format defined in Section 3.1:

AE_CCCC_AUX_ISR_1B_ yyyymmddThhmmss_yyyymmddThhmmss_vvvv.EEF

The date/times represent the start and stop of the validity period. The start date is generally set to equal the date on which the file becomes valid while the stop date is set to some date in the future when it is deemed this type of calibration data must be classified as invalid. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

7.2.2 Specific Product Header

Table 7-3 Instrument Spectral Registration Calibration Specific Product Header Content Description

Tag Name	Content Description	Unit	Type
Specific_Product_Header	Root tag for XML format only.		Structure
Sph_Descriptor	SPH descriptor ASCII string describing the product. AEOLUS_ISR_SPECIFIC_HEADER		String
Total_Num_of_Observations	Total number of level 1A input observations		IntAl

Tag Name	Content Description	Unit	Type
Total_Num_of_Measurements	Total Number of level 1A input measurements		IntAl
Total_Num_of_Reference_Pulses	Total number of level 1A input reference pulses		IntAl
Base_Laser_Frequency	Base Laser Transmit Frequency	GHz	FAdoxy
Spare_1			Spare
Num_of_Mie_Observations_Used	Number of Mie observations used: number of observations with at least 1 valid Mie frequency step		IntAl
Num_of_Rayleigh_Observations_Used	Number of Rayleigh observations used: number of observations with at least 1 valid Rayleigh frequency step.		IntAl
Num_of_Mie_Measurements_Used	Field not used, set to zero.		IntAl
Num_of_Rayleigh_Measurements_Used	Field not used, set to zero.		IntAl
Num_of_Mie_Reference_Pulses_Used	Number of Mie reference pulses used: sum Num_Mie_Used Table 7-8.		IntAl
Num_of_Rayleigh_Reference_Pulses_Used	Number of Rayleigh reference pulses used: sum Num_Rayleigh_Used Table 7-8.		IntAl
Num_of_Valid_Mie_Calibration_Results	Number of valid Mie calibration results For an AUX_ISR_1B file this parameter is either 1 = Num_of_Valid_Rayleigh_Calibration_Results is set to 1 and valid Mie frequency step closest to Rayleigh filter center was found 0 = otherwise.		IntAl
Num_of_Valid_Rayleigh_Calibration_Results	Number of valid Rayleigh calibration results For an AUX_ISR_1B file this parameter is either 1 = Rayleigh filter center was found 0 = otherwise		IntAl
Spare_2			Spare
Total_Num_of_Measurement_Invalid	Field not used, set to zero.		IntAl
Total_Num_of_Pulse_Validity_Status_Flag_False	Total number of reference pulses with pulse validity status flag set to false: sum of Num_Pulse_Validity_Status_Flag_False Table 7-8.		IntAl
Total_Num_of_Sat_Not_on_Target_Measurements	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Mie_Measurement_Bins	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Rayleigh_Measurement_Bins	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Mie_Reference_Pulses	Total number of corrupt Mie reference pulses: sum of Num_Corrupt_Mie Table 7-8.		IntAl

Tag Name	Content Description	Unit	Type
Total_Num_of_Corrupt_Rayleigh_Reference_Pulses	Total number of corrupt Rayleigh reference pulses: sum of Num_Corrupt_Rayleigh Table 7-8.		IntAl
Spare_3			Spare
List_of_Dsds	See Table 7-4 for list of Data Sets in product		288*5
Total size for XML structure in bytes:			

7.2.2.1 Data Set Descriptors

Data sets are organised as shown in Table 7-4. The auxiliary calibration data set name is Instr_Spectral_Reg_GADS.

Table 7-4 Auxiliary Calibration Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	*_GADS	DSD structure for GADS (specific to Auxiliary Calibration Product Type)	G	1 DSR per product
2	Aeolus_Level_1A_Product	DSD for input Aeolus Level 1A Product	R	No DS
3	Level_1B_Proc_Params	DSD for Level 1B Processing Parameters Auxiliary File	R	No DS
4	Satellite_Characterisation	DSD for Satellite Characterisation Auxiliary File	R	No DS
5	Orbit_Scenario_File	DSD for Orbit Scenario Auxiliary File	R	No DS

7.2.3 Data Sets

There is one Data Set for the ISR product, the Instrument Spectral Registration GADS, whose structure is defined in 7.2.3.1.

7.2.3.1 Instrument Spectral Registration GADS

The root tag for this Data Set is **Auxiliary_Calibration_ISR**, and the Data Set consists of a single Data Set Record of the structure described in Table 7-5. Sizes reported here are calculated for the envisaged commanding of N_Steps = 441 frequency steps.

Note: The number of 441 ISR results is just an indication, actual numbers will vary.

Table 7-5 ISR GADS DSR Content Description

Tag Name	Content Description	Unit	Type	Size
First_Start_of_Observation_Time	Start of observation time of the first BRC (UTC)		DateTime	91
Last_Start_of_Observation_Time	Start of observation time of the last BRC (UTC)		DateTime	89
List_of_ISR_Results	List of instrument spectral registration results. See Table 7-6 for structure definition.		List of N_Steps Structures	1099456
Freq_Rayleigh_Filter_Centre	Frequency offset of Rayleigh filter centre (crossing of A and B curves)	GHz	FAdoxy	68
Freq_Mie_USR_Closest_to_Rayleigh_Filter_Centre	Frequency offset of the Mie Channel USR (pixel = 8.5) closest to the Rayleigh filter centre	GHz	FAdoxy	106
Num_Valid_Mie_Results	Number of valid Mie ISR results		IntAl	52
Num_Valid_Rayleigh_Results	Number of valid Rayleigh ISR results		IntAl	62
Total size for XML structure in bytes:				1099924

Table 7-6 ISR GADS List_of_ISR_Results Content Description

Tag Name	Content Description	Unit	Type	Size
ISR_Result	See Table 7-7 for structure description.		Structure	2493
Total size for XML structure in bytes:				2493

Table 7-7 ISR GADS ISR_Result Content Description

Tag Name	Content Description	Unit	Type	Size
Laser_Freq_Offset	Laser frequency offset	GHz	FAdoxy	48
Mie_Valid	TRUE if Mie data is available to compute the ISR result. FALSE only when ALL Mie pulses were eliminated due to corruption or invalid pulse for ALL Mie pulses		Boolean	29
Rayleigh_Valid	TRUE if Rayleigh data is available to compute the ISR result. FALSE only when ALL Mie pulses were eliminated due to corruption or invalid pulse for ALL Rayleigh pulses		Boolean	39
Fizeau_Transmission	Sum of signal over all pulses and columns on the internal Mie reference scaled with laser energy.		FAdoxy	51
Mie_Response	Mie channel spectral response of mean reference pulse.	ACCD pixel index	FAdoxy	38

Tag Name	Content Description	Unit	Type	Size
Rayleigh_A_Response	Rayleigh channel A spectral response of mean reference pulse.		FAdoxy	60
Rayleigh_B_ Response	Rayleigh channel B spectral response of mean reference pulse.		FAdoxy	60
Data_Stat	Input data (reference pulses) statistics. See Table 7-8 for structure definition		Structure	308
Data_Quality	Additional quality parameters for Rayleigh and Mie core algorithms. See Table 7-9 for structure definition.		Structure	963
Etalon_Average_Temperature	See Table 7-12 for structure description		Structure	302
RSPT_Average_Temperature	See Table 7-13 for structure description		Structure	482
Optical_Baseplate_Average_Temperature	Sensor Optical Baseplate Ray average temperature of 5,6,7,8	C	FAdoxy	88
Total size for XML structure in bytes:				2468

Table 7-8 ISR GADS
Data Stat Content Description

Tag Name	Content Description	Unit	Type	Size
Num_Raw_Data	Number of raw reference pulses in input for each Mie and Rayleigh		IntAl	34
Num_Pulse_Validity_Status_Flag_False	Number of invalid pulses		IntAl	82
Num_Mie_Used	Number of Mie reference pulses used		IntAl	34
Num_Rayleigh_Used	Number of Rayleigh reference pulses used		IntAl	44
Num_Corrupt_Mie	Number of corrupt Mie reference pulses		IntAl	40
Num_Corrupt_Rayleigh	Number of corrupt Rayleigh reference pulses		IntAl	50
Total size for XML structure in bytes:				284

Table 7-9 ISR GADS Data_Quality Content Description

Tag Name	Content Description	Unit	Type	Size
Accumulated_Laser_Energy_Mie	Accumulated laser energy of all valid Mie pulses (Mie pulses counted for field Num_Mie_Used in Table 7-8).	mJ	FAdoxy	69
Mean_Laser_Energy_Mie	Accumulated_Laser_Energy_Mie / Num_Mie_Used (see Table 7-8)	mJ	FAdoxy	55
Accumulated_Laser_Energy_Rayleigh	Accumulated laser energy of all valid Rayleigh pulses (Rayleigh pulses counted for field Num_Rayleigh_Used in Table 7-8).	mJ	FAdoxy	79

Tag Name	Content Description	Unit	Type	Size
Mean_Laser_Energy_Rayleigh	Accumulated_Laser_Energy_Rayleigh / Num_Rayleigh_Used (see Table 7-8)	mJ	FAdoxy	65
Laser_Energy_Drift	Ratio of Mean_Laser_Energy_Rayleigh of first frequency step to Mean_Laser_Energy_Rayleigh of current frequency step.		FAdoxy	49
Downhill_Simplex_Used	Flag indicating if Mie Core algorithm 1 or Mie Core algorithm 2 (Downhill Simplex) was used. FALSE: Mie Core algorithm 1 used, structure Mie_Core_2 unused, but structures Mie_Core_1 and Lorentz_Fit used. TRUE: Mie Core algorithm 2 (= downhill simplex algorithm) used, structures Mie_Core_1 and Lorentz_Fit unused, but structure Mie_Core_2 used.		Boolean	52
Mie_Core_1	Mie Core 1 results, see Table 7-10 for structure definition.		Structure	265
Mie_Core_2	Mie Core 2 results, see Table 7-11 for structure definition.		Structure	300
Total size for XML structure in bytes:				934

Table 7-10 ISR GADS Mie_Core_1 Content Description

Tag Name	Content Description	Unit	Type	Size
Gaussian_Width_A_Near_Zero	Input parameter		Boolean	62
Reference_Pulse_Pixels_Near_Zero	Input reference pulse all pixel values all near zero.		Boolean	74
Num_Iterations_Core_1	Number of Gaussian iterations perfomed.		IntAuc	51
Last_Peak_Difference	Difference of residual errors from the finally detected to the previous detected peak during Lorentzian iteration.	ACCD pixel	FAdoxy	53
Total size for XML structure in bytes:				240

Table 7-11 ISR GADS Mie_Core_2 Content Description

Tag Name	Content Description	Unit	Type	Size
Fwhm	Resulting FWHM.	ACCD pixel	FAdoxy	21
Offset	Resulting offset.	ACCD counts	FAdoxy	25
Peak_Height	Resulting peak height.	ACCD counts	FAdoxy	35

Tag Name	Content Description	Unit	Type	Size
Peak_Location	Resulting peak location.	ACCD pixel index	FAdoxy	39
Residual_Error_Change	Difference of residual errors from the finally detected to the previous detected peak during Lorentzian iteration.		FAdoxy	55
Num_Iterations_Core_2	Number of Lorentzian iteratons performed.		IntAuc	51
Simplex_Quality_Flag	1 byte bit packed field. Bit 1: Overall validity, data invalid 1, otherwise 0 Bit 2 peak height lower threshold not met 1, otherwise 0 Bit 3: peak height upper threshold not met 1, otherwise 0 Bit 4: FWHM lower threshold not met 1, otherwise 0 Bit 5: FWHM upper threshold not met 1, otherwise 0 Bit 6: peak location threshold not met 1, otherwise 0 Bit 7: number of iterations in the Lorentz fit exceeds threshold 1, otherwise 0. Bit 8: SNR below threshold 1, otherwise 0 Field set to ‘10000000’ in case the Mie Core algorithm was not invoked.		IntAuc	49
Total size for XML structure in bytes:				275

Table 7-12 ISR GADS Etalon_Average_Temperatures

Tag Name	Content Description	Unit	Type	Size
Ray_Spectrometer_Temp_9	Sensor RSP etalon temperature	C	FAdoxy	60
Ray_Spectrometer_Temp_10	Sensor RSP etalon temperature	C	FAdoxy	62
Ray_Spectrometer_Temp_11	Sensor RSP etalon temperature	C	FAdoxy	62
Ray_Spectrometer_Temp_12	Field set fixed to zero; see R-6.	C	FAdoxy	62
Total size for XML structure in bytes:				246

Table 7-13 ISR GADS RSPT_Average_Temperatures

Tag Name	Content Description	Unit	Type	Size
Thermocouple_8_Ray_Spectrometer_Thermal_Hood_1	Sensor RSPT average temperature	C	FAdoxy	106
Thermocouple_9_Ray_Spectrometer_Thermal_Hood_2	Sensor RSPT average temperature	C	FAdoxy	106

Tag Name	Content Description	Unit	Type	Size
Thermocouple_10_Ray_Spectrometer_Thermal_Hood_3	Sensor RSPT average temperature	C	FAdoxy	108
Thermocouple_11_Ray_Spectrometer_Thermal_Hood_4	Sensor RSPT average temperature	C	FAdoxy	108
Total size for XML structure in bytes:				428

7.2.4 File Size

Table 7-14 summarises the typical product size for Aeolus ISR products. The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 7-14 ISR Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~1697 bytes
Auxiliary Calibration SPH	~3426 bytes
ISR GADS	~1099924 bytes
Product Size:	~ 1105787 bytes

7.3 Instrument Auto Test Calibration

7.3.1 Product Structure

The Instrument Auto Test (IAT) calibration auxiliary data conforms to the product structure described in Section 3. It is contained in one product file containing a Fixed Header and a Main Product Header as defined in Sections 3.3.3 and 0 respectively, as well as a Specific Product Header and a Data Set as described in the following subsections. All headers and data sets are in XML format.

7.3.1.1 File Name

The Instrument Spectral Registration calibration product file name has the format defined in Section 3.1:

AE_CCCC_AUX_IAT_1B_ yyyymmddThhmmss_yyyymmddThhmmss_vvvvv.EEF

Where the date/times represent the start and stop of the validity period. The start date is generally set to equal the date on which the file becomes valid while the stop date is set to some date in the future when it is deemed this type of calibration data must be classified as invalid. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

7.3.2 Specific Product Header

The general Specific Product Header structure for this file is described in Section 7.2.2 and is detailed in the following table.

Table 7-15 Instrument Auto Test Calibration Specific Product Headewr Content Description

Tag Name	Content Description	Unit	Type
Specific_Product_Header	Root tag for XML format only.		Structure
Sph_Descriptor	SPH descriptor ASCII string describing the product. AEOLUS_IAT_SPECIFIC_HEADER		String
Total_Num_of_Observations	Total number of level 1A input observations		IntAl
Total_Num_of_Measurements	Number of level 1A input measurements of level 1A observations that are not skipped		IntAl
Total_Num_of_Reference_Pulses	Number of level 1A input reference pulses of level 1A observations that are not skipped		IntAl
Base_Laser_Frequency	Base Laser Transmit Frequency	GHz	FAdoxy
Spare_1			Spare
Num_of_Mie_Observations_Used	Number of Mie observations used: number of observations with at least 1 valid Mie reference pulse.		IntAl
Num_of_Rayleigh_Observations_Used	Number of Rayleigh observations used: number of observations with at least 1 valid Rayleigh reference pulse.		IntAl
Num_of_Mie_Measurements_Used	Field not used, set to zero.		IntAl
Num_of_Rayleigh_Measurements_Used	Field not used, set to zero.		IntAl
Num_of_Mie_Reference_Pulses_Used	Number of Mie reference pulses used: sum Num_Mie_Used Table 7-19.		IntAl
Num_of_Rayleigh_Reference_Pulses_Used	Number of Rayleigh reference pulses used: sum Num_Rayleigh_Used Table 7-19.		IntAl
Num_of_Valid_Mie_Calibration_Results	Total number of valid Mie frequency steps: sum of Mie_Valid Table 7-18.		IntAl
Num_of_Valid_Rayleigh_Calibration_Results	Total number of valid Rayleigh frequency steps: sum of Rayleigh_Valid Table 7-18.		IntAl
Spare_2			Spare
Total_Num_of_Measurement_Invalid	Field not used, set to zero.		IntAl

Tag Name	Content Description	Unit	Type
Total_Num_of_Pulse_Validity_Status_Flag_False	Total number of reference pulses with pulse validity status flag set to false: sum of Num_Pulse_Validity_Status_Flag_False Table 7-19.		IntAl
Total_Num_of_Sat_Not_on_Target_Measurements	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Mie_Measurement_Bins	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Rayleigh_Measurement_Bins	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Mie_Reference_Pulses	Total number of corrupt Mie reference pulses: sum of Num_Corrupt_Mie Table 7-19.		IntAl
Total_Num_of_Corrupt_Rayleigh_Reference_Pulses	Total number of corrupt Rayleigh reference pulses: sum of Num_Corrupt_Rayleigh Table 7-19.		IntAl
Spare_3			Spare
List_of_Dsds	See Table 7-4 for list of Data Sets in product		288*5
Total size for XML structure in bytes:			

7.3.2.1 Data Set Descriptors

Data sets are organised as shown in Table 7-2. The auxiliary calibration data set name is Instr_Auto_Test_GADS.

7.3.3 Data Sets

There is one Data Set for the IAT product, the Instrument Auto Test GADS, whose structure is defined in 7.3.3.1.

7.3.3.1 Instrument Auto Test GADS

The root tag for this Data Set is **Auxiliary_Calibration_IAT**, and the Data Set consists of a single Data Set Record of the structure described in Table 7-16. Sizes reported here are calculated for the envisaged commanding of N_Steps = 98 frequency steps.

Note: The number of 98 IAT results is just an indication, actual numbers will vary.

Table 7-16 IAT GADS DSR Content Description

Tag Name	Content Description	Unit	Type	Size
First_Start_of_Observation_Time	Start of observation time of the first BRC (UTC)		DateTime	91
Last_Start_of_Observation_Time	Start of observation time of the last BRC (UTC)		DateTime	89
List_of_IAT_Results	List of IAT results. See Table 7-17 for structure definition.		List of N_Steps structures	247885
Rayleigh_A_FWHM	Rayleigh Channel A FWHM Airy fit result	GHz	FAdoxy	44
Rayleigh_A_FSR	Rayleigh Channel A FSR Airy fit result	GHz	FAdoxy	42
Rayleigh_A_Peak	Rayleigh Channel A peak position Airy fit result	GHz	FAdoxy	44
Rayleigh_A_Amp	Rayleigh Channel A amplitude Airy fit result		FAdoxy	42
Rayleigh_B_FWHM	Rayleigh Channel B FWHM Airy fit result	GHz	FAdoxy	44
Rayleigh_B_FSR	Rayleigh Channel A FSR Airy fit result	GHz	FAdoxy	42
Rayleigh_B_Peak	Rayleigh Channel A peak position Airy fit result	GHz	FAdoxy	44
Rayleigh_B_Amp	Rayleigh Channel A amplitude Airy fit result		FAdoxy	42
Rayleigh_Channel_Separation	Rayleigh Channel Separation	GHz	FAdoxy	68
Mean_Slope_of_Mie_Response	Mean Slope of Mie Channel Response calculated using the valid Freq_In_Centre_Subrange = TRUE results	GHz/ ACCD pixel index	FAdoxy	66
Num_of_Valid_Mie_Results	Number of valid Mie IAT frequency steps		IntAl	58
Num_of_Valid_Rayleigh_Results	Number of valid Rayleigh IAT frequency steps		IntAl	68
Num_of_Valid_Results_in_Centre_Subrange	Number of valid frequency steps available to compute Mie channel response (out of 60 centre frequencies)		IntAl	88
Mie_Rms_Error	Mie rms fit error		FAdoxy	40
Mie_Std_Error	Mie standard deviation of the fit error		FAdoxy	40
Ray_A_Rms_Error	Rayleigh channel A rms fit error		FAdoxy	44
Ray_B_Rms_Error	Rayleigh channel B rms fit error		FAdoxy	44
Total size for XML structure in bytes:				248925

Table 7-17 IAT GADS List_of_IAT_Results Content Description

Tag Name	Content Description	Unit	Type	Size
IAT_Result	See Table 7-18 for structure description.		Structure	1547
Total size for XML structure in bytes:				1547

Table 7-18 IAT GADS
IAT_Result Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Valid	TRUE if Mie data is available to compute the ISR result. FALSE only when ALL Mie pulses were eliminated due to corruption or invalid pulse for ALL Mie pulses		Boolean	29
Rayleigh_Valid	TRUE if Rayleigh data is available to compute the ISR result. FALSE only when ALL Rayleigh pulses were eliminated due to corruption or invalid pulse for ALL Rayleigh pulses		Boolean	39
Freq_In_Centre_Subrange	TRUE if the frequency is between -0.75 GHz and 0.75 GHz. For frequencies outside the range, this value is set to FALSE		Boolean	57
Laser_Freq_Offset	Laser frequency offset	GHz	FAdoxy	48
Mie_FWHM	Mie Channel FWHM	ACCD pixel	FAdoxy	30
Mie_Response	Mie Channel Spectral Response of mean reference pulse (computed for frequencies between -0.75GHz and 0.75GHz. For frequencies outside the range, this value is set to 0.0)	ACCD pixel index	FAdoxy	38
Rayleigh_A_Transmission	Rayleigh Channel A Spectral Transmission of mean reference pulse.		FAdoxy	60
Rayleigh_B_Transmission	Rayleigh Channel B Spectral Transmission of mean reference pulse.		FAdoxy	60
Data_Stat	Input data (reference pulses) statistics. See **Table 7-19** for structure definition.		Structure	314
Data_Quality	Additional quality parameters for Rayleigh and Mie core algorithms. See Table 7-20 for structure definition.		Structure	982
Etalon_Average_Temperature	See Table 7-24 for structure description		Structure	302
RSPT_Average_Temperature	See Table 7-25 for structure description		Structure	482
Optical_Baseplate_Average_Temperature	Sensor Optical Baseplate Ray average temperature of 5,6,7,8	C	FAdoxy	88
Total size for XML structure in bytes:				2529

Table 7-19 IAT GADS
Data_Stat Content Description

Tag Name	Content Description	Unit	Type	Size
Num_Raw_Data	Number of raw reference pulses in input for each Mie and Rayleigh		IntAl	34
Num_Pulse_Validity_Status_Flag_False	Number of invalid pulses		IntAl	82

Tag Name	Content Description	Unit	Type	Size
Num_Mie_Used	Number of Mie reference pulses used		IntAl	34
Num_Rayleigh_Used	Number of Rayleigh reference pulses used		IntAl	44
Num_Corrupt_Mie	Number of corrupt Mie reference pulses		IntAl	40
Num_Corrupt_Rayleigh	Number of corrupt Rayleigh reference pulses		IntAl	50
Total size for XML structure in bytes:				284

Table 7-20 IAT GADS Data_Quality Content Description

Tag Name	Content Description	Unit	Type	Size
Accumulated_Laser_Energy_Rayleigh	Accumulated laser energy of all valid Rayleigh pulses (Rayleigh pulses counted for field Num_Rayleigh_Used in Table 7-19).	mJ	FAdoxy	79
Mean_Laser_Energy_Rayleigh	Accumulated_Laser_Energy_Rayleigh / Num_Rayleigh_Used (see Table 7-19)	mJ	FAdoxy	65
Laser_Energy_Drift	Ratio of Mean_Laser_Energy_Rayleigh of first frequency step to Mean_Laser_Energy_Rayleigh of current frequency step.		FAdoxy	49
Downhill_Simplex_Used	Flag indicating if Mie Core algorithm 1 or Mie Core algorithm 2 (Downhill Simplex) was used. FALSE: Mie Core algorithm 1 used, structure Mie_Core_2 unused, but structures Mie_Core_1 and Lorentz_Fit used. TRUE: Mie Core algorithm 2 (= downhill simplex algorithm) used, structures Mie_Core_1 and Lorentz_Fit unused, but structure Mie_Core_2 used.		Boolean	52
Mie_Core_1	Mie Core 1 results, see Table 7-21 for structure definition.		Structure	265
Lorentz_Fit	Lorentz fit results, see Table 7-22 for structure definition.		Structure	143
Mie_Core_2	Mie Core 2 results, see Table 7-23 for structure definition.		Structure	300
Total size for XML structure in bytes:				953

Table 7-21 IAT GADS Mie_Core_1 Content Descrption

Tag Name	Content Description	Unit	Type	Size
Gaussian_Width_A_Near_Zero	Input parameter		Boolean	62
Reference_Pulse_Pixels_Near_Zero	Input reference pulse all pixel values all near zero.		Boolean	74

Tag Name	Content Description	Unit	Type	Size
Num_Iterations_Core_1	Number of Gaussian iterations perfomed.		IntAuc	51
Last_Peak_Difference	Difference of residual errors from the finally detected to the previous detected peak during Lorentzian iteration.	ACCD pixel	FAdoxy	53
Total size for XML structure in bytes:				240

Table 7-22 IAT GADS Lorentz_Fit Content Description

Tag Name	Content Description	Unit	Type	Size
Offset	Resulting offset.	ACCD counts	FAdoxy	25
Peak_Position	Resulting peak position.	ACCD pixel index	FAdoxy	39
Amplitude	Resulting amplitude.	ACCD counts	FAdoxy	31
Fwhm	Resulting FWHM.	ACCD pixel	FAdoxy	21
Total size for XML structure in bytes:				116

Table 7-23 IAT GDS Mie_Core_2 Content Description

Tag Name	Content Description	Unit	Type	Size
Fwhm	Resulting FWHM.	ACCD pixel	FAdoxy	21
Offset	Resulting offset.	ACCD counts	FAdoxy	25
Peak_Height	Resulting peak height.	ACCD counts	FAdoxy	35
Peak_Location	Resulting peak location.	ACCD pixel index	FAdoxy	39
Residual_Error_Change	Difference of residual errors between last and last but one detected by iteration.		FAdoxy	55
Num_Iterations_Core_2	Number of Lorentzian iteratons performed.		IntAuc	51

Tag Name	Content Description	Unit	Type	Size
Simplex_Quality_Flag	1 byte bit packed field. Bit 1: Overall validity, data invalid 1, otherwise 0 Bit 2 peak height lower threshold not met 1, otherwise 0 Bit 3: peak height upper threshold not met 1, otherwise 0 Bit 4: FWHM lower threshold not met 1, otherwise 0 Bit 5: FWHM upper threshold not met 1, otherwise 0 Bit 6: peak location threshold not met 1, otherwise 0 Bit 7: number of iterations in the Lorentz fit exceeds threshold 1, otherwise 0. Bit 8: SNR below threshold 1, otherwise 0 Field set to '10000000' in case the Mie Core algorithm was not invoked.		IntAuc	49
Total size for XML structure in bytes:				275

Table 7-24 IAT GADS
Etalon_Average_Temperatures Content Description

Tag Name	Content Description	Unit	Type	Size
Ray_Spectrometer_Temp_9	Sensor RSP etalon temperature	C	FAdoxy	60
Ray_Spectrometer_Temp_10	Sensor RSP etalon temperature	C	FAdoxy	62
Ray_Spectrometer_Temp_11	Sensor RSP etalon temperature	C	FAdoxy	62
Ray_Spectrometer_Temp_12	Field set fixed to zero; see R-6.	C	FAdoxy	62
Total size for XML structure in bytes:				246

Table 7-25 IAT GADS
RSPT_Average_Temperatures Content Description

Tag Name	Content Description	Unit	Type	Size
Thermocouple_8_Ray_Spectrometer_Thermal_Hood_1	Sensor RSPT average temperature	C	FAdoxy	106
Thermocouple_9_Ray_Spectrometer_Thermal_Hood_2	Sensor RSPT average temperature	C	FAdoxy	106
Thermocouple_10_Ray_Spectrometer_Thermal_Hood_3	Sensor RSPT average temperature	C	FAdoxy	108
Thermocouple_11_Ray_Spectrometer_Thermal_Hood_4	Sensor RSPT average temperature	C	FAdoxy	108
Total size for XML structure in bytes:				428

7.3.4 File Size

Table 7-26 summarises the typical product size for Aeolus IAT products. The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 7-26 IAT Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~16697 bytes
Auxiliary Calibration SPH	~3426 bytes
IAT GADS	~248925 bytes
Product Size:	~269788 bytes

7.4 Dark Current Calibration

7.4.1 Product Structure

The Dark Current Calibration (DCC) product conforms to the product structure described in Section 3. It is contained in one product file containing a Fixed Header and a Main Product Header as defined in Sections 3.3.3 and 3.3.4.1 respectively, and a Specific Product Header and a Data Set as described in the following subsections. All headers and data sets are in XML format.

7.4.1.1 File Name

The Dark Current Calibration product file name has the format defined in Section 3.1:

AE_CCCC_AUX_DCC_1B_ yyyymmddThhmmss_yyyymmddThhmmss_vvvvv.EEF

Where the date/times represent the start and stop of the validity period. The start date is generally set to equal the date on which the file becomes valid while the stop date is set to some date in the future when it is deemed this type of calibration data must be classified as invalid. The version number combined with the date makes this a unique instance of the file..

The product file has an extension .EEF to designate a single file in XML format.

7.4.2 Specific Product Header

The general Specific Product Header structure for this file is described in Section 7.2.2 and is detailed in the following table.

Table 7-27 Instrument Defocus Calibration Specific Product Header Content Description

Tag Name	Content Description	Unit	Type
Specific_Product_Header	Root tag for XML format only.		Structure
Sph_Descriptor	SPH descriptor ASCII string describing the product. AEOLUS_DCC_SPECIFIC_HEADER		String
Total_Num_of_Observations	Total number of level 1A input observations		IntAl
Total_Num_of_Measurements	Total Number of level 1A input measurements		IntAl
Total_Num_of_Reference_Pulses	Total number of level 1A input reference pulses		IntAl
Base_Laser_Frequency	Base Laser Transmit Frequency	GHz	FAdoxy
Spare_1			Spare
Num_of_Mie_Observations_Used	Number of Mie observations processed. (No dependency on validity of measurements of the observation.)		IntAl
Num_of_Rayleigh_Observations_Used	Number of Rayleigh observations processed. (No dependency on validity of measurements of the observation.)		IntAl
Num_of_Mie_Measurements_Used	Number of valid Mie measurements used.		IntAl
Num_of_Rayleigh_Measurements_Used	Number of valid Rayleigh measurements used.		IntAl
Num_of_Mie_Reference_Pulses_Used	Field set to 0.		IntAl
Num_of_Rayleigh_Reference_Pulses_Used	Field set to 0.		IntAl
Num_of_Valid_Mie_Calibration_Results	Field set to 1.		IntAl
Num_of_Valid_Rayleigh_Calibration_Results	Field set to 1.		IntAl
Spare_2			Spare
Total_Num_of_Measurement_Invalid	Total number of level 1A input measurements for which Measurement_Data_Present of Table 5-16 is set to false.		IntAl
Total_Num_of_Pulse_Validity_Status_Flag_False	Field set to 0.		IntAl
Total_Num_of_Sat_Not_on_Target_Measurements	Field set to 0.		IntAl
Total_Num_of_Corrupt_Mie_Measurement_Bins	Number of Mie measurement bins found to be corrupted due to saturated pixels.		IntAl
Total_Num_of_Corrupt_Rayleigh_Measurement_Bins	Number of Mie measurement bins found to be corrupted due to saturated pixels.		IntAl
Total_Num_of_Corrupt_Mie_Reference_Pulses	Field set to 0.		IntAl

Tag Name	Content Description	Unit	Type
Total_Num_of_Corrupt_Rayleigh_Reference_Pulses	Field set to 0.		IntAl
Spare_3			Spare
List_of_Dsds	See Table 7-4 for list of Data Sets in product		288*5
Total size for XML structure in bytes:			

7.4.2.1 Data Set Descriptors

Data sets are organised as shown in Table 7-2. The auxiliary calibration data set name is Dark_Current_Cal_GADS.

7.4.3 Data Sets

There is one data set for the DCC product, the Dark Current Calibration GADS, whose structure is defined in 7.4.3.1.

7.4.3.1 Dark Current Calibration GADS

The root tag for this Data Set is **Auxiliary_Calibration_DCC**, and the Data Set consists of a single Data Set Record of the structure described in Table 7-28. Sizes reported here are calculated for the envisaged commanding of N_Obs = 100 observations.

Note: The number of 100 observations is just an indication, actual numbers will vary.

Table 7-28 DCC GADS DSR Content Description

Tag Name	Content Description	Unit	Type	Size
First_Start_of_Observation_Time	Start of observation time of the first BRC (UTC)		DateTime	91
Last_Start_of_Observation_Time	Start of observation time of the last BRC (UTC)		DateTime	89
Mie_Dark_Current_Calibration_Result	See Table 7-29 for structure definition		Structure	169023
Rayleigh_Dark_Current_Calibration_Result	See Table 7-30 for structure definition		Structure	1695023
Num_Measurement_Map_Image_Pixel_Rows	Number of image pixel rows in the measurement map list		IntAs	79

Tag Name	Content Description	Unit	Type	Size
Num_Measurement_Map_Image_Pixel_Cols	Number of image pixel columns in the measurement map list		IntAs	79
Operational_Mode	Value to indicate if the laser was on, off or a mix for all the observations within DCC mode. Value has to be one of “Laser_On”, “Laser_Off”, or “Laser_Mix”.		Enum	32
Total size for XML structure in bytes:				338416

Table 7-29 DCC GADS Mie_Dark_Current_Calibration_Result Content Description

Tag Name	Content Description	Unit	Type	Size
Mean_Measurement_Dark_Signal	Mean measurement dark signal over ACCD useful zone		FAdoxy	70
Dark_Signal_Non_Uniformity	Dark signal non uniformity standard deviation		FAdoxy	66
Mean_Measurement_Noise	Mean measurement noise over ACCD useful zone		FAdoxy	58
Num_Pixels_Exceeding_Deviation	Number of pixels exceeding the allowed deviation specified through the factor DSNU_Devition_Factor specified in Table 8-139.		IntAs	67
List_of_Measurement_Dark_Signals	Map (Num_Measurement_Map_Image_Pixel_Rows * Num_Measurement_Map_Image_Pixel_Cols) of measurement pixel dark signals. Element (i,j) at image pixel row i, and image pixel column index j, is at Num_Measurement_Map_Image_Pixel_Cols*(i-1) + j position in the list. See **Table 7-31** for structure definition		List of 256 Structures	15430
List_of_Measurement_Noises	Map (Num_Measurement_Map_Image_Pixel_Rows * Num_Measurement_Map_Image_Pixel_Cols) of measurement pixel noise. Element (i,j) at image pixel row i, and image pixel column index j, is at Num_Measurement_Map_Image_Pixel_Cols*(i-1) + j position in the list. See **Table 7-32** for structure definition		List of 256 Structures	12346
List_of_ACCD_Die_Temperatures	List of ACCD die temperature during the acquisition. See **Table 7-33** for structure definition.		List of N_Obs Structures	5464
List_of_Mean_Offset_Measurement_Observations	<offset (i,m)> - Average offset per observation. See **Table 7-34** for structure definition. Map (Num_Measurement_Map_Image_Pixel_Rows * Num_Observation_Map) of average image pixel row offsets. Element (i,m) at image pixel row i, and observation index m, is at Num_Observation_Map *(i-1) + m position in the list.		List of 16*N_Obs Structures	134492
List_of_Mean_Offset_Measurements	<offset (i)> - Average of each image pixel row offset over the entire calibration period. See **Table 7-35** for structure definition.		List of 16 Structures	1030
Total size for XML structure in bytes:				169023

**Table 7-30 DCC GADS
Rayleigh_Dark_Current_Calibration_Result Content Description**

Tag Name	Content Description	Unit	Type	Size
Mean_Measurement_Dark_Signal	Mean measurement dark signal over ACCD useful zone		FAdoxy	70
Dark_Signal_Non_Uniformity	Dark signal non uniformity standard deviation		FAdoxy	66
Mean_Measurement_Noise	Mean measurement noise over ACCD useful zone		FAdoxy	58
Num_Pixels_Exceeding_Deviation	Number of pixels exceeding the allowed deiation specified through the factor DSNU_Devition_Factor specified in Table 8-139.		IntAs	67
List_of_Measurement_Dark_Signals	Map (Num_Measurement_Map_Image_Pixel_Rows * Num_Measurement_Map_Image_Pixel_Cols) of measurement pixel dark signals. Element (i,j) at image pixel row i, and image pixel column index j, is at Num_Measurement_Map_Image_Pixel_Cols*(i-1) + j position in the list. See **Table 7-31** for structure definition		List of 256 Structures	15430
List_of_Measurement_Noises	Map (Num_Measurement_Map_Image_Pixel_Rows * Num_Measurement_Map_Image_Pixel_Cols) of measurement pixel noise. Element (i,j) at image pixel row i, and image pixel column index j, is at Num_Measurement_Map_Image_Pixel_Cols*(i-1) + j position in the list. See **Table 7-32** for structure definition		List of 256 Structures	12346
List_of_ACCD_Die_Temperatures	List of ACCD die temperature during the acquisition. See **Table 7-33** for structure definition.		List of N_Obs Structures	5464
List_of_Mean_Offset_Measurement_Observations	<offset (i,m)> - Average offset per observation. See **Table 7-34** for structure definition. Map (Num_Measurement_Map_Image_Pixel_Rows * Num_Observation_Map) of average image pixel row offsets. Element (i,m) at image pixel row i, and observation index m, is at Num_Observation_Map *(i-1) + m position in the list.		List of N_Obs Structures	134492
List_of_Mean_Offset_Measurements	<offset (i)> - Average of each image pixel row offset over the entire calibration period. See **Table 7-35** for structure definition.3		List of 16 Structures	1030
Total size for XML structure in bytes:				169023

**Table 7-31 DCC GADS
List_of_Measurement_Dark_Signals Content Description**

Tag Name	Content Description	Unit	Type	Size
Measurement_Dark_Signal	Measurement pixel dark signal averaged over observations		FAdoxy	60

Table 7-32 DCC GADS
List_of_Measurement_Noises Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Noise	Measurement pixel noise averaged over observations		FAdoxy	48

Table 7-33 DCC GADS
List_of_ACCD_Die_Temperatures Content Description

Tag Name	Content Description	Unit	Type	Size
ACCD_Die_Temperature	ACCD die temperature average over a BRC	C	FAdoxy	54

Table 7-34 GADS DCC
List_of_Mean_Offset_ Measurement_Observations Content Description

Tag Name	Content Description	Unit	Type	Size
Mean_Offset_Measurement_Observation	Average measurement offset per observation		FAdoxy	84

Table 7-35 DCC GADS
List_of_Mean_Offset Measurements Description

Tag Name	Content Description	Unit	Type	Size
Mean_Offset Measurement	Average measurement offset over all observations		FAdoxy	60

7.4.4 File Size

Table 7-36 summarises the typical product size for Aeolus DCC products. The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 7-36 DCC Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~16697 bytes
Auxiliary Calibration SPH	~3426 bytes
DCC GADS	~338416 bytes
Product Size:	~344279 bytes

7.5 Instrument Defocus Characterisation

7.5.1 Product Structure

The Instrument Defocus Characterisation (IDC) product conforms to the product structure described in Section 3. It is contained in one product file containing a Fixed Header and a Main Product Header as defined in Sections 3.3.3 and 0 respectively, and a Specific Product Header and a Data Set as described in the following subsections. All headers and data sets are in XML format.

7.5.1.1 File Name

The Instrument Defocus Calibration product file name has the format defined in Section 3.1:

AE_CCCC_AUX_IDC_1B_ yyyymmddThhmmss_yyyymmddThhmmss_vvvv.EEF

Where the date/times represent the start and stop of the validity period. The start date is generally set to equal the date on which the file becomes valid while the stop date is set to some date in the future when it is deemed this type of calibration data must be classified as invalid. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

7.5.2 Specific Product Header

The general Specific Product Header structure for this file is described in Section 7.2.2 and is detailed in the following table.

Table 7-37 Instrument Defocus Characterisation Calibration Specific Product Header Content Description

Tag Name	Content Description	Unit	Type
Specific_Product_Header	Root tag for XML format only.		Structure
Sph_Descriptor	SPH descriptor ASCII string describing the product. AEOLUS_IDC_SPECIFIC_HEADER		String
Total_Num_of_Observations	Total number of level 1A input observations		IntAl
Total_Num_of_Measurements	Total Number of level 1A input measurements		IntAl
Total_Num_of_Reference_Pulses	Total number of level 1A input reference pulses		IntAl
Base_Laser_Frequency	Base Laser Transmit Frequency	GHz	FAdoxy
Spare_1			Spare

Tag Name	Content Description	Unit	Type
Num_of_Mie_Observations_Used	Number of Mie observations processed. (No dependency on validity of measurements of the observation.)		IntAl
Num_of_Rayleigh_Observations_Used	Number of Rayleigh observations processed. (No dependency on validity of measurements of the observation.)		IntAl
Num_of_Mie_Measurements_Used	Number of valid Mie measurements used.		IntAl
Num_of_Rayleigh_Measurements_Used	Number of valid Rayleigh measurements used.		IntAl
Num_of_Mie_Reference_Pulses_Used	Field not used, set to zero.		IntAl
Num_of_Rayleigh_Reference_Pulses_Used	Field not used, set to zero.		IntAl
Num_of_Valid_Mie_Calibration_Results	Field not used, set to zero.		IntAl
Num_of_Valid_Rayleigh_Calibration_Results	Field set to '1' if Rayleigh results valid else set to '0'.Rayleigh results are valid in case Std_Dev_Threshold_Met is set to 'true' for both channels, see **Table 7-41**and Table 7-42.		IntAl
Spare_2			Spare
Total_Num_of_Measurement_Invalid	Total number of level 1A input measurements for which Measurement_Valid of Table 5-16 is set to false.		IntAl
Total_Num_of_Pulse_Validity_Status_Flag_False	Total number of level 1A input reference pulses with Pulse_Validity_Status_Flag of Table 5-18 set to false.		IntAl
Total_Num_of_Sat_Not_on_Target_Measurements	Total number of level 1A input measurements with Spacecraft_Attitude_On_Target of Table 5-16 set to false.		IntAl
Total_Num_of_Corrupt_Mie_Measurement_Bins	Number of Mie measurement bins found to be corrupted due to saturated pixels.		IntAl
Total_Num_of_Corrupt_Rayleigh_Measurement_Bins	Number of Rayleigh measurement bins found to be corrupted due to saturated pixels.		IntAl
Total_Num_of_Corrupt_Mie_Reference_Pulses	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Rayleigh_Reference_Pulses	Field not used, set to zero.		IntAl
Spare_3			Spare
List_of_Dsds	See Table 7-4 for list of Data Sets in product		288*5
Total size for XML structure in bytes:			

7.5.2.1 Data Set Descriptors

Data sets are organised as shown in Table 7-2. The auxiliary calibration data set name is Instr_Defocus_Char_GADS.

7.5.3 Data Sets

There is one data set for the IDC product, the Instrument Defocus Characterisation GADS, whose structure is defined in 7.5.3.1.

7.5.3.1 Instrument Defocus Characterisation GADS

The root tag for this Data Set is **Auxiliary_Calibration_IDC**, and the Data Set consists of a single Data Set Record of the structure described in Table 7-38. The size is calculated using the number of input N_Brc = 55.

Table 7-38 IDC GADS DSR Content Description

Tag Name	Content Description	Unit	Type	Size
First_Start_of_Observation_Time	Start of observation time of the first BRC (UTC)		DateTime	91
Last_Start_of_Observation_Time	Start of observation time of the last BRC (UTC)		DateTime	89
List_of_Mean_Mie_Image_Pixel_Level_Vals	Map of mean Mie image pixel intensity values in list form. The map contains Num_Image_Pixel_Rows * Num_Image_Pixel_Cols number of items. Location of item(i,j) at the list is Num_Image_Pixel_Cols * (i-1) + j, where i is the row index and j is the column index . See **Table 7-39** for structure definition		List of 256 Structures	19028
List_of_Mean_Rayleigh_Image_Pixel_Level_Vals	Map of mean Rayleigh image pixel intensity values in list form. The map contains Num_Image_Pixel_Rows * Num_Image_Pixel_Cols number of items. Location of item(i,j) at the list is Num_Image_Pixel_Cols * (i-1) + j, where i is the row index and j is the column index . See Table 7-40 for structure definition		List of 256 Structures	21598
Num_Image_Pixel_Rows	Number of image pixel rows		IntAs	47
Num_Image_Pixel_Cols	Number of image pixel cols		IntAs	47
Channel_1_Energetic_Centroid	See Table 7-41for structure definition		Structure	1938
Channel_2_Energetic_Centroid	See Table 7-42 for structure definition		Structure	1938
Imaging_Integration_Time_Valid	TRUE = Imaging integration time is valid		Boolean	69
List_of_Input_Info_Brcs	List of structures with information on input Brcs; see for structure definition		List of N_Brc structures	51972
Total size for XML structure in bytes:				96817

Table 7-39 IDC GADS List_of_Mean_Mie_Image_Pixel_Intensity_Vals Content Description

Tag Name	Content Description	Unit	Type	Size
Mean_Mie_Image_Pixel_Level_Val	Mean image pixel intensity	ACCD counts	FAdoxy	74

Table 7-40 IDC GADS List_of_Mean_Rayleigh_Image_Pixel_Intensity_Vals Content Description

Tag Name	Content Description	Unit	Type	Size
Mean_Rayleigh_Image_Pixel_Level_Val	Mean image pixel intensity	ACCD counts	FAdoxy	84

Table 7-41 IDC GADS Channel_1_Energetic_Centroid Content Description

Tag Name	Content Description	Unit	Type	Size
ENC_Row	Row value closest to the energetic centroid	ACCD pixel index	FAdoxy	26
ENC_Col	Column value closest to the energetic centroid	ACCD pixel index	FAdoxy	26
List_of_ENC_Row_Cross_Section_Vals	Energetic centroid row cross section. List of image pixel intensities along the ENC_Row. See **Table 7-43** for structure definition		List of 8 Structures	586
List_of_ENC_Col_Cross_Section_Vals	Energetic centroid column cross section. List of image pixel intensities along the ENC_Column. See **Table 7-44** for structure definition		List of 16 Structures	1098
ENC_Row_Std_Dev	Energetic centroid row standard deviation		FAdoxy	44
ENC_Col_Std_Dev	Energetic centroid column standard deviation		FAdoxy	44
Std_Dev_Threshold_Met	Set to ‘true’ if ENC_Row_Std_Dev and ENC_Col_Std_Dev are below threshold ENC_Std_Dev_Upper_Threshold, see Table 8-140; else set to ‘false’.		Boolean	52
Total size for XML structure in bytes:				1876

Table 7-42 IDC GADS Channel_2_Energetic_Centroid Content Description

Tag Name	Content Description	Unit	Type	Size
ENC_Row	Row value closest to the energetic centroid	ACCD pixel index	FAdoxy	26
ENC_Col	Column value closest to the energetic centroid	ACDD pixel index	FAdoxy	26
List_of_ENC_Row_Cross_Section_Vals	Energetic centroid row cross section. List of image pixel intensities along the ENC_Row. See **Table 7-43** for structure definition		List of 8 Structures	586
List_of_ENC_Col_Cross_Section_Vals	Energetic centroid column cross section. List of image pixel intensities along the ENC_Column. See **Table 7-44** for structure definition		List of 16 Structures	1098
ENC_Row_Std_Dev	Energetic centroid row standard deviation		FAdoxy	44
ENC_Col_Std_Dev	Energetic centroid column standard deviation		FAdoxy	44
Std_Dev_Threshold_Met	Set to 'true' if ENC_Row_Std_Dev and ENC_Col_Std_Dev are below threshold ENC_Std_Dev_Upper_Threshold, see Table 8-140; else set to 'false'.		Boolean	52
Total size for XML structure in bytes:				1876

Table 7-43 IDC GADS List_of_ENC_Row_Cross_Section_Vals Content Description

Tag Name	Content Description	Unit	Type	Size
ENC_Row_Cross_Section_Val	Energetic centroid row cross section pixel value. Image pixel intensity along the ENC_Row.	ACCD counts	FAdoxy	64

Table 7-44 IDC GADS List_of_ENC_Col_Cross_Section_Vals Content Description

Tag Name	Content Description	Unit	Type	Size
ENC_Col_Cross_Section_Val	Energetic centroid column cross section pixel value. Image pixel intensity along the ENC_Col.	ACCD counts	FAdoxy	64

Table 7-45 IDC GADS List_of_Input_Info_Brcs Content Description

Tag Name	Content Description	Unit	Type	Size
Input_Info_Brc	Structure containing information for one input Brc		Structure	944

Table 7-46 IDC GADS Input_Info_Brc Content Description

Tag Name	Content Description	Unit	Type	Size
M1_TC_Temp	Average of M1 TC temperature	C	FAdoxy	34
M2_TC_Temp	Average of M2 TC temperature	C	FAdoxy	34
Struts_Temp_Pxpy	Average of Struts temperature +X+Y	C	FAdoxy	46
Struts_Temp_Mxpy	Average of Struts temperature -X+Y	C	FAdoxy	46
Struts_Temp_My	Average of Struts temperature -Y	C	FAdoxy	42
Aht_22_Tel_M1	Average of Aht 22 M1 temperatures	C	FAdoxy	40
Aht_23_Tel_M1	Average of Aht 23 M1 temperatures	C	FAdoxy	40
Aht_24_Tel_M1	Average of Aht 24 M1 temperatures	C	FAdoxy	40
Aht_25_Tel_M1	Average of Aht 25 M1 temperatures	C	FAdoxy	40
Aht_26_Tel_M1	Average of Aht 26 M1 temperatures	C	FAdoxy	40
Aht_27_Tel_M1	Average of Aht 27 M1 temperatures	C	FAdoxy	40
Tc_18_Tel_M11	Average of TC 18 Tel M1-1 temperatures	C	FAdoxy	40
Tc_19_Tel_M12	Average of TC 19 Tel M1-2 temperatures	C	FAdoxy	40
Tc_20_Tel_M13	Average of TC 20 Tel M1-3 temperatures	C	FAdoxy	40
Tc_21_Tel_M14	Average of TC 21 Tel M1-4 temperatures	C	FAdoxy	40
Tc_25_Tm15_Ths1Y	Average of TC 25 TM15 Ths1-Y temperatures	C	FAdoxy	46
Tc_27_Tm16_Ths1Y	Average of TC 27 TM16 Ths1-Y temperatures	C	FAdoxy	46
Tc_29_Ths2	Average of TC 29 Ths2 temperatures	C	FAdoxy	34
Tc_23_Ths1	Average of TC 23 Ths1 temperatures	C	FAdoxy	34
Tc_32_Ths3	Average of TC 32 Ths3 temperatures	C	FAdoxy	34
Sun_Elevation_Angle	Sun elevation angle on observation level	deg	FAdoxy	52
Latitude	Geodetic latitude of DEM intersection of observation	10-6DegN	IntAul	30
Longitude	Geodetic longitude of DEM intersection of observation	10-6DegE	IntAul	32
Total size for XML structure in bytes:				910

7.5.4 File Size

Table 7-47 summarises the typical product size for Aeolus IDC products. The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 7-47 IDC Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~1697 bytes
Auxiliary Calibration SPH	~3426 bytes
IDC GADS	~96817 bytes
Product Size:	~102680 bytes

7.6 Laser Chopper Phase Adjustment

Deleted.

7.7 Mie Response Calibration

7.7.1 Product Structure

The Mie Response Calibration (MRC) product conforms to the product structure described in Section 3. It is contained in one product file containing Fixed Header as defined in Section 3.3.3 and Main Product Header, Specific Product Header and a Data Set described in following subsections. All headers and data sets are in XML format.

7.7.1.1 File Name

The Mie Response Calibration product file name has the format defined in Section 3.1:

AE_CCCC_AUX_MRC_1B_ yyyymmddThhmmss_yyyymmddThhmmss_vvvv.EEF

Where the date/times represent the start and stop of the validity period. The start date is generally set to equal the date on which the file becomes valid while the stop date is set to some date in the future when it is deemed this type of calibration data must be classified as invalid. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

7.7.2 Specific Product Header

The general Specific Product Header structure for this file is described in Section 7.2.2 and is detailed in the following table.

Table 7-48 Mie Response Calibration Specific Product Header Conent Description

Tag Name	Content Description	Unit	Type
Specific_Product_Header	Root tag for XML format only.		Structure
Sph_Descriptor	SPH descriptor ASCII string describing the product. AEOLUS_MRC_SPECIFIC_HEADER		String
Total_Num_of_Observations	Total number of level 1A input observations		IntAl
Total_Num_of_Measurements	Total Number of level 1A input measurements		IntAl
Total_Num_of_Reference_Pulses	Total number of level 1A input reference pulses		IntAl
Base_Laser_Frequency	Base Laser Transmit Frequency	GHz	FAdoxy
Spare_1			Spare
Num_of_Mie_Observations_Used	Number of Mie observations where at least one valid measurement was used.		IntAl
Num_of_Rayleigh_Observations_Used	Field not used, set to zero.		IntAl
Num_of_Mie_Measurements_Used	Number of Mie measurements used.		IntAl
Num_of_Rayleigh_Measurements_Used	Field not used, set to zero.		IntAl
Num_of_Mie_Reference_Pulses_Used	Number of Mie reference pulses used.		IntAl
Num_of_Rayleigh_Reference_Pulses_Used	Field not used, set to zero.		IntAl
Num_of_Valid_Mie_Calibration_Results	Number of valid Mie calibration results, either 1 = valid calibration results for the ground echo calibration 0 = no valid calibration results.		IntAl
Num_of_Valid_Rayleigh_Calibration_Results	Field not used, set to zero.		IntAl
Spare_2			Spare
Total_Num_of_Measurement_Invalid	Total number of measurements for which the number of corresponding valid pulses is below Meas_Cavitiy_Lock_Status_Thresh: sum of Num_Measurement_Invalid Table 7-65.		IntAl
Total_Num_of_Pulse_Validity_Status_Flag_False	Total number of reference pulses with pulse validity status flag set to false: sum of Num_Pulse_Validity_Status_Flag_False Table 7-65.		IntAl
Total_Num_of_Sat_Not_on_Target_Measurements	Total number of measurements with satellite not on target status: sum of Sat_Not_on_Target_Measurements Table 7-65.		IntAl
Total_Num_of_Corrupt_Mie_Measurement_Bins	Total number of corrupt Mie measurement bins: sum of Num_Corrupt_Measurement_Bins Table 7-65.		IntAl
Total_Num_of_Corrupt_Rayleigh_Measurement_Bins	Field not used, set to zero.		IntAl

Tag Name	Content Description	Unit	Type
Total_Num_of_Corrupt_Mie_Reference_Pulses	Total number of corrupt Mie reference pulses: sum of Num_Corrupt_Reference_Pulses Table 7-65.		IntAl
Total_Num_of_Corrupt_Rayleigh_Reference_Pulses	Field not used, set to zero.		IntAl
Spare_3			Spare
List_of_Dsds	See Table 7-4 for list of Data Sets in product		288*
Total size for XML structure in bytes:			

7.7.2.1 Data Set Descriptors

Data sets are organised as shown in Table 7-49.

Table 7-49 MRC Auxiliary Calibration Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	Mie_Response_Cal_GADS	DSD structure for GADS (specific to Auxiliary Calibration Product Type)	G	1 DSR per product
2	Aeolus_Level_1A_Product	DSD for input Aeolus Level 1A Product	R	No DS
3	Level_1B_Proc_Params	DSD for Level 1B Processing Parameters Auxiliary File	R	No DS
4	Satellite_Characterisation	DSD for Satellite Characterisation Auxiliary File	R	No DS
5	Orbit_Scenario_File	DSD for Orbit Scenario Auxiliary File	R	No DS
6	Digital_Elevation_Model	DSD for Digital Elevation Model Definition File	R	No DS
7	Geoid_Model	DSD for Geoid Model file EGM96	R	No DS
8	Range_Dependent_Bias	DSD for the input Aeolus Range Dependent Bias Auxiliary product	R	No DS
9	Dark_Current_Memory_Zone	DSD for the input Aeolus Dark Current in Memory Zone	R	No DS

7.7.2.2 Specific Product Header Size

The Specific Product Header size for this file has to be increased for 4 additional data set descriptors, and thus has an overall size of 3412 bytes + 4*288 bytes = 4564 bytes.

7.7.3 Data Sets

There is one data set for the MRC product, the Mie Response Calibration GADS, whose structure is defined in 7.7.3.1.

7.7.3.1 Mie Response Calibration GADS

The root tag for this Data Set is **Auxiliary_Calibration_MRC**, and the Data Set consists of a single Data Set Record of the structure described in Table 7-50. The number of frequency steps is variable as well as the number of (observations) measurements used for the calculation of a single frequency step result. Sizes reported here are calculated for the envisaged commanding of N_Steps = 40 frequency steps, 52 usable measurements for each single step.

Note: The numbers of 40 frequency steps and 52 usable measurements is just an indication, actual numbers will vary.

Table 7-50 MRC GADS DSR Content Description

Tag Name	Content Description	Unit	Type	Size
First_Start_of_Observation_Time	Start of observation time of the first BRC (UTC)		DateTime	91
Last_Start_of_Observation_Time	Start of observation time of the last BRC (UTC)		DateTime	89
Calibration_Valid	TRUE = Mie Response Calibration is valid. Based on acceptable ranges of calibration results for measurement and reference pulse; and the number of valid frequencies: all flags of Table 7-52 and Table 7-53, and parameters Satisfied_Min_Valid_Freq_Per_Cal and Freq_Offset_Data_Monotonic of Table 7-51 are TRUE.		Boolean	45
List_of_Frequency_Step_Results	List of channel response per frequency step. See Table 7-59 for structure definition.		List of N_Steps Structures	70347
Measurement_Response_Calibration	See Table 7-61 for structure definition		Structure	376
Reference_Pulse_Response_Calibration	See Table 7-62 for structure definition		Structure	415
Calibration_Validity_Indicators	See Table 7-51 for structure definition		Structure	1327231
Mie_Response_Calibration_Thresholds	See Table 7-63 for structure definition		Structure	1354
Diff_Offset_Freq_Ref_Meas	Difference between reference pulse and ground measurement offset frequencies (difference of x-intercepts of the best straight line fits)	GHz	FAdoxy	74
List_of_Frequency_Step_Geolocations	List of geolocation information for all frequency steps. See Table 7-66 for structure definition		List of N_Steps Structures	28795
List_of_Frequency_Step_M1_Temperatures	List of M1 temperature information for all frequency steps. See Table 7-68 for structure definition		List of N_Steps Structures	24201

Tag Name	Content Description	Unit	Type	Size
Total size for XML structure in bytes:				1453135

Table 7-51 MRC GADS
Calibration_Validity_Indicators Content Description

Tag Name	Content Description	Unit	Type	Size
Freq_Offset_Data_Monotonic	TRUE = the frequency offset data trend is monotonic		Boolean	63
Measurement_Calibration_Validity	See Table 7-52 for structure definition		Structure	425
Reference_Pulse_Calibration_Validity	See Table 7-53 for structure definition		Structure	433
List_of_Additional_Calibration_Results	Mie Core results for measurement and single frequency step level data for all frequency steps. See **Table 7-54** for structure definition		List of N_Steps Structures	1326243
Total size for XML structure in bytes:				1327164

Table 7-52 MRC GADS
Measurement_Calibration_Validity Content Description

Tag Name	Content Description	Unit	Type	Size
Satisfied_Min_Valid_Freq_Per_Cal	TRUE = Satisfied minimum number of valid frequency steps per calibration		Boolean	75
Mean_Sensitivity_Valid	TRUE = Mean sensitivity within threshold range		Boolean	55
Error_Response_Std_Dev_Valid	TRUE = Error Response standard deviation within threshold range		Boolean	67
Zero_Freq_Response_Valid	TRUE = Zero frequency response within threshold range		Boolean	59
Data_Monotonic	TRUE = measurement data is monotonic		Boolean	39
Num_Valid_Frequency_Steps	Number of valid frequency steps in the current calibration		IntAul	60
Total size for XML structure in bytes:				355

Table 7-53 MRC GADS
Reference_Pulse_Calibration_Validity Content Description

Tag Name	Content Description	Unit	Type	Size
Satisfied_Min_Valid_Freq_Per_Cal	TRUE = Satisfied minimum number of valid reference pulse frequency steps per calibration		Boolean	75
Mean_Sensitivity_Valid	TRUE = Mean sensitivity within threshold range		Boolean	55
Error_Response_Std_Dev_Valid	TRUE = Error Response standard deviation within threshold range		Boolean	67

Tag Name	Content Description	Unit	Type	Size
Zero_Freq_Response_Valid	TRUE = Zero frequency response within threshold range		Boolean	59
Data_Monotonic	TRUE = reference pulse data is monotonic		Boolean	39
Num_Valid_Frequency_Steps	Number of valid frequency steps in the current reference pulse calibration		IntAul	60
Total size for XML structure in bytes:				355

Table 7-54 MRC GADS List_of_Additional_Calibration_Results Content Description

Tag Name	Content Description	Unit	Type	Size
Additional_Calibration_Result	See Table 7-55 for structure definition.		Structure	33154
Total size for XML structure in bytes:				33154

Table 7-55 MRC GADS Additional_Calibration_Result Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Step_MC_Results	See **Table 7-58** for structure definition. Frequency step result is coded from co-added valid measurement data.		Structure	359
List_of_Measurement _Results	See **Table 7-56** for structure definition. Average size calculated for 59 valid measurements per frequency step.		List of Structures	32745
Total size for XML structure in bytes:				33104

Table 7-56 MRC GADS List of Measurement _Results Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_ Results	See Table 7-57 for structure definition.		Structure	554
Total size for XML structure in bytes:				554

Table 7-57 MRC GADS Measurement_Result Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_MC_Results	See Table 7-58 for structure definition.		Structure	284
Altitude_of_DEM_Intersection	Geodetic height above WGS84 ellipsoid of the intersection of DEM and the line-of-sight	m	FAdoxy	81

Tag Name	Content Description	Unit	Type	Size
Expected_Ground_Bin_Index	Index of expected ground bin corresponding to the altitude of DEM intersection		IntAuc	57
Ground_Bin_Detected	This list contains 24 values separated by blanks. The items in this list refer to height bins 1 ... 24. 1 if ground bin was detected, else 0.		24 * IntAuc	91
Total size for XML structure in bytes:				513

Table 7-58 MRC GADS Frequency_Step_MC_Results Content Description and MRC_GADS Measurement_MC_Results Content Description

Tag Name	Content Description	Unit	Type	Size
Peak _Position	Calculated peak position of signal. Value always reported, even if data is flagged invalid.	ACCD pixel index	FAdoxy	42
FWHM	Calculated FWHM of signal. Value always reported, even if data is flagged invalid.	ACCD pixel	FAdoxy	22
Amplitude	Calculated amplitude of signal. Value always reported, even if data is flagged invalid.	ACCD counts	FAdoxy	32
Offset	Calculated offset of signal. Value always reported, even if data is flagged invalid.	ACCD counts	FAdoxy	26
Error_Flag	1 byte bit packed field. Bit 1: Overall validity, data invalid 1, otherwise 0 Bit 2 peak height lower threshold not met 1, otherwise 0 Bit 3: peak height upper threshold not met 1, otherwise 0 Bit 4: FWHM lower threshold not met 1, otherwise 0 Bit 5: FWHM upper threshold not met 1, otherwise 0 Bit 6: peak location threshold not met 1, otherwise 0 Bit 7: number of iterations in the Lorentz fit exceeds threshold 1, otherwise 0. Bit 8: SNR below threshold 1, otherwise 0 Field set to ‘10000000’ in case the Mie Core algorithm was not invoked.		IntAuc	34
Residual_Error	Quadratic sum of differences between modelled and measured ACCD counts per pixel.		FAdoxy	42
Num_Iterations	Number of executed iterations in the nonlinear simplex algorithm.		IntAuc	37
Total size for XML structure in bytes:				235

Table 7-59 MRC GADS List_of_Frequency_Step_Results Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Step_Result	See Table 7-60 for structure definition.		Structure	1757
Total size for XML structure in bytes:				1757

Table 7-60 MRC GADS Frequency_Step_Result Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Offset	Frequency offset	GHz	FAdoxy	46
Frequency_Valid	TRUE = Satisfied minimum number of valid measurements per frequency step, Reference_Pulse_ Frequency_Valid=TRUE, and Measurement_Response_Valid=TRUE.		Boolean	41
Reference_Pulse_ Frequency_Valid	TRUE = Satisifed minimum number of valid pulses per frequency step and Reference_Pulse_Response_Valid=TRUE		Boolean	73
Measurement_Response_Valid	TRUE = Measurement response is valid		Boolean	63
Reference_Pulse_Response_Val id	TRUE = Reference Pulse Response is valid		Boolean	71
Measurement_Response	Measurement channel response	ACCD pixel index	FAdoxy	54
Measurement_Error_Mie_Respo nse	Measurement error, difference to best straight line fit	ACCD pixel	FAdoxy	74
Reference_Pulse_Response	Reference pulse channel response	ACCD pixel index	FAdoxy	62
Reference_Pulse_Error_Mie_Re sponse	Reference pulse error, difference to best straight line fit	ACCD pixel	FAdoxy	82
Normalized_Useful_Signal	24 values of useful signal separated by blanks. The first value corresponds to the lidar bin which is the upper most in the atmosphere.		24 * FAdoxy	245
Mie_Scattering_Ratio	24 values of Mie scattering ratio separated by blanks. The first value correspnds to the lidar bin which is the upper most in the atmosphere. If the scattering ratio cannot be computed, the field is set to -1.0.		24 * FAdoxy	237
Frequency_Step_Data_Statistics	Frequency step product confidence data. See **Table 7-65** for structure definition		Structure	662
Total size for XML structure in bytes:				1710

Table 7-61 MRC GADS
Measurement_Response_Calibration Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Mean_Sensitivity	Measurement mean sensitivity (slope of the best straight line of channel response)	ACCD pixel/ GHz	FAdoxy	70
Measurement_Zero_Frequency	Measurement zero frequency response (y-intercept of the best straight line of channel response)	ACCD pixel index	FAdoxy	66
Measurement_Error_Mie_Response_Std_Dev	Measurement Error_Mie_Response standard deviation		FAdoxy	90
Measurement_Offset_Frequency	Measurement zero response frequency (x-intercept of the best straight line of channel response)	GHz	FAdoxy	80
Total size for XML structure in bytes:				306

Table 7-62 MRC GADS
Reference_Pulse_Response_Calibration Content Description

Tag Name	Content Description	Unit	Type	Size
Reference_Pulse_Mean_Sensitivity	Reference pulse mean sensitivity (slope of the best straight line of channel response)	ACCD pixel/GHz	FAdoxy	78
Reference_Pulse_Zero_Frequency	Reference pulse zero frequency response(intercept of the best straight line of channel response)	ACCD pixel index	FAdoxy	74
Reference_Pulse_Error_Mie_Response_Std_Dev	Reference pulse Error_Mie_Response standard deviation		FAdoxy	98
Reference_Pulse_Offset_Frequency	Reference pulse zero response frequency (x-intercept of the best straight line of channel response)	GHz	FAdoxy	87
Total size for XML structure in bytes:				337

Table 7-63 MRC GADS
Mie_Response_Calibration_Thresholds Content Description

Tag Name	Content Description	Unit	Type	Size
Min_Valid_Freq_Per_Cal	Minimum valid frequencies per calibration, copy of processing input parameter, see Table 8-141.		IntAul	54
Min_Valid_Reference_Pulse_Freq_Per_Cal	Minimum valid reference pulse frequencies per calibration, copy of processing input parameter, see Table 8-141.		IntAul	86
Min_Valid_Measurements_Per_Freq	Minimum valid measurements per frequency, copy of processing input parameter, see Table 8-141.		IntAul	72
Min_Valid_Reference_Pulses_Per_Freq	Minimum valid pulses per frequency, copy of processing input parameter, see Table 8-141.		IntAul	80
Mie_Response_Calibration_Ranges	See Table 7-64 for structure definition		Structure	1152
Total size for XML structure in bytes:				1278

**Table 7-64 MRC GADS
Mie_Response_Calibration_Ranges Content Description**

Tag Name	Content Description	Unit	Type	Size
Min_Mie_Measurement_Mean_Sensitivity	Minimum mean sensitivity of atmospheric echo	ACCD pixel index/ GHz	FAdoxy	86
Max_Mie_Measurement_Mean_Sensitivity	Maximum mean sensitivity of atmosperic echo	ACCD pixel index/ GHz	FAdoxy	86
Min_Mie_Reference_Pulse_Mean_Sensitivity	Minimum mean sensitivity of internal calibration	ACCD pixel index/ GHz	FAdoxy	94
Max_Mie_Reference_Pulse_Mean_Sensitivity	Maximum mean sensitivity of internal calibration	ACCD pixel index/ GHz	FAdoxy	94
Min_Mie_Measurement_Zero_Freq_Response	Minimum zero frequency response of atmospheric echo	ACCD pixel index	FAdoxy	90
Max_Mie_Measurement_Zero_Freq_Response	Maximum zero frequency response of atmosperic echo	ACCD pixel index	FAdoxy	90
Min_Mie_Reference_Pulse_Zero_Freq_Response	Minimum zero frequency response of internal calibration	ACCD pixel index	FAdoxy	98
Max_Mie_Reference_Pulse_Zero_Freq_Response	Maximum zero frequency response of internal calibration	ACCD pixel index	FAdoxy	98
Max_Mie_Measurement_Error_Response_Std_Dev	Maximum error response standard deviation of atmosperic echo		FAdoxy	98
Max_Mie_Reference_Pulse_Error_Response_Std_Dev	Maximum error response standard deviation of internal calibration		FAdoxy	106
Mie_Fit_Upper_Frequency_Range	Upper frequency range when computing the best fit	GHz	FAdoxy	72
Mie_Fit_Lower_Frequency_Range	Upper frequency range when computing the best fit	GHz	FAdoxy	72
Total size for XML structure in bytes:				1084

**Table 7-65 MRC GADS
Frequency_Step_Data_Statistics Content Description**

Tag Name	Content Description	Unit	Type	Size
Num_Input_Measurements	Number of L1A input measurements for the frequency step. Num_Input_Measurements - Num_Measurement_Invalid = Num_Measurements_Usable		IntAl	54

Tag Name	Content Description	Unit	Type	Size
Num_Valid_Measurements	A measurement is a valid measurement if it is usable, see Num_Measurements_Usable, and at least one ground echo bin was detected. Num_Valid_Measurements = Num_Measurements_Usable - Num_Ground_Echo_Not_Detected_Measurements		IntAl	54
Num_Measurements_Usable	Number of atmospheric measurements usable. The atmospheric measurement is usable if L1A input data table 5-16 Measurement_Valid = TRUE, Measurement_Data_Present = TRUE, Spacecraft_Attitude_On_Target = TRUE and measurement is not corrupted (see R-2, chapter 14.3 Detection of corrupted data), measurement data was acquired after laser frequency has settled, and all corresponding pulses have the same commanded laser frequency.		IntAl	56
Num_Reference_Pulses_Usable	Number reference pulses usable. Reference pulse is usable when the pulse is valid, data is not corrupted, and pulse data was acquired for a measurement after laser frequency has settled.		IntAl	64
Num_Measurement_Invalid	Number of measurements that are not counted for Num_Measurements_Usable.		IntAl	54
Num_Pulse_Validity_Status_Flag_False	Number reference pulses with Pulse_Validity_Status_Flag Table 5-18 set to false of all valid measurements (measurements where Measurement_Valid Table 5-16 set to true) that contain only pulses with a frequency offset of the current frequency step.		IntAl	81
Num_Sat_Not_on_Target_Measurements	Number of measurements with satellite not on target status Num_Sat_Not_on_Target_Measurements are a subset of Num_Measurement_Invalid		IntAl	78
Num_Corrupt_Measurement_Bins	Number of corrupt measurement lidar bins of all valid measurements (measurements where Measurement_Valid Table 5-16 set to true) that contain only pulses with a frequency offset of the current frequency step.		IntAl	66
Num_Corrupt_Reference_Pulses	Total number of corrupt reference pulses		IntAl	66
Num_Mie_Core_Algo_Fails_Measurments	Number of measurements where the Mie core algorithm failed.		IntAl	80
Num_Ground_Echo_Not_Detected_Measurements	Number of measurements where a ground echo was not detected.		IntAl	92
Total size for XML structure in bytes:				745

Table 7-66 MRC GADS List_of_Frequency_Step_Geolocations Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Step_Geolocation	See Table 7-67 for structure definition.		Structure	718
Total size for XML structure in bytes:				718

Table 7-67 MRC GADS Frequency_Step_Geolocation Content Description

Tag Name	Content Description	Unit	Type	Size
Start_of_Observation_Time_Last_BRC	Start time of the last observation with measurements contributing to this frequency step. (UTC)		DateTime	88
Latitude_of_DEM_Intersection	Geodetic latitude of the intersection of DEM and the line-of-sight. Using n_meas valid Mie measurements for the calculation of the frequency step result, the Latitude_of_DEM_Intersection **Table 5-10** of valid measurement n_Meas / 2 is reported.	10-6DegN	IntAl	70
Longitude_of_DEM_Intersection	Geodetic longitude of the intersection of DEM and the line-of-sight. Using n_meas valid Mie measurements for the calculation of the frequency step result, the Longitude_of_DEM_Intersection **Table 5-10** of valid measurement n_Meas / 2 is reported.	10-6DegE	IntAl	72
Altitude	25 values of geodetic height above WGS84 ellipsoid separated by blanks. The first item contains the height of the upper edge of the top-most bin. The remaining 24 items contain the height of the lower edge of each height bin.	m	25 * FAdoxy	221
Satellite_Range	25 values of satellite range separated by blanks. The first item contains the range of the upper edge of the top-most bin. The remaining 24 items contain the range of the lower edge of each height bin.	m	25 * FAdoxy	210
Total size for XML structure in bytes:				661

Table 7-68 MRC GADS List_of_Frequency_Step_M1_Temperatures Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Step_M1_Temperature	See Table 7-69 for structure definition.		Structure	603
Total size for XML structure in bytes:				**603**

Table 7-69 MRC GADS Frequency_Step_M1_Temperature Content Description

Tag Name	Content Description	Unit	Type	Size
Aht_22_Tel_M1	Average Aht 22 Tel M1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Aht_23_Tel_M1	Average Aht 23 Tel M1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Aht_24_Tel_M1	Average Aht 24 Tel M1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Aht_25_Tel_M1	Average Aht 25 Tel M1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Aht_26_Tel_M1	Average Aht 26 Tel M1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Aht_27_Tel_M1	Average Aht 27 Tel M1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Tc_18_Tel_M11	Average TC 18 Tel M1-1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Tc_19_Tel_M12	Average TC 19 Tel M1-2 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Tc_20_Tel_M13	Average TC 20 Tel M1-3 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Tc_21_Tel_M14	Average TC 21 Tel M1-4 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Tc_25_Tm15_Ths1Y	Average TC 25 TM15 Ths 1-Y temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	45
Tc_27_Tm16_Ths1Y	Average TC 27 TM16 Ths 1-Y temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	45
Tc_29_Ths2	Average TC 29 Ths 2 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	33
Tc_23_Ths1	Average TC 23 Ths 1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	33
Tc_32_Ths3	Average TC 32 Ths 3 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	33
Total size for XML structure in bytes:				**540**

7.7.4 File Size

Table 7-70 summarises the typical product size for Aeolus MRC products. The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 7-70 MRC Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~1697 bytes
Auxiliary Calibration SPH	~4564 bytes
MRC GADS	~1453018 bytes
Product Size:	~1460019 bytes

7.8 Rayleigh Response Calibration

7.8.1 Product Structure

The Rayleigh Response Calibration (RRC) product conforms to the product structure described in Section 3. It is contained in one product file containing Fixed Header as defined in Section 3.3.3 and Main Product Header, Specific Product Header and a Data Set described in following subsections. All headers and data sets are in XML format.

7.8.1.1 File Name

The Rayleigh Response Calibration product file name has the format defined in Section 3.1:

AE_CCCC_AUX_RRC_1B_ yyyymmddThhmmss_yyyymmddThhmmss_vvvv.EEF

where the date/times represent the start and stop of the validity period. The start date is generally set to equal the date on which the file becomes valid while the stop date is set to some date in the future when it is deemed this type of calibration data must be classified as invalid. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

7.8.2 Specific Product Header

The general Specific Product Header structure for this file is described in Section 7.2.2 and is detailed in the following table.

Table 7-71 Rayleigh Response Calibration Specific Product Header Content Description

Tag Name	Content Description	Unit	Type
Specific_Product_Header	Root tag for XML format only.		Structure
Sph_Descriptor	SPH descriptor ASCII string describing the product. AEOLUS_RRC_SPECIFIC_HEADER		String
Total_Num_of_Observations	Total number of level 1A input observations		IntAl
Total_Num_of_Measurements	Total Number of level 1A input measurements		IntAl
Total_Num_of_Reference_Pulses	Total number of level 1A input reference pulses		IntAl
Base_Laser_Frequency	Base Laser Transmit Frequency	GHz	FAdoxy
Spare_1			Spare
Num_of_Mie_Observations_Used	Field not used, set to zero.		IntAl
Num_of_Rayleigh_Observations_Used	Number of Rayleigh observations where at least one valid measurement was used.		IntAl
Num_of_Mie_Measurements_Used	Field not used, set to zero.		IntAl
Num_of_Rayleigh_Measurements_Used	Number of Rayleigh measurements used.		IntAl
Num_of_Mie_Reference_Pulses_Used	Field not used, set to zero.		IntAl
Num_of_Rayleigh_Reference_Pulses_Used	Number of Rayleigh reference pulses used.		IntAl
Num_of_Valid_Mie_Calibration_Results	Field not used, set to zero.		IntAl
Num_of_Valid_Rayleigh_Calibration_Results	Number of valid Rayleigh calibration results, either 2 = valid calibration results for the atmospheric and the ground echo calibration 1 = valid calibration results for the atmospheric or the ground echo calibration 0 = no valid calibration result.		IntAl
Spare_2			Spare
Total_Num_of_Measurement_Invalid	Total number of measurements for which the number of corresponding valid pulses is below Meas_Cavitiy_Lock_Status_Thresh: sum of Num_Measurement_InvalidTable 7-91 .		IntAl
Total_Num_of_Pulse_Validity_Status_Flag_False	Total number of reference pulses with pulse validity status flag set to false: sum of Num_Pulse_Validity_Status_Flag_False Table 7-91.		IntAl
Total_Num_of_Sat_Not_on_Target_Measurements	Total number of measurements with satellite not on target status: sum of Sat_Not_on_Target_Measurements Table 7-91.		IntAl
Total_Num_of_Corrupt_Mie_Measurement_Bins	Field not used, set to zero.		IntAl

Tag Name	Content Description	Unit	Type
Total_Num_of_Corrupt_Rayleigh_Measurement_Bins	Total number of corrupt Rayleigh measurement bins: sum of Num_Corrupt_Measurement_Bins Table 7-91.		IntAl
Total_Num_of_Corrupt_Mie_Reference_Pulses	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Rayleigh_Reference_Pulses	Total number of corrupt Rayleigh reference pulses: sum of Num_Corrupt_Reference_Pulses Table 7-91.		IntAl
Spare_3			Spare
List_of_Dsds	See Table 7-72 for list of Data Sets in product		288*9
Total size for XML structure in bytes:			

7.8.2.1 Data Set Descriptors

Data sets are organised as shown in Table 7-72.

Table 7-72 RRC Auxiliary Calibration Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	Rayleigh_Response_Cal_GADS	DSD structure for GADS (specific to Auxiliary Calibration Product Type)	G	1 DSR per product
2	Aeolus_Level_1A_Product	DSD for input Aeolus Level 1A Product	R	No DS
3	Level_1B_Proc_Params	DSD for Level 1B Processing Parameters Auxiliary File	R	No DS
4	Satellite_Characterisation	DSD for Satellite Characterisation Auxiliary File	R	No DS
5	Orbit_Scenario_File	DSD for Orbit Scenario Auxiliary File	R	No DS
6	Digital_Elevation_Model	DSD for Digital Elevation Model Definition File	R	No DS
7	Geoid_Model	DSD for Geoid Model file EGM96	R	No DS
8	Range_Dependent_Bias	DSD for the input Aeolus Range Dependent Bias Auxiliary product	R	No DS
9	Dark_Current_Memory_Zone	DSD for the input Aeolus Dark Current in Memory Zone	R	No DS

7.8.2.2 Specific Product Header Size

The Specific Product Header size for this file has to be increased for 4 additional data set descriptors, and thus has an overall size of 3412 bytes + 4*288 bytes = 4564 bytes.

7.8.3 Data Sets

There is one data set for the RRC product, the Rayleigh Response Calibration GADS, whose structure is defined in 7.8.3.1.

7.8.3.1 Rayleigh Response Calibration GADS

The root tag for this Data Set is **Auxiliary_Calibration_RRC**, and the Data Set consists of a single Data Set Record of the structure described in Table 7-73. The number of frequency steps is variable as well as the number of (observations) measurements used for the calculation of a single frequency step result. Sizes reported here are calculated for the envisaged commanding of N_Steps = 40 frequency steps.

Note: The number of 40 frequency steps is just an indication, actual numbers will vary.

Table 7-73 RRC GADS DSR Content Description

Tag Name	Content Description	Unit	Type	Size
First_Start_of_Observation_Time	Start of observation time of the first BRC (UTC)		DateTime	91
Last_Start_of_Observation_Time	Start of observation time of the last BRC (UTC)		DateTime	89
Calibration_Valid	TRUE = Rayleigh Response Calibration of the atmospheric echo is valid. Based on acceptable ranges of calibration results for measurement and reference pulse; and the number of valid frequencies: all flags of Table 7-82 and Table 7-84, and parameters Satisfied_Min_Valid_Freq_Per_Cal and Freq_Offset_Data_Monotonic of Table 7-81 are TRUE.		Boolean	45
Ground_Calibration_Valid	TRUE = Rayleigh Response Calibration of the ground echo is valid. Based on acceptable ranges of calibration results for ground measurement and reference pulse; and the number of valid frequencies: all flags of Table 7-83 and Table 7-84, and parameters Satisfied_Min_Valid_Freq_Per_Cal and Freq_Offset_Data_Monotonic of Table 7-81 are TRUE.		Boolean	57
List_of_Frequency_Step_Results	List of channel response per frequency step. See **Table 7-74** for structure description		List of Structures	74120
List_of_Frequency_Step_Temperatures	List of Etalon, RSPT, Optical Baseplate, and M1 average temperatures per frequency step. See **Table 7-76** for structure description		List of N_Steps Structures	60916
Measurement_Response_Calibration	Rayleigh calibration results of atmospheric echo. See **Table 7-78** for structure description		Structure	892
Ground_Measurement_Response_Calibration	Rayleigh calibration results of the ground echo. See Table 7-79 for structure description		Structure	1045

Tag Name	Content Description	Unit	Type	Size
Reference_Pulse_Response_Calibration	Rayleigh calibration results of the internal reference pulse. See Table 7-80 for structure description		Structure	957
Calibration_Validity_Indicators	Calibration validity indicators for atmospheric echo, ground echon, and internal references. See **Table 7-81** for structure description		Structure	6412284
Rayleigh_Response_Calibration_Thresholds	Processing and quality thresholds as defined by the AUX_PAR_1B file. See Table 7-89for structure description		Structure	2323
Diff_Offset_Freq_Ref_Meas	Difference between reference pulse and atmospheric measurement offset frequencies (difference of x-intercepts of the best straight line fits)	GHz	FAdoxy	74
Diff_Offset_Freq_Ref_Ground_Meas	Difference between reference pulse and ground measurement offset frequencies (difference of x-intercepts of the best straight line fits)	GHz	FAdoxy	88
Min_Aht_9_Rsp_Etalon	Minimum Etalon temperature for current sensor, over all BRCs and all time samples per BRC.	C	FAdoxy	54
Max_Aht_9_Rsp_Etalon	Maximum Etalon temperature for current sensor, over all BRCs and all time samples per BRC.	C	FAdoxy	54
Min_Aht_10_Rsp_Etalon	Minimum Etalon temperature for current sensor, over all BRCs and all time samples per BRC.	C	FAdoxy	56
Max_Aht_10_Rsp_Etalon	Maximum Etalon temperature for current sensor, over all BRCs and all time samples per BRC.	C	FAdoxy	56
Min_Aht_11_Rsp_Etalon	Minimum Etalon temperature for current sensor, over all BRCs and all time samples per BRC.	C	FAdoxy	56
Max_Aht_11_Rsp_Etalon	Maximum Etalon temperature for current sensor, over all BRCs and all time samples per BRC.	C	FAdoxy	56
Min_Aht_12_Rsp_Etalon	Field set fixed to zero; see R-6.	C	FAdoxy	56
Max_Aht_12_Rsp_Etalon	Field set fixed to zero; see R-6.	C	FAdoxy	56
Data_Is_Valid	FALSE if one of the sensor temperature ranges (difference between min and max values over all the BRCs and time samples) is greater than the allowed threshold. TRUE otherwise.		Boolean	34
List_of_Frequency_Step_Geolocations	List of geolocation information for all frequency steps. This information is needed by the AUX_CSR /AUX_PRR generator running at the APMF. See **Table 7-95** for structure description.		List of N_Steps Structures	39836
List_of_ Frequency_Step_Centroid_Values	List of information on energetic centroid and std dev of the Rayleigh spots for all frequency steps. See **Error! Reference source not found.** for structure definition.		List of N_Steps Structures	52123
Total size for XML structure in bytes:				874362

Table 7-74 RRC GADS
List_of_Frequency_Step_Results Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Step_Result	See Table 7-75 for structure description		Structure	1780
Total size for XML structure in bytes:				1780

Table 7-75 RRC GADS
Frequency_Step_Result Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Offset	Frequency offset	GHz	FAdoxy	46
Frequency_Valid	TRUE = Satisfied minimum number of valid measurements per frequency step (value of parameter Num_Valid_Measurements Table 7-91 compared to threshold Min_Valid_Measurements_Per_Freq Table 7-89), Reference_Pulse_Frequency_Valid= TRUE, and Measurement_Response_Valid=TRUE.		Boolean	41
Ground_Frequency_Valid	TRUE = Satisfied minimum number of valid ground measurements per frequency step(value of parameter Num_Valid_Measurements Table 7-91 compared to threshold Min_Valid_Ground_Measurements_Per_Freq Table 7-89), Reference_Pulse_Frequency_Valid= TRUE, and Ground_Measurement_Response_Valid=TRUE		Boolean	55
Reference_Pulse_Frequency_Valid	TRUE = Satisfied minimum number of valid pulses per frequency step (value of parameter Num_Reference_Pulses_Usable Table 7-91 compared to threshold Min_Valid_Reference_Pulses_Per_Freq Table 7-89), Reference_Pulse_Response_Valid= TRUE,		Boolean	73
Measurement_Response_Valid	TRUE = Measurement response is valid; Rayleigh core algorithm applied successfully to the mean atmospheric echo		Boolean	63
Ground_Measurement_Response_Valid	TRUE = Ground measurement response is valid; Rayleigh core algorithm applied successfully the mean ground echo		Boolean	77
Reference_Pulse_Response_Valid	TRUE = Reference Pulse Response is valid; Rayleigh core algorithm applied successfully the mean reference pulse		Boolean	71
Measurement_Response	Measurement channel response		FAdoxy	54
Measurement_Error_Rayleigh_Response	Measurement error, difference to best straight line fit		FAdoxy	84
Ground_Measurement_Response	Ground measurement channel response		FAdoxy	68
Ground_Measurement_Error_Rayleigh_Response	Ground measurement error, difference to best straight line fit		FAdoxy	98

Tag Name	Content Description	Unit	Type	Size
Reference_Pulse_Response	Reference pulse channel response		FAdoxy	62
Reference_Pulse_Error_Rayleigh_Response	Reference pulse error, difference to best straight line fit		FAdoxy	92
Normalized_Useful_Signal	24 values of useful signal separated by blanks. The first value correspnds to the lidar bin which is the upper most in the atmosphere.		24 * FAdoxy	245
Frequency_Step_Data_Statistics	Frequency step product confidence data. See **Table 7-91** for structure description		Structure	676
Total size for XML structure in bytes:				1805

Table 7-76 RRC GADS List_of_Frequency_Step_Temperatures Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Step_Temperature	See Table 7-77 for structure description		Structure	1521

Table 7-77 RRC GADS Frequency_Step_Temperature Content Description

Tag Name	Content Description	Unit	Type	Size
Etalon_Average_Temperature	See Table 7-92 for structure definition		Structure	302
RSPT_Average_Temperature	See Table 7-93 for structure definition		Structure	482
Optical_Baseplate_Average	Sensor OB Ray average temperature of temperatures of sensors 5, 6, 7, 8, for all BRCs with measurements of the frequency step.	C	FAdoxy	88
M1_Average_Temperature	See Table 7-94 for structure definition.		Structure	589
Total size for XML structure in bytes:				**1461**

Table 7-78 RRC GADS Measurement_Response_Calibration Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Mean_Sensitivity	Measurement mean sensitivity	1/GHz	FAdoxy	70
Measurement_Zero_Frequency	Measurement zero frequency response		FAdoxy	66
Measurement_Error_Rayleigh_Response_Std_Dev	Measurement Error_Rayleigh_Response standard deviation		FAdoxy	100
Measurement_Offset_Frequency	Measurement zero response frequency (x-intercept of the best straight line of channel response)	GHz	FAdoxy	80

Tag Name	Content Description	Unit	Type	Size
List_of_Measurement_Error_Fit_Coefficients	List of coefficients of polynomial fit of the errors of the measurement response (parameter Measurement_Error_Rayleigh_Response of Table 7-75). Order of polynom specified by parameter Error_Fit_Degree of Table 8-142. List element 1 <= i <= Error_Fit_Degree +1 is the coefficient of x^{i-1}. See Table 7-98 for structure definition.		List of Error_Fit_Degree + 1 structures	576
Total size for XML structure in bytes:				892

Table 7-79 RRC GADS Ground_Measurement_Response_Calibration Content Description

Tag Name	Content Description	Unit	Type	Size
Ground_Measurement_Mean_Sensitivity	Ground measurement mean sensitivity	1/GHz	FAdoxy	84
Ground_Measurement_Zero_Frequency	Ground measurement zero frequency response		FAdoxy	80
Ground_Measurement_Error_Rayleigh_Response_Std_Dev	Ground measurement Error_Rayleigh_Response standard deviation		FAdoxy	114
Ground_Measurement_Offset_Frequency	Ground measurement zero response frequency (x-intercept of the best straight line of channel response)	GHz	FAdoxy	94
List_of_Ground_Measurement_Error_Fit_Coefficients	List of coefficients of polynomial fit of the errors of the ground measurement response (parameter Ground_Measurement_Error_Rayleigh_Response of Table 7-75). Order of polynom specified by parameter Error_Fit_Degree of Table 8-142. List element 1 <= i <= Error_Fit_Degree +1 is the coefficient of x^{i-1}. See Table 7-99 for structure definition.		List of Error_Fit_Degree + 1 structures	673
Total size for XML structure in bytes:				1045

Table 7-80 RRC GADS Reference_Pulse_Response_Calibration Content Description

Tag Name	Content Description	Unit	Type	Size
Reference_Pulse_Mean_Sensitivity	Reference pulse mean sensitivity	1/GHz	FAdoxy	78
Reference_Pulse_Zero_Frequency	Reference pulse zero frequency response		FAdoxy	74

Tag Name	Content Description	Unit	Type	Size
Reference_Pulse_Error_Rayleigh_Response_Std_Dev	Reference pulse Error_Rayleigh_Response standard deviation		FAdoxy	108
Reference_Pulse_Offset_Frequency	Reference pulse zero response frequency (x-intercept of the best straight line of channel response)	GHz	FAdoxy	87
List_of_Reference_Pulse_Error_Fit_Coefficients	List of coefficients of polynomial fit of the errors of the reference pulse response (parameter Reference_Pulse_Error_Rayleigh_Response of Table 7-75). Order of polynom specified by parameter Error_Fit_Degree of Table 8-142. List element 1 <= i <= Error_Fit_Degree +1 is the coefficient of x^{i-1}. See Table 7-100 for structure definition.		List of Error_Fit_Degree + 1 structures	620
Total size for XML structure in bytes:				957

Table 7-81 RRC GADS Calibration_Validity_Indicators Content Description

Tag Name	Content Description	Unit	Type	Size
Freq_Offset_Data_Monotonic	TRUE = the frequency offset data trend is monotonic		Boolean	63
Measurement_Calibration_Validity	See Table 7-82 for structure description		Structure	425
Ground_Measurement_Calibration_Validity	See Table 7-82 for structure description		Structure	439
Reference_Pulse_Calibration_Validity	See Table 7-84 for structure description		Structure	433
List_of_Additional_Calibration_Results	So far the additional calibration results contain information on the ground detection. See Table 7-85 for structure description		List of N_Steps Structures	639801
Total size for XML structure in bytes:				641161

Table 7-82 RRC GADS Measurement_Calibration_Validity Content Description

Tag Name	Content Description	Unit	Type	Size
Satisfied_Min_Valid_Freq_Per_Cal	TRUE = Satisfied minimum number of valid frequency steps per calibration; value of Num_Valid_Frequency_Steps compared to Table 7-89 Min_Valid_Freq_Per_Cal		Boolean	75
Mean_Sensitivity_Valid	TRUE = Mean sensitivity within threshold range and parameter Data_Is_Valid of Table 7-73 is TRUE.		Boolean	55
Error_Response_Std_Dev_Valid	TRUE = Error Response standard deviation within threshold range and parameter Data_Is_Valid of Table 7-73 is TRUE.		Boolean	67

Tag Name	Content Description	Unit	Type	Size
Zero_Freq_Response_Valid	TRUE = Zero frequency response within threshold range and parameter Data_Is_Valid of Table 7-73 is TRUE.		Boolean	59
Data_Monotonic	TRUE = measurement data is monotonic; Measurement_Response values of all frequency steps where Frequency_Valid=TRUE Table 7-75 increase or decrease monotonic.		Boolean	39
Num_Valid_Frequency_Steps	Number of valid frequency steps in the current calibration; frequency step counted valid if parameter Frequency_Valid=TRUE, see Table 7-75.		IntAul	60
Total size for XML structure in bytes:				355

Table 7-83 RRC GADS Ground_Measurement_Calibration_Validity Content Description

Tag Name	Content Description	Unit	Type	Size
Satisfied_Min_Valid_Freq_Per_Cal	TRUE = Satisfied minimum number of valid frequency steps per gound calibration; value of Num_Valid_Frequency_Steps compared to Table 7-89 Min_Valid_Ground_Freq_Per_Cal		Boolean	75
Mean_Sensitivity_Valid	TRUE = Mean sensitivity within threshold range and parameter Data_Is_Valid of Table 7-73 is TRUE.		Boolean	55
Error_Response_Std_Dev_Valid	TRUE = Error Response standard deviation within threshold range and parameter Data_Is_Valid of Table 7-73 is TRUE.		Boolean	67
Zero_Freq_Response_Valid	TRUE = Zero frequency response within threshold range and parameter Data_Is_Valid of Table 7-73 is TRUE.		Boolean	59
Data_Monotonic	TRUE = measurement data is monotonic; Ground_Measurement_Response values of all frequency steps where Ground_Frequency_Valid=TRUE Table 7-75 increase or decrease monotonic.		Boolean	39
Num_Valid_Frequency_Steps	Number of valid frequency steps in the current ground calibration; frequency step counted valid if parameter Ground_Frequency_Valid=TRUE, see Table 7-75.		IntAul	60
Total size for XML structure in bytes:				355

Table 7-84 RRC GADS Reference_Pulse_Calibration_Validity Content Description

Tag Name	Content Description	Unit	Type	Size
Satisfied_Min_Valid_Freq_Per_Cal	TRUE = Satisfied minimum number of valid frequency steps per calibration; value of Num_Valid_Reference_Pulse Frequency_Steps compared to Table 7-89 Min_Valid_Reference_Pulse_Freq_Per_Cal		Boolean	75
Mean_Sensitivity_Valid	TRUE = Mean sensitivity within threshold range and parameter Data_Is_Valid of Table 7-73 is TRUE.		Boolean	55
Error_Response_Std_Dev_Valid	TRUE = Error Response standard deviation within threshold range and parameter Data_Is_Valid of Table 7-73 is TRUE.		Boolean	67
Zero_Freq_Response_Valid	TRUE = Zero frequency response within threshold range and parameter Data_Is_Valid of Table 7-73 is TRUE.		Boolean	59
Data_Monotonic	TRUE = reference pulse data is monotonic; Reference_Pulse_Response values of all frequency steps where Frequency_Valid=TRUE Table 7-75 increase or decrease monotonic.		Boolean	39
Num_Valid_Frequency_Steps	Number of valid frequency steps in the current calibration; frequency step counted valid if parameter Reference_Pulse_Frequency_Valid =TRUE, see Table 7-75.		IntAul	60
Total size for XML structure in bytes:				355

Table 7-85 RRC GADS List_of_Additional_Calibration_Results

Tag Name	Content Description	Unit	Type	Size
Additional_Calibration_Result	See Table 7-86 for structure description.		Structure	15993
Total size for XML structure in bytes:				15993

Table 7-86 RRC GADS Additional_Calibration_Results

Tag Name	Content Description	Unit	Type	Size
List_of_Measurement_Results	See Table 7-87 for structure description. Average size calculated for 59 valid measurements per frequency step.		List of structures	15930
Total size for XML structure in bytes:				15930

Table 7-87 RRC GADS List_of_Measurement_Results

Tag Name	Content Description	Unit	Type	Size
Measurement_Result	See Table 7-88 for structure description.		Structure	269
Total size for XML structure in bytes:				269

Table 7-88 RRC GADS Measurement_Result

Tag Name	Content Description	Unit	Type	Size
Altitude_of_DEM_Intersection	Geodetic height above WGS84 ellipsoid of the intersection of DEM and the line-of-sight	m	FAdoxy	80
Expected_Ground_Bin_Index	Index of expected ground bin corresponding to the altitude of DEM intersection		IntAuc	57
Ground_Bin_Detected	This list contains 24 values separated by blanks. The items in this list refer to height bins 1 ... 24. 1 if ground bin was detected, else 0		24 * IntAuc	91
Total size for XML structure in bytes:				228

Table 7-89 RRC GADS Rayleigh_Response_Calibration_Thresholds Content Description

Tag Name	Content Description	Unit	Type	Size
Min_Valid_Freq_Per_Cal	Minimum valid frequencies per calibration, copy of processing input parameter, see Table 8-142.		IntAul	54
Min_Valid_Ground_Freq_Per_Cal	Minimum valid ground frequencies per calibration, copy of processing input parameter, see Table 8-142.		IntAul	68
Min_Valid_Reference_Pulse_Freq_Per_Cal	Minimum valid reference pulse frequencies per calibration, copy of processing input parameter, see Table 8-142.		IntAul	86
Min_Valid_Measurements_Per_Freq	Minimum valid measurements per frequency, copy of processing input parameter, see Table 8-142.		IntAul	72
Min_Valid_Ground_Measurements_Per_Freq	Minimum valid ground measurements per frequency, copy of processing input parameter, see Table 8-142.		IntAul	86
Min_Valid_Reference_Pulses_Per_Freq	Minimum valid pulses per frequency, copy of processing input parameter, see Table 8-142.		IntAul	80
Rayleigh_Response_Calibration_Ranges	See Table 7-90 for structure description		Structure	1352
Lower_Altitude_Limit	RRC lower altitude limit, copy of processing input parameter, see Table 8-142.	m	FAdoxy	54

Tag Name	Content Description	Unit	Type	Size
Upper_Altitude_Limit	RRC upper altitude limit, copy of processing input parameter, see Table 8-142.	m	FAdoxy	54
Maximum_Upper_DEM_Offset	Maximum height difference that center of detected ground bin is allowed to be above center of DEM intersection bin, copy of processing input parameter, see Table 8-142.	m	FAdoxy	57
Maximum_Lower_DEM_Offset	Maximum height difference that center of detected ground bin is allowed to be below center of DEM intersection bin, copy of processing input parameter, see Table 8-142.	m	FAdoxy	57
Min_Rayleigh_Ground_Detection_Signal_Derivative	Minimum derivative of Rayleigh signal shift for ground detection, copy of processing input parameter, see Table 8-142.		FAdoxy	108
Max_Rayleigh_Ground_Detection_Response_Shift	Maximum Rayleigh Response shift for ground detection, copy of processing input parameter, see Table 8-142.		FAdoxy	102
Etalon_Temp_Range_Threshold	RRC RSP Etalon range threshold, copy of processing input parameter, see Table 8-142.	C	Fadoxy	68
Scattering_Ratio_Threshold	Copy of RRC_Params input parameter, see Table 8-142.		Fadoxy	65
Total size for XML structure in bytes:				2237

Table 7-90 RRC GADS Rayleigh_Response_Calibration_Ranges Content Description

Tag Name	Content Description	Unit	Type	Size
Min_Rayleigh_Measurement_Mean_Sensitivity	Minimum mean sensitivity of atmosperic echo, copy of processing input parameter, Table 8-149	1/GHz	FAdoxy	96
Min_Rayleigh_Measurement_Zero_Freq_Response	Minimum zero frequency response of atmosperic echo, copy of processing input parameter, Table 8-149		FAdoxy	100
Max_Rayleigh_Measurement_Mean_Sensitivity	Maximum mean sensitivity of atmosperic echo, copy of processing input parameter, Table 8-149	1/GHz	FAdoxy	96
Max_Rayleigh_Measurement_Zero_Freq_Response	Maximum zero frequency response of atmosperic echo, copy of processing input parameter, Table 8-149		FAdoxy	100
Max_Rayleigh_Measurement_Error_Response_Std_Dev	Maximum error response standard deviation of atmosperic echo, copy of processing input parameter, Table 8-149		FAdoxy	108
Min_Rayleigh_Ground_Measurement_Mean_Sensitivity	Minimum mean sensitivity of ground echo , copy of processing input parameter, Table 8-149	1/GHz	FAdoxy	110
Min_Rayleigh_Ground_Measurement_Zero_Freq_Response	Minimum zero frequency response of ground echo, copy of processing input parameter, Table 8-149		FAdoxy	114
Max_Rayleigh_Ground_Measurement_Mean_Sensitivity	Maximum mean sensitivity of ground echo, copy of processing input parameter, Table 8-149	1/GHz	FAdoxy	110

Tag Name	Content Description	Unit	Type	Size
Max_Rayleigh_Ground_Measurement_Zero_Freq_Response	Maximum zero frequency response of ground echo, copy of processing input parameter, Table 8-149		FAdoxy	114
Max_Rayleigh_Ground_Measurement_Error_Response_Std_Dev	Maximum error response standard deviation of ground echo, copy of processing input parameter, Table 8-149		FAdoxy	122
Min_Rayleigh_Reference_Pulse_Mean_Sensitivity	Minimum mean sensitivity of internal calibration, copy of processing input parameter, Table 8-149	1/ GHz	FAdoxy	104
Min_Rayleigh_Reference_Pulse_Zero_Freq_Response	Minimum zero frequency response of internal calibration, copy of processing input parameter, Table 8-149		FAdoxy	108
Max_Rayleigh_Reference_Pulse_Mean_Sensitivity	Maximum mean sensitivity of internal calibration, copy of processing input parameter, Table 8-149	1/ GHz	FAdoxy	104
Max_Rayleigh_Reference_Pulse_Zero_Freq_Response	Maximum zero frequency response of internal calibration, copy of processing input parameter, Table 8-149		FAdoxy	108
Max_Rayleigh_Reference_Pulse_Error_Response_Std_Dev	Maximum error response standard deviation of internal calibration, copy of processing input parameter, Table 8-149		FAdoxy	116
Rayleigh_Fit_Upper_Frequency_Range	Upper frequency range when computing the best fit, copy of processing input parameter, Table 8-149	GHz	FAdoxy	82
Rayleigh_Fit_Lower_Frequency_Range	Upper frequency range when computing the best fit, copy of processing input parameter, Table 8-149	GHz	FAdoxy	82
Total size for XML structure in bytes:				1274

Table 7-91 RRC GADS Frequency_Step_Data_Statistics Content Description

Tag Name	Content Description	Unit	Type	Size
Num_Valid_Measurements	A measurement is a valid measurement if it is usable, see Num_Measurements_Usable, the number of atmospheric height bins within the specified range is not 0, all range bins in the specified range are valid, and at least 1 corresponding reference pulse is valid.		IntAl	54
Num_Measurements_Usable	Number of atmospheric measurements usable. The atmospheric measurement is usable if L1A input data table 5-16 Measurement_Laser_Freq_Locked = TRUE, Measurement_Data_Present = TRUE, Spacecraft_Attitude_On_Target = TRUE and measurement is not corrupted, measurement data was acquired after laser frequency has settled, and all corresponding pulses have the same commanded laser frequency.		IntAl	56
Num_Measurements_Valid_Ground	A measurement is a valid ground measurement if it is usable, see Num_Measurements_Usable, ground bins have been detected, and at least 1 corresponding reference pulse is valid.		IntAl	68

Tag Name	Content Description	Unit	Type	Size
Num_Reference_Pulses_Usable	Number reference pulses usable. Reference pulse is usuable if the pulse is valid, data is not corrupted, and pulse data was acquired for a measurement after laser frequency has settled.		IntAl	64
Num_Measurement_Invalid	Number of measurements that are not counted for Num_Measurements_Usable OR where reference pulse data of that measurement is invalid		IntAl	54
Num_Pulse_Validity_Status_Flag_False	Number reference pulses with Pulse_Validity_Status_Flag Table 5-18 set to false of all valid measurements (measurements where Measurement_Valid Table 5-16 set to true) that contain only pulses with a frequency offset of the current frequency step.		IntAl	78
Num_Sat_Not_on_Target_Measurements	Number of measurements with satellite not on target status		IntAl	78
Num_Corrupt_Measurement_Bins	Number of corrupt measurement lidar bins of all valid measurements (measurements where Measurement_Valid Table 5-16 set to true) that contain only pulses with a frequency offset of the current frequency step.		IntAl	66
Num_Corrupt_Reference_Pulses	Number of corrupt reference pulses, see R-2, chapter 14.3.		IntAl	66
Total size for XML structure in bytes				584

Table 7-92 RRC GADS Etalon_Average_Temperature Content Description

Tag Name	Content Description	Unit	Type	Size
Ray_Spectrometer_Temp_9	Sensor RSP etalon temperature	C	FAdoxy	60
Ray_Spectrometer_Temp_10	Sensor RSP etalon temperature	C	FAdoxy	62
Ray_Spectrometer_Temp_11	Sensor RSP etalon temperature	C	FAdoxy	62
Ray_Spectrometer_Temp_12	Field set fixed to zero; see R-6.	C	FAdoxy	62
Total size for XML structure in bytes:				864

Table 7-93 RRC GADS RSPT_Average_Temperature Content Description

Tag Name	Content Description	Unit	Type	Size
Thermocouple_8_Ray_Spectrometer_Thermal_Hood_1	Sensor RSPT average temperature	C	FAdoxy	106
Thermocouple_9_Ray_Spectrometer_Thermal_Hood_2	Sensor RSPT average temperature	C	FAdoxy	106
Thermocouple_10_Ray_Spectrometer_Thermal_Hood_3	Sensor RSPT average temperature	C	FAdoxy	108

Tag Name	Content Description	Unit	Type	Size
Thermocouple_11_Ray_Spectrometer_Thermal_Hood_4	Sensor RSPT average temperature	C	FAdoxy	108
Total size for XML structure in bytes:				428

Table 7-94RRC GADS M1_Average_Temperature Content Description

Tag Name	Content Description	Unit	Type	Size
Aht_22_Tel_M1	Average Aht 22 Tel M1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Aht_23_Tel_M1	Average Aht 23 Tel M1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Aht_24_Tel_M1	Average Aht 24 Tel M1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Aht_25_Tel_M1	Average Aht 25 Tel M1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Aht_26_Tel_M1	Average Aht 26 Tel M1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Aht_27_Tel_M1	Average Aht 27 Tel M1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Tc_18_Tel_M11	Average TC 18 Tel M1-1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Tc_19_Tel_M12	Average TC 19 Tel M1-2 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Tc_20_Tel_M13	Average TC 20 Tel M1-3 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Tc_21_Tel_M14	Average TC 21 Tel M1-4 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	39
Tc_25_Tm15_Ths1Y	Average TC 25 TM15 Ths 1-Y temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	45
Tc_27_Tm16_Ths1Y	Average TC 27 TM16 Ths 1-Y temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	45
Tc_29_Ths2	Average TC 29 Ths 2 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	33
Tc_23_Ths1	Average TC 23 Ths 1 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	33
Tc_32_Ths3	Average TC 32 Ths 3 temperature for all BRCs with measurements of the frequency step.	C	FAdoxy	33
Total size for XML structure in bytes:				**540**

Table 7-95 RRC GADS List_of_Frequency_Step_Geolocations Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Step_Geolocation	See Table 7-96 for structure description		Structure	982

Table 7-96 RRC GADS Frequency_Step_Geolocation Content Description

Tag Name	Content Description	Unit	Type	Size
Start_of_Observation_Time_Last_BRC	Start time of the last observation with measurements contributing to this frequency step. (UTC)		DateTime	96
Latitude_of_DEM_Intersection	Geodetic latitude of the intersection of DEM and the line-of-sight. Using n_meas valid Mie measurements for the calculation of the frequency step result, the Latitude_of_DEM_Intersection **Table 5-10** of valid measurement n_Meas / 2 is reported.	10-6DegN	IntAl	69
Longitude_of_DEM_Intersection	Geodetic longitude of the intersection of DEM and the line-of-sight. Using n_meas valid Mie measurements for the calculation of the frequency step result, the Longitude_of_DEM_Intersection **Table 5-10** of valid measurement n_Meas / 2 is reported.	10-6DegE	IntAl	71
Altitude	This list contains 25 values, separated by blanks. The first item contains the geodetic height above WGS84 ellipsoid of the upper edge of the top-most bin. The remaining 24 items contain the geodetic height above WGS84 ellipsoid of the lower edge of each height bin.	m	25 * FAdoxy	249
Satellite_Range	This list contains 25 values, separated by blanks. The first item contains the distance along LOS of the upper edge of the top-most bin. The remaining 24 items contain the distance along LOS of the lower edge of each height bin.	m	25 * FAdoxy	249
List_of_Geoid_Separations	List of geoid separation values, one value for each BRC contributing to the results of the frequency step. With nominal settings 3 BRCs per frequency step.		Structure	188
Total size for XML structure in bytes:				922

Table 7-97 RRC GADS List_of_Geoid_Separations Content Description

Tag Name	Content Description	Unit	Type	Size
Geoid_Separation	Height of geoid above WGS84 ellipsoid.	m	FAdoxy	45

Table 7-98 RRC GADS List_of_Measurement_Error_Fit_Coefficients Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Error_Fit_Coefficient	One coefficient of the fitted polynomial.		FAdoxy	81

Table 7-99 RRC GADS List_of_Ground_Measurement_Error_Fit_Coefficients Content Description

Tag Name	Content Description	Unit	Type	Size
Ground_Measurement_Error_Fit_Coefficient	One coefficient of the fitted polynomial.		FAdoxy	95

Table 7-100 List_of_Reference_Pulse_Error_Fit_Coefficients Content Description

Tag Name	Content Description	Unit	Type	Size
Reference_Pulse_Error_Fit_Coefficient	One coefficient of the fitted polynomial.		FAdoxy	87

Table 7-101 RRC GADS List_of_Frequency_Step_Centroid_Values Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Step_Centroid_Values	See **Error! Reference source not found.** for structure description.		Structure	**1301**

Table 7-102 RRC GADS Frequency Step Centroid Values Content Description

Tag Name	Content Description	Unit	Type	Size
Enc_Col_Ref_Pulse_A	Col value of the energetic centroid of the mean reference pulse of the frequency step for channel A. Value set to 0 if parameter couldn't be retrieved.	ACCD pixel index	FAdoxy	71
Enc_Col_Ref_Pulse_Std_Dev_A	Energetic centroid column standard deviation for the mean reference pulse of channel A. Value set to 0 if parameter couldn't be retrieved.		FAdoxy	67
Enc_Col_Ref_Pulse_B	Col value of the energetic centroid of the mean reference pulse of the frequency step for channel B. Value set to 0 if parameter couldn't be retrieved.	ACCD pixel index	FAdoxy	71
Enc_Col_Ref_Pulse_Std_Dev_B	Energetic centroid column standard deviation for the mean reference pulse for channel B Value set to 0 if parameter couldn't be retrieved.		FAdoxy	67

Tag Name	Content Description	Unit	Type	Size
Enc_Col_A	This list contains 25 values, separated by blanks. Col values of the energetic centroids of the mean signal of the frequency step for channel A: the first 24 values for the atmospheric bins, and the last element for the solar background bin. Value set to 0 if parameter couldn't be retrieved.	ACCD pixel index	25 * FAdoxy	242
Enc_Col_Std_Dev_A	This list contains 25 values, separated by blanks. Energetic centroid column standard deviation values for channel A: the first 24 values for the atmospheric bins, and the last element for the solar background bin. Value set to 0 if parameter couldn't be retrieved.		25 * FAdoxy	238
Enc_Col_B	This list contains 25 values, separated by blanks. Col values of the energetic centroids of the mean signal of the frequency step for channel B: the first 24 values for the atmospheric bins, and the last element for the solar background bin. Value set to 0 if parameter couldn't be retrieved.	ACCD pixel index	25 * FAdoxy	242
Enc_Col_Std_Dev_B	This list contains 25 values, separated by blanks. Energetic centroid column standard deviation values for channel B: the first 24 values for the atmospheric bins, and the last element for the solar background bin. Value set to 0 if parameter couldn't be retrieved.		25 * FAdoxy	238
Total size for XML structure in bytes:				**1236**

7.8.4 File Size

Table 7-103 summarises the typical product size for Aeolus RRC products. The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 7-103 RRC Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~1697 bytes
Auxiliary Calibration SPH	~4564 bytes
RRC GADS	~874362 bytes
Product Size:	~881363 bytes

7.9 Laser Diode Temperature Adjustment Calibration

Deleted.

7.10 Offline Wind Measurement Mode

7.10.1 Product Structure

The Offline Wind Measurement Mode (OWV) product conforms to the product structure described in Section 3. The structure of this file is an exact replica of the Wind Measurement mode. Please see Section 6.1 to Section 6.3 for more details.

7.10.1.1 File Name

The Offline Wind Measurement Mode product file name has the format defined in Section 3.1:

AE_CCCC_AUX_OWV_1B_ yyyymmddThhmmss_ *uuuuuuuu_oooooo_vvvv*

The level 1B Offline Wind Measurement product consists of two files:

1. Header file containing Fixed Header, MPH, and SPH with DSDs in XML format. The header file has a file extension ‘HDR’.
2. Data Block file with a copy of the MPH and SPH in KVT format followed by the Data Sets in binary format. The Data Block file has the extension ‘DBL’.

7.11 Zero Wind Calibration

Zero Wind Calibration auxiliary file is generated during Wind Measurement mode. It contains data records for each measurement where a ground return is detected and therefore provides a calibration point where the apparent wind speed should have been measured as zero. This product gives an indication where yaw steering errors, instrument pointing errors or other calibration errors may be introducing errors and these can be applied as wind speed corrections to subsequent measurements.

7.11.1 Product Structure

The Zero Wind Calibration (ZWC) auxiliary data conforms to the structure described in Section 3. It is contained in one product file containing Fixed Header as defined in Section 3.3.3 and Main Product Header, Specific Product Header and a Data Set described in following subsections. All headers and data sets are in XML format.

7.11.1.1 File Name

The Zero Wind Calibration product file name has the format defined in Section 3.1:

AE_CCCC_AUX_ZWC_1B_ yyyymmddThhmmss_yyyymmddThhmmss_vvvv.EEF

Where the date/times represent the start and stop of the validity period. The start date is generally set to equal the date on which the file becomes valid while the stop date is set to some date in the future when it is deemed this type of calibration data must be classified as invalid. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

7.11.2 Specific Product Header

The general Specific Product Header structure for this file is described in Section 7.2.2 and is detailed in the following table.

Table 7-104 Zero Wind Calibration Specific Product Header Content Description

Tag Name	Content Description	Unit	Type
Specific_Product_Header	Root tag for XML format only.		Structure
Sph_Descriptor	SPH descriptor ASCII string describing the product. AEOLUS_ZWC_SPECIFIC_HEADER		String
Total_Num_of_Observations	Total number of level 1A input observations		IntAl
Total_Num_of_Measurements	Total Number of level 1A input measurements		IntAl
Total_Num_of_Reference_Pulses	Total number of level 1A input reference pulses		IntAl
Base_Laser_Frequency	Base Laser Transmit Frequency	GHz	FAdoxy
Spare_1			Spare
Num_of_Mie_Observations_Used	Number of Mie observations where at least one valid measurement was used.		IntAl
Num_of_Rayleigh_Observations_Used	Number of Rayleigh observations where at least one valid measurement was used.		IntAl
Num_of_Mie_Measurements_Used	Field not used, set to zero.		IntAl
Num_of_Rayleigh_Measurements_Used	Number of Rayleigh measurements used.		IntAl
Num_of_Mie_Reference_Pulses_Used	Field not used, set to zero.		IntAl
Num_of_Rayleigh_Reference_Pulses_Used	Number of Rayleigh reference pulses used.		IntAl
Num_of_Valid_Mie_Calibration_Results	Same as Num_of_Mie_Observations_Used		IntAl

Tag Name	Content Description	Unit	Type
Num_of_Valid_Rayleigh_Calibration_Results	Same as Num_of_Rayleigh_Observations_Used		IntAl
Spare_2			Spare
Total_Num_of_Measurement_Invalid	Total number of measurements for which the number of corresponding valid pulses is below Meas_Cavitiy_Lock_Status_Thresh: sum of Num_Measurement_InvalidTable 7-91 .		IntAl
Total_Num_of_Pulse_Validity_Status_Flag_False	Total number of reference pulses with pulse validity status flag set to false: sum of Num_Pulse_Validity_Status_Flag_False Table 7-91.		IntAl
Total_Num_of_Sat_Not_on_Target_Measurements	Total number of measurements with satellite not on target status: sum of Sat_Not_on_Target_Measurements Table 7-91.		IntAl
Total_Num_of_Corrupt_Mie_Measurement_Bins	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Rayleigh_Measurement_Bins	Total number of corrupt Rayleigh measurement bins: sum of Num_Corrupt_Measurement_Bins Table 7-91.		IntAl
Total_Num_of_Corrupt_Mie_Reference_Pulses	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Rayleigh_Reference_Pulses	Total number of corrupt Rayleigh reference pulses: sum of Num_Corrupt_Reference_Pulses Table 7-91.		IntAl
Spare_3			Spare
List_of_Dsds	See Table 7-105 for list of Data Sets in product		288*12
Total size for XML structure in bytes:			

7.11.2.1 Data Set Descriptors

Data sets are organised as shown in Table 7-105.

Table 7-105 ZWC Auxiliary Calibration Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	Zero_Wind_Cal_GADS	DSD structure for GADS (specific to Auxiliary Calibration Product Type)	G	1 DSR per product
2	Aeolus_Level_1A_Product	DSD for input Aeolus Level 1A Product	R	No DS
3	Aeolus_MRC	DSD for input Aeolus Mie Response Calibration Auxiliary product	R	No DS
4	Aeolus_RRC	DSD for input Aeolus Rayleigh Response Calibration Auxiliary product	R	No DS

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
5	Level_1B_Proc_Params	DSD for Level 1B Processing Parameters Auxiliary File	R	No DS
6	Satellite_Characterisation	DSD for Satellite Characterisation Auxiliary File	R	No DS
7	Orbit_Scenario_File	DSD for Orbit Scenario Auxiliary File	R	No DS
8	Digital_Elevation_Model	DSD for Digital Elevation Model Definition File	R	No DS
9	Geoid_Model	DSD for Geoid Model file EGM96	R	No DS
10	Harmonic_Bias_Estimation	DSD for the input Aeolus Harmonic Bias Estimation Auxiliary product	R	No DS
11	Range_Dependent_Bias	DSD for the input Aeolus Range Dependent Bias Auxiliary product	R	No DS
12	Dark_Current_Memory_Zone	DSD for the input Aeolus Dark Current in Memory Zone	R	No DS

7.11.2.2 Specific Product Header Size

The Specific Product Header size for this file has to be increased for 7 additional data set descriptors, and thus has an overall size of 3412 bytes + 7*288 bytes = 5428 bytes.

7.11.3 Data Sets

There is one data set for the ZWC product with a data set record for each measurement where ground zero wind is detected. There can be a maximum of 30 measurement records per BRC and 470 BRCs per orbit. When ground wind detection fails then no record is created. Each BRC may have none, one or many zero wind calibration records depending on atmosphere and ground conditions.

7.11.3.1 Zero Wind Calibration ADS

The root tag for this Data Set is **Auxiliary_Calibration_ZWC**, and the Data Set consists of multiple Data Set Records of the structure described in Table 7-106. Sizes provided here are calculated for nominal N_Meas = 30 measurements commanded for WVM mode.

Note: The number of 30 measurements is just an indication, actual numbers will vary.

Table 7-106 ZWC GADS DSR Content Description

Tag Name	Content Description	Unit	Type	Size
Start_of_Observation_Time	Start of observation time (UTC)		DateTime	79

Tag Name	Content Description	Unit	Type	Size
Observation_Info	Observation information containing the attitude and geolocation. See **Table 7-107** for structure definition		Structure	917
ZWC_Result_Type	Enum indicating ZWC result type. One of Mie only (ZWC_Mie), Rayleigh only (ZWC_Rayleigh), or both (ZWC_Both)		Enum	37
Mie_Ground_Correction_Velocity	Mie ground correction velocity. This value is a valid new ground correction velocity which is filled in when ZWC_Result_Type is set to ZWC_Mie or ZWC_Both. In case the ZWC_Result_Type is set to ZWC_Rayleigh, the value from the previous record is copied.	m/s	FAdoxy	74
Rayleigh_Ground_Correction_Velocity	Rayleigh ground correction factor. This value is a valid new ground correction velocity which is filled in when ZWC_Result_Type is set to ZWC_Rayleigh or ZWC_Both. In case the ZWC_Result_Type is set to ZWC_Mie, the value from the previous record is copied.	m/s	FAdoxy	84
Validity_Indicators	Validity indicators. Sizes calculated for nominal 30 measurements in WVM mode. See Table 7-111 for structure definition		Structure	7740
Measurement_Info	Measurement level information valid for Mie and Rayleigh. Sizes calculated for nominal 30 measurements in WVM mode. See **Table 7-108** for structure definition.		Structure	15008
Total size for XML structure in bytes:				23939

Table 7-107 ZWC GADS Observation_Info Content Description

Tag Name	Content Description	Unit	Type	Size
Latitude_of_DEM_Intersection	Geodetic latitude of DEM Intersection with instrument line-of-sight at the centre of the observation	10-6DegN	IntAl	66
Longitude_of_DEM_Intersection	Geodetic longitude of DEM Intersection with instrument line-of-sight at the centre of the observation	10-6DegE	IntAl	68
Argument_of_Latitude_of_DEM_Intersection	Argument of geodetic latitude of DEM Intersection with instrument line-of-sight at the centre of the observation	10-6DegN	IntAl	97
Roll_Angle	Instrument roll angle in ECEF frame at the centre of the observation	deg	FAdoxy	34
Pitch_Angle	Instrument pitch angle in ECEF frame at the centre of the observation	deg	FAdoxy	36
Yaw_Angle	Instrument yaw angle in ECEF frame at the centre of the observation	deg	FAdoxy	32
Mie_Satellite_Range_to_Target	This list contains 25 values, separated by blanks. The first item contains the range from satellite to the upper edge of the top-most Mie lidar observation range bin. The remaining 24 items contain the height of the lower edge of each lidar observation range bin.	m	25 * IntAul	268
Rayleigh_Satellite_Range_to_Target	This list contains 25 values, separated by blanks. The first item contains the range from satellite to the upper edge of the top-most Rayleigh lidar observation range bin. The remaining 24 items contain the height of the lower edge of each lidar observation range bin.	m	25 * IntAul	278
Total size for XML structure in bytes:				879

Table 7-108 ZWC GADS Measurement_Info Content Description

Tag Name	Content Description	Unit	Type	Size
DEM_Height	This list contains N_Meas values separated by blanks. The items in this list refer to the geodetic height above WGS84 ellipsoid of the DEM intersection of the measurements 1 .. N_Meas of the observation. As the ZWC product does not hold a dedicated parameter to store the number of measurements of a specific observation, N_Meas has to be determined from the count attribute.	m	N_Meas* FAdoxy	265

Tag Name	Content Description	Unit	Type	Size
Surface_Type	This list contains N_Meas values separated by blanks. The items in this list refer to the surface type of the measurements 1 .. N_Meas of the observation. The parameter holds five different values: 0 for ACE data, 1 for MSS data, 2 for EGM96 data, and 3 for SRTM30 data. Values 1 and 2 correspond to sea surface, see R-4. As the ZWC product does not hold a dedicated parameter to store the number of measurements of a specific observation, N_Meas has to be determined from the count attribute.		N_Meas * IntAuc	89
List_of_Measurement_Range_Infos	See Table 7-109 for structure definition.		List of N_Meas structures	14617
Total size for XML structure in bytes:				14971

Table 7-109 ZWC GADS List_of_Mie_Measurement_Range_Infos Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Range_Info	See Table 7-110 for structure definition		Structure	485

Table 7-110 ZWC GADS Measurement_Range_Info Content Description

Tag Name	Content Description	Unit	Type	Size
Satellite_Range_to_Target_Mie	This list contains 25 values, separated by blanks. The first item contains the range from satellite to the upper edge of the top-most Mie lidar measurement range bin. The remaining 24 items contain the height of the lower edge of each lidar measurement range bin.	m	25 * IntAul	213
Satellite_Range_to_Target_Rayleigh	This list contains 25 values, separated by blanks. The first item contains the range from satellite to the upper edge of the top-most Rayleigh lidar measurement range bin. The remaining 24 items contain the height of the lower edge of each lidar measurement range bin.	m	25 * IntAul	223
Total size for XML structure in bytes:				436

Table 7-111 ZWC GADS Validity_Indicators Content Description

Tag Name	Content Description	Unit	Type	Size
Min_Num_of_Mie_Ground_Echo_Measurements	Minimum number of Mie ground wind measurements to validate ground correction factor		IntAul	96
Mie_Land_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates land surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	78
Mie_Water_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates water/sea ice surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	80
Mie_Max_Ground_Echo_Bin_Thickness_Above_DEM	Threshold applied to a bin identified as ground bin candidate. If the threshold is not met, the signal of the bin is not added to the sum of the ground signal on observation level.	m	FAdoxy	95
Min_Num_of_Rayleigh_Ground_Echo_Measurements	Minimum number of Rayleigh ground wind measurements to validate ground correction factor		IntAul	106
Rayleigh_Land_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates land surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	88
Rayleigh_Water_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates water/sea ice surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	90
Rayleigh_Max_Ground_Echo_Bin_Thickness_Above_DEM	Threshold applied to a bin identified as ground bin candidate. If the threshold is not met, the signal of the bin is not added to the sum of the ground signal on observation level.	m	FAdoxy	95
Number_of_Mie_Ground_Measurements	Number of Mie measurements with GROUND_ECHO_DETECTED=TRUE		IntAul	60
Number_of_Rayleigh_Ground_Measurements	Number of Rayleigh measurements with GROUND_ECHO_DETECTED=TRUE		IntAul	70
Mie_Average_Ground_Echo_Bin_Thickness	Average of measurement ground wind bin altitudes for Mie	m	FAdoxy	86
Rayleigh_Average_Ground_Echo_Bin_Thickness	Average of measurement ground wind bin altitudes for Rayleigh	m	FAdoxy	96
Mie_Average_Ground_Echo_Bin_Thickness_Above_DEM	Average ground wind bin thickness (air column height) for Mie.	m	FAdoxy	108
Rayleigh_Average_Ground_Echo_Bin_Thickness_Above_DEM	Average ground wind bin thickness (air column height) for Rayleigh	m	FAdoxy	118

Tag Name	Content Description	Unit	Type	Size
Mie_Min_Top_Ground_Bin	Highest of all the ground bins detected in all the measurements used in that observation. (Highest bin is bin number 1.) Value is set to 0 in case ground could not be detected in any measurement of the observation.		IntAl	56
Rayleigh_Min_Top_Ground_Bin	Highest of all the ground bins detected in all the measurements used in that observation. (Highest bin is bin number 1.) Value is set to 0 in case ground could not be detected in any measurement of the observation.		IntAl	66
Mie_Max_Bottom_Ground_Bin	Lowest of all the ground bins detected in all the measurements used in that observation. (Lowest bin is bin number 24.) Value is set to 0 in case ground could not be detected in any measurement of the observation.		IntAl	62
Rayleigh_Max_Bottom_Ground_Bin	Lowest of all the ground bins detected in all the measurements used in that observation. (Lowest bin is bin number 24.) Value is set to 0 in case ground could not be detected in any measurement of the observation.		IntAl	72
Mie_Ground_FWHM	Mie Core 2 output FWHM when applied to observation level Mie ground signal. This value is filled in when ZWC_Result_Type is set to ZWC_Mie or ZWC_Both and the Mie Core 2 algorithm has been applied. In all other cases the value is set to 0.0.	ACCD pixel	FAdoxy	43
Mie_Ground_Useful_Signal	Useful signal of observation level Mie ground signal. This value is filled in when ZWC_Result_Type is set to ZWC_Mie or ZWC_Both. In all other cases the value is set to 0.0.	ACCD counts	FAdoxy	61
Mie_Ground_Signal_to_Noise_Ratio	Signal to noise ratio of observation level Mie ground signal. This value is filled in when ZWC_Result_Type is set to ZWC_Mie or ZWC_Both. In all other cases the value is set to 0.0.		FAdoxy	77
Mie_Ground_Refined_Signal_to_Noise_Ratio	Refined signal to noise ratio of observation level Mie ground signal. This value is filled in when ZWC_Result_Type is set to ZWC_Mie or ZWC_Both. In all other cases the value is set to 0.0.		FAdoxy	93
Rayleigh_Ground_Useful_Signal	Useful signal of observation level Rayleigh ground signal. This value is filled in when ZWC_Result_Type is set to ZWC_Rayleigh or ZWC_Both. In all other cases the value is set to 0.0.	ACCD counts	FAdoxy	71

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Ground_Signal_to_Noise_Ratio	Signal to noise ratio of observation level Rayleigh ground signal. This value is filled in when ZWC_Result_Type is set to ZWC_Rayleigh or ZWC_Both. In all other cases the value is set to 0.0.		FAdoxy	87
Mie_Measurement_Validity_Indicators	See Table 7-112 for structure definition		Structure	2705
Rayleigh_Measurement_Validity_Indicators	See Table 7-113 for structure definition		Structure	3028
Total size for XML structure in bytes:				7697

Table 7-112 ZWC GADS Mie_Measurement_Validity_Indicators Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Used	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. 1 if measurement ground bin was detected, velocity calculated and used for average of ground correction value on observation level.		N_Meas * IntAuc	126
Expected_Ground_Bin_Index	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Expected DEM ground bin		N_Meas * IntAuc	142
Topocentric_Elevation_Expected_Ground_Bin	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Topocentric elevation of the expected groundbin.	deg	N_Meas * FAdoxy	326
Top_Ground_Bin	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Highest detected bin with ground return signal. Value is set to 0 in case ground could not be detected in the measurement.		N_Meas * IntAuc	123
Topocentric_Elevation_Top_Ground_Bin	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Topocentric elevation of the highest detected ground bin.	deg	N_Meas * FAdoxy	316
Bottom_Ground_Bin	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Lowest detected bin with ground return signal. Value is set to 0 in case ground could not be detected in the measurement.		N_Meas * IntAuc	129

Tag Name	Content Description	Unit	Type	Size
Topocentric_Elevation_Bottom_Ground_Bin	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Topocentric elevation of the lowest detected ground bin.	deg	N_Meas * FAdoxy	322
Height_Difference_Expected_to_Top	Height difference between detected top ground bin and expected ground bin, with reference to centre altitude of bins.	m	N_Meas * FAdoxy	310
Height_Difference_Expected_to_Bottom	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Height difference between detected bottom ground bin and expected ground bin, with reference to centre altitude of bins.	m	N_Meas * FAdoxy	316
Mean_Ground_Bin_SNR	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Mean SNR over SNR values of detected ground bins.		N_Meas * FAdoxy	283
Num_Top_Ground_Bins_Discarded	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Number of bins above expected bin in which ground return signal was detected, but offset to expected bin was larger than threshold.		N_Meas * IntAuc	153
Num_Bottom_Ground_Bins_Discarded	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Number of bins below expected bin in which ground return signal was detected, but offset to expected bin was larger than threshold.		N_Meas * IntAuc	159
Total size for XML structure in bytes:				2705

Table 7-113 ZWC GADS Rayleigh_Measurement_Validity_Indicators Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Used	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. TRUE if measurement ground bin was detected, velocity calculated and used for average of ground correction value on observation level.		N_Meas * IntAuc	126
Expected_Ground_Bin_Index	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Expected DEM ground bin		N_Meas * IntAuc	142

Tag Name	Content Description	Unit	Type	Size
Topocentric_Elevation_Expected_Ground_Bin	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Topocentric elevation of the expected groundbin.	deg	N_Meas * FAdoxy	326
Top_Ground_Bin	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Highest detected bin with ground return signal. Value is set to 0 in case ground could not be detected in the measurement.		N_Meas * IntAuc	123
Topocentric_Elevation_Top_Ground_Bin	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Topocentric elevation of the highest detected ground bin.	deg	N_Meas * FAdoxy	316
Bottom_Ground_Bin	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Lowest detected bin with ground return signal. Value is set to 0 in case ground could not be detected in the measurement.		N_Meas * IntAuc	129
Topocentric_Elevation_Bottom_Ground_Bin	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Topocentric elevation of the lowest detected ground bin.	deg	N_Meas * FAdoxy	322
Height_Difference_Expected_to_Top	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Height difference between detected top ground bin and expected ground bin, with reference to centre altitude of bins.	m	N_Meas * FAdoxy	310
Height_Difference_Expected_to_Bottom	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Height difference between detected bottom ground bin and expected ground bin, with reference to centre altitude of bins.	m	N_Meas * FAdoxy	316
Channel_A_Mean_Ground_Bin_SNR	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Mean SNR over SNR values of detected ground bins.		N_Meas * FAdoxy	303
Channel_B_Mean_Ground_Bin_SNR	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Mean SNR over SNR values of detected ground bins.		N_Meas * FAdoxy	303

Tag Name	Content Description	Unit	Type	Size
Num_Top_Ground_Bins_Discarded	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Number of bins above expected bin in which ground return signal was detected, but offset to expected bin was larger than threshold.		N_Meas * IntAuc	153
Num_Bottom_Ground_Bins_Discarded	This list contains N_Meas values separated by blanks. The items in this list refer to measurements 1 .. N_Meas of the observation. Number of bins below expected bin in which ground return signal was detected, but offset to expected bin was larger than threshold.		N_Meas * IntAuc	159
Total size for XML structure in bytes:				3028

7.11.4 File Size

Table 7-114 summarises the typical product size for Aeolus ZWC products. The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations. The file size is estimated when 470* 30 measurements result in zero wind detection.

Table 7-114 ZWC Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~1697 bytes
Auxiliary Calibration SPH	~5428 bytes
ZWC GADS	~ 11251330 bytes
Product Size:	~11,3 Mbytes

7.12 Dark Current in Memory Zone Parameters

7.12.1 Product Structure

The Dark Current in Memory Zone Parameters product conforms to the product structure described in Section 3. It is contained in one product file containing Fixed Header and Main Product Header as defined in Sections 3.3.3 and 3.3.4 respectively. All headers and data sets are in XML format.

7.12.1.1 File Name

The Dark Current in Memory Zone Parameters auxiliary file name has the format defined in Section 3.1:

AE_CCCC_AUX_DCMZ1B _yyyymmddThhmmss_yyyymmddThhmmss_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, each validity period representing different phases of the ADM-Aeolus mission. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

7.12.2 Specific Product Header

The general Specific Product Header structure for this file is described in Section 7.2.2 and is detailed in the following table.

Table 7-115 Dark Current in Memory Zone Calibration Specific Product Header Content Description

Tag Name	Content Description	Unit	Type
Specific_Product_Header	Root tag for XML format only.		Structure
Sph_Descriptor	SPH descriptor ASCII string describing the product. DCMZ_CHAR_SPECIFIC_HEADER		String
Total_Num_of_Observations	Total number of level 1A input observations		IntAl
Total_Num_of_Measurements	Total Number of level 1A input measurements		IntAl
Total_Num_of_Reference_Pulses	Total number of level 1A input reference pulses		IntAl
Base_Laser_Frequency	Base Laser Transmit Frequency	GHz	FAdoxy
Spare_1			Spare
Num_of_Mie_Observations_Used	Number of Mie observations where at least one valid measurement was used.		IntAl
Num_of_Rayleigh_Observations_Used	Number of Rayleigh observations where at least one valid measurement was used.		IntAl
Num_of_Mie_Measurements_Used	Number of Mie measurements used.		IntAl
Num_of_Rayleigh_Measurements_Used	Number of Rayleigh measurements used.		IntAl
Num_of_Mie_Reference_Pulses_Used	Field not used, set to zero.		IntAl

Tag Name	Content Description	Unit	Type
Num_of_Rayleigh_Reference_Pulses_Used	Field not used, set to zero.		IntAl
Num_of_Valid_Mie_Calibration_Results	Number of valid Mie calibration results, either 1 = Mie dark current rate was estimated and is provided in the data set. 0 = Mie dark current rate could not be estimated.		IntAl
Num_of_Valid_Rayleigh_Calibration_Results	Number of valid Rayleigh calibration results, either 1 = Rayleigh dark current rate was estimated and is provided in the data set. 0 = Rayleigh dark current rate could not be estimated.		IntAl
Spare_2			Spare
Total_Num_of_Measurement_Invalid	Total number of measurements invalid, measurements where Measurements_Valid of Table 5-16 is set to FALSE.		IntAl
Total_Num_of_Pulse_Validity_Status_Flag_False	Field not used, set to zero.		IntAl
Total_Num_of_Sat_Not_on_Target_Measurements	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Mie_Measurement_Bins	Number of Mie measurement bins found to be corrupted due to saturated pixels.		IntAl
Total_Num_of_Corrupt_Rayleigh_Measurement_Bins	Number of Rayleigh measurement bins found to be corrupted due to saturated pixels.		IntAl
Total_Num_of_Corrupt_Mie_Reference_Pulses	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Rayleigh_Reference_Pulses	Field not used, set to zero.		IntAl
Spare_3			Spare
List_of_Dsds	See Table 7-116.		288*6
Total size for XML structure in bytes:			3700

7.12.2.1 Data Set Descriptors

Data sets are organised as shown in Table 7-116. The auxiliary calibration data set name is Dcmz_Char_GADS.

Table 7-116 Auxiliary Calibration Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	*_GADS	DSD structure for GADS (specific to Auxiliary Calibration Product Type)	G	1 DSR per product
2	Aeolus_Level_1A_Product	DSD for input Aeolus Level 1A Product	R	No DS
3	Level_1B_Proc_Params	DSD for Level 1B Processing Parameters Auxiliary File	R	No DS
4	Satellite_Characterisation	DSD for Satellite Characterisation Auxiliary File	R	No DS
5	Orbit_Scenario_File	DSD for Orbit Scenario Auxiliary File	R	No DS
6	Dark_Current_Memory_Zone	DSD for input Dark Current inMemory Zone Auxiliary File	R	No DS

7.12.3 Data Sets

7.12.3.1 Dark Current in Memory Zone Parameters GADS

The root tag for this Data Set is **Auxiliary_Calibration_DCMZ**, and the data set consists of a single Data Set Record of the structure described in Table 7-117.

Table 7-117 DCMZ Parameters GADS Content Description

Tag Name	Content Description	Unit	Type	Size
Measurement_Type	Type set to 'DUDE' for DUDE measurements or to 'DCMZ' for DCMZ measurements.		String	41
Data_Quality	Data quality parameters; see Table 7-118 for structure definition.		Structure	1050
List_of_Rayleigh_Dark_Current_Rates_per_Row	A list of 24 structures with dark current rates per row. The first structure corresponds to the upper most row on the Rayleigh memory zone. See Table 7-119 for structure definition.		List of 24 Structures	355
List_of_Mie_Dark_Current_Rates_per_Row	A list of 24 structures with dark current rates per row. The first structure corresponds to the upper most row on the Rayleigh memory zone. See Table 7-120 for structure definition.		List of 24 Structures	335

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Background_Rates	This list contains 16 values, separated by blanks. The 16 values correspond to the background row of the ACCD in the memory zone. Each value gives the rate at which the ACCD pixel signal increases in a specific pixel in the Rayleigh memory and integration zone per second. The first value corresponds to the left most useful pixel on the ACCD in a row.	ACCD counts / (ACCD pixel * s)	16 * FAdoxy	232
Mie_Background_Rates	This list contains 16 values, separated by blanks. The 16 values correspond to the background row of the ACCD in the memory zone. Each value gives the rate at which the ACCD pixel signal increases in a specific pixel in the Rayleigh memory and integration zone per second. The first value corresponds to the left most useful pixel on the ACCD in a row.	ACCD counts / (ACCD pixel * s)	16 * FAdoxy	222
Total size for XML structure in bytes:				**2235**

Table 7-118 DCMZ GADS Data_Quality Content Description

Tag Name	Content Description	Unit	Type	Size
Num_Meas_Exceed_Solar_Bckg_Thres_Rayleigh	Number of Rayleigh measurements where the background signal exceeded the threshold.		IntAul	92
Min_Num_Meas_Used_for_Rayleigh	Minimum number of Rayleigh measurement values that has been used to derive the dark current rate for a specific pixel.		IntAul	70
Max_Num_Meas_Used_for_Rayleigh	Maximum number of Rayleigh measurement values that has been used to derive the dark current rate for a specific pixel.		IntAul	70
Min_Num_Meas_Used_for_Mie	Minimum number of Mie measurement values that has been used to derive the dark current rate for a specific pixel.		IntAul	60
Max_Num_Meas_Used_for_Mie	Maximum number of Mie measurement values that has been used to derive the dark current rate for a specific pixel.		IntAul	60
Num_Input_Values_Rayleigh	Number of retrieved Rayleigh dark current rates that have been replaced with the input value.		IntAul	60
Num_Input_Values_Mie	Number of retrieved Mie dark current rates that have been replaced with the input value.		IntAul	50
Num_Meas_Exceed_Sun_Elevation_Threshold	Number of Rayleigh measurements where the sun elevation at DEM intersection exceeded the threshold.		IntAul	86
Num_Background_Input_Values_Rayleigh	Number of retrieved Rayleigh background rates that have been replaced with the input value.		IntAul	82
Num_Background_Input_Values_Mie	Number of retrieved Mie dark background rates that have been replaced with the input value.		IntAul	72

Tag Name	Content Description	Unit	Type	Size
Min_Num_Meas_Used_for_Background_Rayleigh	Minimum number of Rayleigh measurement values that has been used to derive the background rate for a specific pixel.		IntAul	92
Max_Num_Meas_Used_for_Background_Rayleigh	Maximum number of Rayleigh measurement values that has been used to derive the background rate for a specific pixel.		IntAul	92
Min_Num_Meas_Used_for_Background_Mie	Minimum number of Mie measurement values that has been used to derive the background rate for a specific pixel.		IntAul	82
Max_Num_Meas_Used_for_Background_Mie	Maximum number of Mie measurement values that has been used to derive the background rate for a specific pixel.		IntAul	82
Total size for XML structure in bytes:				**1050**

Table 7-119 DCMZ GADS Rayleigh_Dark_Current_Rates_per_Row Content Description

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Dark_Current_Rates_per_Row	This list contains 16 values, separated by blanks. The 16 values correspond to a specific row of the ACCD in the memory zone. Each value gives the rate at which the ACCD pixel signal increases in a specific pixel in the Rayleigh memory zone per second. The first value corresponds to the left most useful pixel on the ACCD in a row.	ACCD counts / (ACCD pixel * s)	16 * FAdoxy	253
Total size for XML structure in bytes:				**253**

Table 7-120 DCMZ GADS Mie_Dark_Current_Rates_per_Row Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Dark_Current_Rates_per_Row	This list contains 16 values, separated by blanks. The 16 values correspond to a specific row of the ACCD in the memory zone. Each value gives the rate at which the ACCD pixel signal increases in a specific pixel in the Mie memory zone per second. The first value corresponds to the left most useful pixel on the ACCD in a row.	ACCD counts / (ACCD pixel * s)	16 * FAdoxy	243
Total size for XML structure in bytes:				**243**

7.12.4 File Size

Table 7-121 summarises the typical product size for Aeolus DCMZ products. The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 7-121 Dark Current in Memory Zone ParametersTypical File Size

Structure	Product Size
FH	~740 bytes
MPH	~1697 bytes
Auxiliary Calibration SPH	~3700 bytes
Dark Current in Memory Zone Parameters GADS	~ 2235 bytes
Product Size:	~ 8372 bytes

7.13 Laser Beam Monitoring

7.13.1 Product Structure

The Laser Beam Monitoring Parameters product conforms to the product structure described in Section 3. It is contained in one product file containing Fixed Header and Main Product Header as defined in Sections 3.3.3 and 3.3.4 respectively. All headers and data sets are in XML format.

7.13.1.1 File Name

The Laser Beam Monitoring Parameters auxiliary file name has the format defined in Section 3.1:

AE_CCCC_AUX_LBM_1B _yyyymmddThhmmss_yyyymmddThhmmss_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, each validity period representing different phases of the ADM-Aeolus mission. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

7.13.2 Specific Product Header

The general Specific Product Header structure for this file is described in Section 7.2.2 and is detailed in the following table.

Table 7-122 Laser Beam Monitoring Calibration Specific Product Header Content Description

Tag Name	Content Description	Unit	Type
Specific_Product_Header	Root tag for XML format only.		Structure
Sph_Descriptor	SPH descriptor ASCII string describing the product. AEOLUS_LBM_SPECIFIC_HEADER		String
Total_Num_of_Observations	Total number of level 1A input observations		IntAl
Total_Num_of_Measurements	Total Number of level 1A input measurements		IntAl
Total_Num_of_Reference_Pulses	Total number of level 1A input reference pulses		IntAl
Base_Laser_Frequency	Base Laser Transmit Frequency	GHz	FAdoxy
Spare_1			Spare
Num_of_Mie_Observations_Used	Number of Mie observations where at least one valid measurement was used.		IntAl
Num_of_Rayleigh_Observations_Used	Number of Rayleigh observations where at least one valid measurement was used.		IntAl
Num_of_Mie_Measurements_Used	Number of Mie measurements used.		IntAl
Num_of_Rayleigh_Measurements_Used	Number of Rayleigh measurements used.		IntAl
Num_of_Mie_Reference_Pulses_Used	Number of Mie reference pulses used.		IntAl
Num_of_Rayleigh_Reference_Pulses_Used	Number of Rayleigh reference pulses used.		IntAl
Num_of_Valid_Mie_Calibration_Results	Set to 1 if for all frequency steps in range, the Mie validity is set to TRUE.; 0 otherwise.		IntAl
Num_of_Valid_Rayleigh_Calibration_Results	Set to 1 if for all frequency steps in range, the Rayleigh validity is set to TRUE.; 0 otherwise.		IntAl
Spare_2			Spare
Total_Num_of_Measurement_Invalid	Total number of measurements invalid, measurements where Measurements_Data_Present of Table 5-16 is set to FALSE.		IntAl
Total_Num_of_Pulse_Validity_Status_Flag_False	Total number of reference pulses with pulse validity status flag set to false: sum of Num_Pulse_Validity_Status_Flag_False Table 7-91.		IntAl
Total_Num_of_Sat_Not_on_Target_Measurements	Field set to 0.		IntAl
Total_Num_of_Corrupt_Mie_Measurement_Bins	Number of Mie measurement bins found to be corrupted due to saturated pixels.		IntAl
Total_Num_of_Corrupt_Rayleigh_Measurement_Bins	Number of Rayleigh measurement bins found to be corrupted due to saturated pixels.		IntAl

Tag Name	Content Description	Unit	Type
Total_Num_of_Corrupt_Mie_Reference_Pulses	Field not used, set to zero.		IntAl
Total_Num_of_Corrupt_Rayleigh_Reference_Pulses	Field not used, set to zero.		IntAl
Spare_3			Spare
List_of_Dsds			288*5
Total size for XML structure in bytes:			3412

7.13.2.1 Data Set Descriptors

Data sets are organised as shown in Table 7-2. The auxiliary calibration data set name is Lbm_Cal_GADS.

7.13.3 Data Sets

7.13.3.1 Laser Beam Monitoring Parameters GADS

The root tag for this Data Set is **Auxiliary_Calibration_LBM**, and the data set consists of a single Data Set Record of the structure described in Table 7-123. Sizes reported here are calculated for N_Steps = 67 frequency steps.

Table 7-123 LBM GADS DSR Content Description

Tag Name	Content Description	Unit	Type	Size
First_Start_of_Observation_Time	Start of observation time of the first BRC (UTC)		DateTime	91
Last_Start_of_Observation_Time	Start of observation time of the last BRC (UTC)		DateTime	89
List_of_Frequency_Step_Results	List of validity and quality parameters per frequency step. See Table 7-124 for structure description.		List of N_Steps Structures	56680
List_of_Average_Rayleigh_Image_Vals	Map of mean image pixel intensity above minimum values in list form. The map contains Num_Image_Pixel_Rows * Num_Image_Pixel_Cols number of items. Location of item(i,j) at the list is Num_Image_Pixel_Cols * (i-1) + j, where i is the row index and j is the column index . See Table 7-126 for structure definition		List of 256 Structures	16971
Rayleigh_Min_Pixel_Value	Minimum pixel value of averaged Rayleigh images	ACCD counts	FAdoxy	16950
Enc_Col_Channel_A	Barycentre column value of the direct channel spot	ACCD pixel index	FAdoxy	48

Tag Name	Content Description	Unit	Type	Size
End_Row_Channel_A	Barycentre row value of the direct channel spot	ACCD pixel index	FAdoxy	48
End_Col_Channel_B	Barycentre column value of the reflected channel spot	ACCD pixel index	FAdoxy	48
Enc_Row_Channel_B	Barycentre row value of the reflected channel spot	ACCD pixel index	FAdoxy	48
Enc_Col_Std_Dev_Channel_A	Energetic centroid column standard deviation for channel A.		FAdoxy	64
Enc_Row_Std_Dev_Channel_A	Energetic centroid row standard deviation for channel A.		FAdoxy	64
Enc_Col_Std_Dev_Channel_B	Energetic centroid column standard deviation for channel B.		FAdoxy	64
Enc_Row_Std_Dev_Channel_B	Energetic centroid row standard deviation for channel B.		FAdoxy	64
List_of_Average_Mie_Image_Vals	Map of mean image pixel intensity above minimum values in list form. The map contains Num_Image_Pixel_Rows * Num_Image_Pixel_Cols number of items. Location of item(i,j) at the list is Num_Image_Pixel_Cols * (i-1) + j, where i is the row index and j is the column index . See Table 7-127 for structure definition		List of 256 Structures	14402
List_of_Average_Mie_Image_Val_Per_Cols	Num_Image_Pixel_Cols values calculated from the values reported in List_of_Average_Mie_Image_Vals by summing up values over all rows for each column. See Table 7-128 for structure definition.		List of 16 Structures	1233
Mie_ Min_Pixel_Value	Minimum pixel value of averaged Mie images	ACCD counts	FAdoxy	52
Mie_ Max_Pixel_Value	Maximum pixel value of averaged Mie images	ACCD counts	FAdoxy	52
Mie_ Mean_Pixel_Value	Mean value of pixel intensities in List_of_Average_Mie_Image_Rows	ACCD counts	FAdoxy	54
Mie_Std	Standard deviation over values in List_of_Average_Mie_Image_Rows		FAdoxy	28
List_of_Fluence_Values	Map of fluence values in list form. The map contains Num_Image_Pixel_Rows * Num_Image_Pixel_Cols number of items. Location of item(i,j) at the list is Num_Image_Pixel_Cols * (i-1) + j, where i is the row index and j is the column index . See Table 7-129 for structure definition.		List of 256 Structures	10033
Mie_Max_Fluence_Value	Maximum value found in List_of_Fluence_Values		FAdoxy	55

Tag Name	Content Description	Unit	Type	Size
List_of_Mie_Image_Derivatives	Map of '0' and '1' where '1' indicates that the value of the mean image pixel intensitiy above minimum is above the threshold Mie_ Mean_Pixel_Value + * Mie_Std, where is taken from See Table 7-130 for structure definition.		List of 256 Structures	12352
Mie_Initial_Guess_Ellipse_Center_Col	Ellipse center in x-direction.	ACCD pixel index	FAdoxy	86
Mie_Initial_Guess_Ellipse_Center_Row	Ellipse center in y direction.	ACCD pixel index	FAdoxy	86
Mie_Initial_Guess_Ellipse _Major_Semi_Axes	Length of semi major axes.	ACCD pixel	FAdoxy	80
Mie_Initial_Guess_Ellipse _Minor_Semi_Axes	Length of semi minor axes.	ACCD pixel	FAdoxy	80
Mie_Initial_Guess_Ellipse_Col_Axes_Angle	Angle of major axis to x-axes.	Degree	FAdoxy	94
Mie_Ellipse_Center_Col	Ellipse center in x-direction.	ACCD pixel index	FAdoxy	58
Mie_Ellipse_Center_Row	Ellipse center in y direction.	ACCD pixel index	FAdoxy	58
Mie__Ellipse Major_Semi_Axes	Length of semi major axes.	ACCD pixel	FAdoxy	52
Mie_Ellipse _Minor_Semi_Axes	Length of semi minor axes.	ACCD pixel	FAdoxy	52
Mie_Ellipse_Col_Axes_Angle	Angle of major axis to x-axes.	Degree	FAdoxy	66
Total size for XML structure in bytes:				**130111**

Table 7-124 LBM GADS List_of_Frequency_Step_Results Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Step_Result	See for structure description		Structure	845
Total size for XML structure in bytes:				**845**

Table 7-125 LBM GADS Frequency_Step_Results Content Descripti Content Description

Tag Name	Content Description	Unit	Type	Size
Frequency_Offset	Frequency offset	GHz	FAdoxy	46
Frequency_Valid_Mie	TRUE if threshold Min_Num_Valid_Images (see Table 8-145) is reached, FALSE otherwise.		Boolean	49
Frequency_Valid_Rayleigh	TRUE if threshold Min_Num_Valid_Images (see Table 8-145) is reached, FALSE otherwise.		Boolean	59

Tag Name	Content Description	Unit	Type	Size
Frequency_Step_In_Range	TRUE if Frequency_Offset is within range specified by Start_Frequency_Ramp and Stop_Frequency_Ramp (see Table 8-145), FALSE otherwise.		Boolean	57
Num_Valid_Mie_Images	Number of valid Mie images for frequency step.		IntAuc	48
Num_Valid_Rayleigh_Images	Number of valid Rayleigh images for frequency step.		IntAuc	58
Mean_Mie_DCO	Mean DCO values calculated from all DCO correction values used for a specific row of the valid Mie images.		16 * FAdoxy	157
Mean_Rayleigh_DCO	Mean DCO values calculated from all DCO correction values used for a specific row of the valid Rayleigh images.		16 * FAdoxy	167
Mean_Rayleigh_Energy	Mean energy of all pulses attributed to the valid Rayleigh images.	mJ	FAdoxy	53
Mean_Mie_Energy	Mean energy of all pulses attributed to the valid Mie images.	mJ	FAdoxy	43
Sun_Elevation_Angles	List of Sun_Elevation_Angles on observation level for all the BRCs with images contributing to the frequency step result. (Nominally n = 2.)	deg	n * FAdoxy	61
Total size for XML structure in bytes:				**798**

Table 7-126 LBM GADS List_of_Average_Rayleigh_Image_Vals Content Description

Tag Name	Content Description	Unit	Type	Size
Average_Rayleigh_Image_Val	Mean image pixel intensity above minimum	ACCD counts	FAdoxy	66

Table 7-127 LBM GADS List_of_Average_Mie_Image_Vals Content Description

Tag Name	Content Description	Unit	Type	Size
Average_Mie_Image_Val	Mean image pixel intensity above minimum	ACCD counts	FAdoxy	56

Table 7-128 LBM GADS List_of_Average_Mie_Image_Val_Per_Cols Content Description

Tag Name	Content Description	Unit	Type	Size
Average_Mie_Image_Val_Per_Col	Mean image pixel intensity above minimum per column.	ACCD counts	FAdoxy	72

Table 7-129 LBM GADS List_of_Fluence_Values Content Description

Tag Name	Content Description	Unit	Type	Size
Fluence_Value	Fluence value of one pixel		FAdoxy	39

Table 7-130 LBM GADS List_of_Mie_Image_Derivatives Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Image_Derivative	Mie image derivative value.		IntAus	48

7.13.4 File Size

Table 7-131 summarises the typical product size for Aeolus LBM products. The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 7-131 LBM Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~1697 bytes
Auxiliary Calibration SPH	~3426 bytes
LBM GADS	~130111 bytes
Product Size:	~135974 bytes

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8 INPUT AUXILIARY FILES

The following sections describe files used by the Aeolus L1bP to produce Level 0, Level 1A, Level 1B and calibration products.

8.1 Satellite Characterisation

8.1.1 Product Structure

The Satellite Characterisation Auxiliary conforms to the product structure described in Section 3. It is contained in one product file containing Fixed Header and Main Product Header as defined in Sections 3.3.3 and 0 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.

8.1.1.1 File Name

The Satellite Characterisation auxiliary file name has the format defined in Section 3.1:

AE_CCCC_AUX_CHAR__ 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, each validity period representing different phases of the ADM-Aeolus mission, over which the properties of the satellite may change. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

8.1.2 Specific Product Header

The following table describes the specific product header structure of all input auxiliary files. The specific product header of these files differ only in the root tag provided for the field Specific Product Header.

The root tag for the Satellite Characterisation input auxiliary file is SAT_CHAR_SPECIFIC_HEADER.

Table 8-1 Auxiliary Data Specific Product Header Content Description

Tag Name	Content Description	Unit	Type	Size
Specific_Product_Header	Root tag.		Structure	51
Sph_Descriptor	Specific Product Header descriptor: ASCII string describing the product		String	59
List_of_Dsds	Each Auxiliary Calibration product has only one DSD. The type of DSD used by each product is described in their respective sections.		List of Structures	394
Total size for XML structure in bytes:				504

8.1.2.1 Data Set Descriptors

Only a single Data Set appears in the Aeolus Satellite Characterisation Auxiliary data file: Satellite Characterisation GADS, as described in Section 8.1.3.

Table 8-2 Satellite Characterisation Auxiliary Calibration Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	Satellite_Characterisation	DSD structure for GADS	G	1 DSR per product

8.1.3 Data Sets

8.1.3.1 Satellite Characterisation GADS

The root tag for this Data Set is **Satellite_Characterisation**, and the Data Set consists of a single Data Set Record of the structure described in Table 8-3.

Table 8-3 Satellite Characterisation GADS DSR Content Description

Tag Name	Content Description	Unit	Type	Size
DEU_A	See Table 8-4 for structure definition		Structure	452
DEU_B	See Table 8-8 for structure definition		Structure	452
DEU_Common	See Table 8-11 for structure definition		Structure	1018
TLE_1	See Table 8-18 for structure definition		Structure	1862

Tag Name	Content Description	Unit	Type	Size
TLE_2	See Table 8-31 for structure definition		Structure	1862
ACDM_A	See Table 8-43 for structure definition		Structure	18113
ACDM_B	See Table 8-66 for structure definition		Structure	18113
ACDM_Common	See Table 8-88 for structure definition		Structure	1981
Laser_Transmit_Frequency	See Table 8-90 for structure definition		Structure	36178
List_of_Vertical_Sampling_Times	Table listing the 8 possible values of vertical sampling time coefficients, as defined in the Transfer Curve Document. See **Table 8-91** for structure definition		List of 8 Structures	476
List_of_Background_Integration_Times	Table listing the 8 possible values of background integration time coefficients for Mie and Rayleigh, as defined in the Transfer Curve. See **Table 8-92** for structure definition		List of 8 Structures	590
List_of_Ray_Mie_Delays	Table listing the 64 possible values of offset delay coefficients between Rayleigh and Mie first bin, as defined in the Transfer Curve Document. See **Table 8-93** for structure definition		List of 64 Structures	2354
List_of_Imaging_Integration_Times	Table listing the 4 possible values of imaging integration time coefficients for both Mie and Rayleigh, as defined in the Transfer Curve Document. See **Table 8-94** for structure definition		List of 4 Structures	304
Laser_Wavelength	Laser wavelength.	nm	FAdoxy	46
Low_Frequency_Clock	Low Frequency Clock	s	FAdoxy	52
Master_Clock_Rate	Master Clock Rate (TMC)	GHz	FAdoxy	48
Error_Quantifiers	See Table 8-96 for structure definition		Structure	508
Roll_Error	Roll Error; used to calculate the Velocity_of_Attitude_Uncertainty_Error and to correct for bin altitude assignment error.	deg	FAdoxy	34
Pitch_Error	Pitch Error; used to calculate the Velocity_of_Attitude_Uncertainty_Error	deg	FAdoxy	36
List_of_Tripod_Obscuration_Corrections	Table listing the 16 Telescope Tripod Obscuration corrections. See **Table 8-97** for structure definition		List of 16 Structures	1234
Laser_Pulse_Time_Delays	Laser pulse time delays. See **Table 8-98** for structure definition		Structure	358
List_of_Rayleigh_Linearity_Corrections	Table listing up to 65536 Rayleigh Linearity Corrections. See **Table 8-100** for structure definition		List of N Structures (0<N<65536	7995474
Aisp_Default_Parameters	Default values for unused Aisp parameters See **Table 8-101** for structure definition		Structure	514
Height_Rayleigh_Bin_1	Geodetic height above WGS84 ellipsoid of upper edge of highest Rayleigh sample bin (SP_VS_R)	km	FAdoxy	52
d2	Aladin internal delay in milliseconds	ms	FAdoxy	18

Tag Name	Content Description	Unit	Type	Size
Del_2_M	Fixed delay in milliseconds before the effective first layer starting point for Rayleigh Channel	ms	FAdoxy	28
Del_2_R	Fixed delay in milliseconds before the effective first layer starting point for Mie Channel	ms	FAdoxy	28
Velocity_Offset	Commanded Doppler velocity offset	m/s	FAdoxy	44
Scan_Limit	Off-nadir angle below which the yaw steering shall be switched off	deg	FAdoxy	34
Nominal_Scan_Angle	Nominal pointing of the satellite	deg	FAdoxy	50
Radiometric_Gain_Mie	Radiometric gain factor for the Mie signal.	ACCD counts/electron	FAdoxy	54
Radiometric_Gain_Rayleigh	Radiometric gain factor for the Rayleigh signal.	ACCD counts/electron	FAdoxy	64
Mie_Time_In_Memory_Zone	Time duration the signal remains in the memory zone for the Mie.	s	FAdoxy	62
Rayleigh_Time_In_Memory_Zone	Time duration the signal remains in the memory zone for the Rayleigh.	s	FAdoxy	72
Total size for XML GADS in bytes:				8046704

Table 8-4 Satellite Characterisation GADS DEU_A Content Description

Tag Name	Content Description	Unit	Type	Size
List_of_TM_1_StandardTelVals	List of standard telemetry values for DEU A used for transfer curves 8230 and 8232. See Table 8-5 for structure definition.		List of 2 structures	159
List_of_TM_8230_PhysVals	List of physical values for transfer curve 8230. See Table 8-6 for structure definition.		List of 2 structures	139
List_of_TM_8232_PhysVals	List of physical values for transfer curve 8232. See Table 8-7 for structure definition.		List of 2 structures	139
Total size for XML structure in bytes:				**437**

Table 8-5 Satellite Characterisation GADS List_of_TM_1_StandardTelVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_1_StandardTelVal	Single telemetry value.		IntAs	49

Table 8-6 Satellite Characterisation GADS List_of_ TM_8230_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8230_PhysVal	Single physical value.		FAdoxy	43

Table 8-7 Satellite Characterisation GADS List_of_ TM_8232_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8232_PhysVal	Single physical value.		FAdoxy	43

Table 8-8 Satellite Characterisation GADS DEU_B Content Description

Tag Name	Content Description	Unit	Type	Size
List_of_TM_1_StandardTelVals	List of standard telemetry values for DEU B used for transfer curves 8310 and 8312. See Table 8-5 for structure definition.		List of 2 structures	159
List_of_TM_8310_PhysVals	List of physical values for transfer curve 8310. See Table 8-9 for structure definition.		List of 2 structures	139
List_of_TM_8312_PhysVals	List of physical values for transfer curve 8312. See Table 8-10 for structure definition.		List of 2 structures	139
Total size for XML structure in bytes:				**437**

Table 8-9 Satellite Characterisation GADS List_of_ TM_8310_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8310_PhysVal	Single physical value.		FAdoxy	43

Table 8-10 Satellite Characterisation GADS List_of_ TM_8312_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8312_PhysVal	Single physical value.		FAdoxy	43

Table 8-11 Satellite Characterisation GADS DEU_Common Content Description

Tag Name	Content Description	Unit	Type	Size
List_of_TM_1_StandardTelVals	List of standard telemetry values for DEU Common used for transfer curves 8235, 8236, 8237, 8238, 8239, and 8240. See Table 8-5 for structure definition.		List of 2 structures	159
List_of_TM_8235_PhysVals	List of physical values for transfer curve 8235. See Table 8-12 for structure definition.		List of 2 structures	139
List_of_TM_8236_PhysVals	List of physical values for transfer curve 8236. See Table 8-13 for structure definition.		List of 2 structures	139
List_of_TM_8237_PhysVals	List of physical values for transfer curve 8237. See Table 8-14 for structure definition.		List of 2 structures	139
List_of_TM_8238_PhysVals	List of physical values for transfer curve 8238. See Table 8-15 for structure definition.		List of 2 structures	139
List_of_TM_8239_PhysVals	List of physical values for transfer curve 8239. See Table 8-16 for structure definition.		List of 2 structures	139
List_of_TM_8240_PhysVals	List of physical values for transfer curve 8240. See Table 8-17 for structure definition.		List of 2 structures	139
Total size for XML structure in bytes:				**993**

Table 8-12 Satellite Characterisation GADS List_of_ TM_8235_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8235_PhysVal	Single physical value.		FAdoxy	43

Table 8-13 Satellite Characterisation GADS List_of_ TM_8236_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8236_PhysVal	Single physical value.		FAdoxy	43

Table 8-14 Satellite Characterisation GADS List_of_ TM_8237_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8237_PhysVal	Single physical value.		FAdoxy	43

Table 8-15 Satellite Characterisation GADS List_of_ TM_8238_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8238_PhysVal	Single physical value.		FAdoxy	43

Table 8-16 Satellite Characterisation GADS List_of_ TM_8239_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8239_PhysVal	Single physical value.		FAdoxy	43

Table 8-17 Satellite Characterisation GADS List_of_ TM_8240_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8240_PhysVal	Single physical value.		FAdoxy	43

Table 8-18 Satellite Characterisation GADS TLE_1 Content Description

Tag Name	Content Description	Unit	Type	Size
List_of_TM_1_StandardTelVals	List of standard telemetry values for TLE_1 used for transfer curves 8419, 8437, 8513, 8514, 8517, 8518, 8521, 8522, 8544, and 8545. See Table 8-5 for structure definition.		List of 2 structures	159
List_of_TM_2_StandardTelVals	List of standard telemetry values for TLE_1 used for transfer curve 8451. See Table 8-19 for structure definition.		List of 2 structures	159
List_of_TM_8419_PhysVals	List of physical values for transfer curve 8419. See Table 8-20 for structure definition.		List of 2 structures	139
List_of_TM_8437_PhysVals	List of physical values for transfer curve 8437. See Table 8-21 for structure definition.		List of 2 structures	139
List_of_TM_8451_PhysVals	List of physical values for transfer curve 8451. See Table 8-22 for structure definition.		List of 2 structures	139
List_of_TM_8513_PhysVals	List of physical values for transfer curve 8513. See Table 8-23 for structure definition.		List of 2 structures	139
List_of_TM_8514_PhysVals	List of physical values for transfer curve 8514. See Table 8-24 for structure definition.		List of 2 structures	139
List_of_TM_8517_PhysVals	List of physical values for transfer curve 8517. See Table 8-25 for structure definition.		List of 2 structures	139

Tag Name	Content Description	Unit	Type	Size
List_of_TM_8518_PhysVals	List of physical values for transfer curve 8518. See Table 8-26 for structure definition.		List of 2 structures	139
List_of_TM_8521_PhysVals	List of physical values for transfer curve 8521. See Table 8-27 for structure definition.		List of 2 structures	139
List_of_TM_8522_PhysVals	List of physical values for transfer curve 8522. See Table 8-28 for structure definition.		List of 2 structures	139
List_of_TM_8544_PhysVals	List of physical values for transfer curve 8544. See Table 8-29 for structure definition.		List of 2 structures	139
List_of_TM_8545_PhysVals	List of physical values for transfer curve 8545. See Table 8-30 for structure definition.		List of 2 structures	139
Total size for XML structure in bytes:				**1847**

Table 8-19 Satellite Characterisation GADS List_of_TM_2_StandardTelVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_2_StandardTelVal	Single telemetry value.		IntAs	49

Table 8-20 Satellite Characterisation GADS List_of_ TM_8419_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8419_PhysVal	Single physical value.		FAdoxy	43

Table 8-21 Satellite Characterisation GADS List_of_ TM_8437_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8437_PhysVal	Single physical value.		FAdoxy	43

Table 8-22 Satellite Characterisation GADS List_of_ TM_8451_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8451_PhysVal	Single physical value.		FAdoxy	43

Table 8-23 Satellite Characterisation GADS List_of_ TM_8513_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8513_PhysVal	Single physical value.		FAdoxy	43

Table 8-24 Satellite Characterisation GADS List_of_ TM_8514_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8514_PhysVal	Single physical value.		FAdoxy	43

Table 8-25 Satellite Characterisation GADS List_of_ TM_8517_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8517_PhysVal	Single physical value.		FAdoxy	43

Table 8-26 Satellite Characterisation GADS List_of_ TM_8518_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8518_PhysVal	Single physical value.		FAdoxy	43

Table 8-27 Satellite Characterisation GADS List_of_ TM_8521_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8521_PhysVal	Single physical value.		FAdoxy	43

Table 8-28 Satellite Characterisation GADS List_of_ TM_8522_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8522_PhysVal	Single physical value.		FAdoxy	43

Table 8-29 Satellite Characterisation GADS List_of_ TM_8544_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8544_PhysVal	Single physical value.		FAdoxy	43

Table 8-30 Satellite Characterisation GADS List_of_ TM_8545_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8545_PhysVal	Single physical value.		FAdoxy	43

Table 8-31 Satellite Characterisation GADS TLE_2 Content Description

Tag Name	Content Description	Unit	Type	Size
List_of_TM_1_StandardTelVals	List of standard telemetry values for TLE_2 used for transfer curves 8619, 8637, 8713, 8714, 8717, 8718, 8721, 8722, 8744, and 8745. See Table 8-5 for structure definition.		List of 2 structures	159
List_of_TM_2_StandardTelVals	List of standard telemetry values for TLE_2 used for transfer curve 8651. See Table 8-19 for structure definition.		List of 2 structures	159
List_of_TM_8619_PhysVals	List of physical values for transfer curve 8619. See Table 8-32 for structure definition.		List of 2 structures	139
List_of_TM_8637_PhysVals	List of physical values for transfer curve 8637. See Table 8-33 for structure definition.		List of 2 structures	139
List_of_TM_8651_PhysVals	List of physical values for transfer curve 8651. See Table 8-34 for structure definition.		List of 2 structures	139
List_of_TM_8713_PhysVals	List of physical values for transfer curve 8713. See Table 8-35 for structure definition.		List of 2 structures	139
List_of_TM_8714_PhysVals	List of physical values for transfer curve 8714. See Table 8-36 for structure definition.		List of 2 structures	139
List_of_TM_8717_PhysVals	List of physical values for transfer curve 8717. See Table 8-37 for structure definition.		List of 2 structures	139
List_of_TM_8718_PhysVals	List of physical values for transfer curve 8718. SeeTable 8-38 for structure definition.		List of 2 structures	139
List_of_TM_8721_PhysVals	List of physical values for transfer curve 8721. See Table 8-39 for structure definition.		List of 2 structures	139
List_of_TM_8722_PhysVals	List of physical values for transfer curve 8722. See Table 8-40 for structure definition.		List of 2 structures	139
List_of_TM_8744_PhysVals	List of physical values for transfer curve 8744. SeeTable 8-41 for structure definition.		List of 2 structures	139

Tag Name	Content Description	Unit	Type	Size
List_of_TM_8745_PhysVals	List of physical values for transfer curve 8745. SeeTable 8-42 for structure definition.		List of 2 structures	139
Total size for XML structure in bytes:				1847

Table 8-32 Satellite Characterisation GADS List_of_ TM_8619_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8619_PhysVal	Single physical value.		FAdoxy	43

Table 8-33 Satellite Characterisation GADS List_of_ TM_8637_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8637_PhysVal	Single physical value.		FAdoxy	43

Table 8-34 Satellite Characterisation GADS List_of_ TM_8651_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8651_PhysVal	Single physical value.		FAdoxy	43

Table 8-35 Satellite Characterisation GADS List_of_ TM_8713_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8713_PhysVal	Single physical value.		FAdoxy	43

Table 8-36 Satellite Characterisation GADS List_of_ TM_8714_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8714_PhysVal	Single physical value.		FAdoxy	43

Table 8-37 Satellite Characterisation GADS List_of_ TM_8717_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8717_PhysVal	Single physical value.		FAdoxy	43

Table 8-38 Satellite Characterisation GADS List_of_ TM_8718_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8718_PhysVal	Single physical value.		FAdoxy	43

Table 8-39 Satellite Characterisation GADS List_of_ TM_8721_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8721_PhysVal	Single physical value.		FAdoxy	43

Table 8-40 Satellite Characterisation GADS List_of_ TM_8722_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8722_PhysVal	Single physical value.		FAdoxy	43

Table 8-41 Satellite Characterisation GADS List_of_ TM_8744_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8744_PhysVal	Single physical value.		FAdoxy	43

Table 8-42 Satellite Characterisation GADS List_of_ TM_8745_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8745_PhysVal	Single physical value.		FAdoxy	43

Table 8-43 Satellite Characterisation GADS ACDM_A Content Description

Tag Name	Content Description	Unit	Type	Size
List_of_TM_1_StandardTelVals	List of standard telemetry values for ACDM_A used for transfer curves 8116, 8117, 8118, 8119, 8146, 8147, 8148, and 8149. See Table 8-5 for structure definition.		List of 16 structures	845
List_of_TM_2_StandardTelVals	List of standard telemetry values for ACDM_A used for transfer curves 8104, 8105, 8106, 8107, 8108, 8109, 8138, 8139, 8140, and 8141. See Table 8-19 for structure definition.		List of 16 structures	845
List_of_TM_3_StandardTelVals	List of standard telemetry values for ACDM_A used for transfer curves 8130, 8131, 8132, and 8133. See Table 8-44 for structure definition.		List of 16 structures	845
List_of_TM_8104_PhysVals	List of physical values for transfer curve 8104. See Table 8-45 for structure definition.		List of 16 structures	741
List_of_TM_8105_PhysVals	List of physical values for transfer curve 8105. See Table 8-46 for structure definition.		List of 16 structures	741
List_of_TM_8106_PhysVals	List of physical values for transfer curve 8106. See Table 8-47 for structure definition.		List of 16 structures	741
List_of_TM_8107_PhysVals	List of physical values for transfer curve 8107. See Table 8-48 for structure definition.		List of 16 structures	741
List_of_TM_8108_PhysVals	List of physical values for transfer curve 8108. See Table 8-49 for structure definition.		List of 16 structures	741
List_of_TM_8109_PhysVals	List of physical values for transfer curve 8109. See Table 8-50 for structure definition.		List of 16 structures	741
List_of_TM_8116_PhysVals	List of physical values for transfer curve 8116. See Table 8-51 for structure definition.		List of 16 structures	741
List_of_TM_8117_PhysVals	List of physical values for transfer curve 8117. See Table 8-52 for structure definition.		List of 16 structures	741
List_of_TM_8118_PhysVals	List of physical values for transfer curve 8118. See Table 8-53 for structure definition.		List of 16 structures	741
List_of_TM_8130_PhysVals	List of physical values for transfer curve 8130. See Table 8-54 for structure definition.		List of 16 structures	741
List_of_TM_8131_PhysVals	List of physical values for transfer curve 8131. See Table 8-55 for structure definition.		List of 16 structures	741
List_of_TM_8132_PhysVals	List of physical values for transfer curve 8132. See Table 8-56 for structure definition.		List of 16 structures	741
List_of_TM_8133_PhysVals	List of physical values for transfer curve 8133. See Table 8-57 for structure definition.		List of 16 structures	741
List_of_TM_8138_PhysVals	List of physical values for transfer curve 8138. See Table 8-58 for structure definition.		List of 16 structures	741
List_of_TM_8139_PhysVals	List of physical values for transfer curve 8139. See Table 8-59 for structure definition.		List of 16 structures	741

Tag Name	Content Description	Unit	Type	Size
List_of_TM_8140_PhysVals	List of physical values for transfer curve 8140. See Table 8-60 for structure definition.		List of 16 structures	741
List_of_TM_8141_PhysVals	List of physical values for transfer curve 8141. See Table 8-61 for structure definition.		List of 16 structures	741
List_of_TM_8146_PhysVals	List of physical values for transfer curve 8146. See Table 8-62 for structure definition.		List of 16 structures	741
List_of_TM_8147_PhysVals	List of physical values for transfer curve 8147. See Table 8-63 for structure definition.		List of 16 structures	741
List_of_TM_8148_PhysVals	List of physical values for transfer curve 8148. See Table 8-64 for structure definition.		List of 16 structures	741
List_of_TM_8149_PhysVals	List of physical values for transfer curve 8149. See Table 8-65 for structure definition.		List of 16 structures	741
Total size for XML structure in bytes:				**18096**

Table 8-44 Satellite Characterisation GADS List_of_TM_3_StandardTelVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_3_StandardTelVal	Single telemetry value.		IntAs	49

Table 8-45 Satellite Characterisation GADS List_of_ TM_8104_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8104_PhysVal	Single physical value.		FAdoxy	43

Table 8-46 Satellite Characterisation GADS List_of_ TM_8105_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8105_PhysVal	Single physical value.		FAdoxy	43

Table 8-47 Satellite Characterisation GADS List_of_ TM_8106_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8106_PhysVal	Single physical value.		FAdoxy	43

Table 8-48 Satellite Characterisation GADS List_of_ TM_8107_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8107_PhysVal	Single physical value.		FAdoxy	43

Table 8-49 Satellite Characterisation GADS List_of_ TM_8108_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8108_PhysVal	Single physical value.		FAdoxy	43

Table 8-50 Satellite Characterisation GADS List_of_ TM_8109_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8109_PhysVal	Single physical value.		FAdoxy	43

Table 8-51 Satellite Characterisation GADS List_of_ TM_8116_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8116_PhysVal	Single physical value.		FAdoxy	43

Table 8-52 Satellite Characterisation GADS List_of_ TM_8117_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8117_PhysVal	Single physical value.		FAdoxy	43

Table 8-53 Satellite Characterisation GADS List_of_ TM_8118_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8118_PhysVal	Single physical value.		FAdoxy	43

Table 8-54 Satellite Characterisation GADS List_of_ TM_8130_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8130_PhysVal	Single physical value.		FAdoxy	43

Table 8-55 Satellite Characterisation GADS List_of_ TM_8131_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8131_PhysVal	Single physical value.		FAdoxy	43

Table 8-56 Satellite Characterisation GADS List_of_ TM_8132_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8132_PhysVal	Single physical value.		FAdoxy	43

Table 8-57 Satellite Characterisation GADS List_of_ TM_8133_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8133_PhysVal	Single physical value.		FAdoxy	43

Table 8-58 Satellite Characterisation GADS List_of_ TM_8138_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8138_PhysVal	Single physical value.		FAdoxy	43

Table 8-59 Satellite Characterisation GADS List_of_ TM_8139_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8139_PhysVal	Single physical value.		FAdoxy	43

Table 8-60 Satellite Characterisation GADS List_of_ TM_8140_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8140_PhysVal	Single physical value.		FAdoxy	43

Table 8-61 Satellite Characterisation GADS List_of_ TM_8141_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8141_PhysVal	Single physical value.		FAdoxy	43

Table 8-62 Satellite Characterisation GADS List_of_ TM_8146_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8146_PhysVal	Single physical value.		FAdoxy	43

Table 8-63 Satellite Characterisation GADS List_of_ TM_8147_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8147_PhysVal	Single physical value.		FAdoxy	43

Table 8-64 Satellite Characterisation GADS List_of_ TM_8148_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8148_PhysVal	Single physical value.		FAdoxy	43

Table 8-65 Satellite Characterisation GADS List_of_ TM_8149_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8149_PhysVal	Single physical value.		FAdoxy	43

Table 8-66 Satellite Characterisation GADS ACDM_B Content Description

Tag Name	Content Description	Unit	Type	Size
List_of_TM_1_StandardTelVals	List of standard telemetry values for ACDM_A used for transfer curves 8123, 8124, 8125, 8126, 8150, 8151, 8152, and 8153. See Table 8-5 for structure definition.		List of 16 structures	845
List_of_TM_2_StandardTelVals	List of standard telemetry values for ACDM_A used for transfer curves 8110, 8111, 8112, 8113, 8114, 8115, 8142, 8143, 8144, and 8145. See Table 8-19 for structure definition.		List of 16 structures	845
List_of_TM_3_StandardTelVals	List of standard telemetry values for ACDM_A used for transfer curves 8134, 8135, 8136, and 8137. See Table 8-44 for structure definition.		List of 16 structures	845
List_of_TM_8110_PhysVals	List of physical values for transfer curve 8110. See Table 8-67 for structure definition.		List of 16 structures	741
List_of_TM_8111_PhysVals	List of physical values for transfer curve 8111. See Table 8-68 for structure definition.		List of 16 structures	741
List_of_TM_8112_PhysVals	List of physical values for transfer curve 8112. See Table 8-69 for structure definition.		List of 16 structures	741
List_of_TM_8113_PhysVals	List of physical values for transfer curve 8113. See Table 8-70 for structure definition.		List of 16 structures	741
List_of_TM_8114_PhysVals	List of physical values for transfer curve 8114. See Table 8-71 for structure definition.		List of 16 structures	741
List_of_TM_8115_PhysVals	List of physical values for transfer curve 8115. See Table 8-72 for structure definition.		List of 16 structures	741
List_of_TM_8123_PhysVals	List of physical values for transfer curve 8123. See Table 8-73 for structure definition.		List of 16 structures	741
List_of_TM_8124_PhysVals	List of physical values for transfer curve 8124. See Table 8-74 for structure definition.		List of 16 structures	741
List_of_TM_8125_PhysVals	List of physical values for transfer curve 8125. See Table 8-75 for structure definition.		List of 16 structures	741
List_of_TM_8134_PhysVals	List of physical values for transfer curve 8134. See Table 8-76 for structure definition.		List of 16 structures	741
List_of_TM_8135_PhysVals	List of physical values for transfer curve 8135. See Table 8-77 for structure definition.		List of 16 structures	741
List_of_TM_8136_PhysVals	List of physical values for transfer curve 8136. See Table 8-78 for structure definition.		List of 16 structures	741
List_of_TM_8137_PhysVals	List of physical values for transfer curve 8137. See Table 8-79 for structure definition.		List of 16 structures	741
List_of_TM_8142_PhysVals	List of physical values for transfer curve 8142. See Table 8-80 for structure definition.		List of 16 structures	741
List_of_TM_8143_PhysVals	List of physical values for transfer curve 8143. See Table 8-81 for structure definition.		List of 16 structures	741
List_of_TM_8144_PhysVals	List of physical values for transfer curve 8144. See Table 8-82 for structure definition.		List of 16 structures	741

Tag Name	Content Description	Unit	Type	Size
List_of_TM_8145_PhysVals	List of physical values for transfer curve 8145. See Table 8-83 for structure definition.		List of 16 structures	741
List_of_TM_8150_PhysVals	List of physical values for transfer curve 8150. See Table 8-84 for structure definition.		List of 16 structures	741
List_of_TM_8151_PhysVals	List of physical values for transfer curve 8151. See Table 8-85 for structure definition.		List of 16 structures	741
List_of_TM_8152_PhysVals	List of physical values for transfer curve 8152. See Table 8-86 for structure definition.		List of 16 structures	741
List_of_TM_8153_PhysVals	List of physical values for transfer curve 8153. See Table 8-87 for structure definition.		List of 16 structures	741
Total size for XML structure in bytes:				**18096**

Table 8-67 Satellite Characterisation GADS List_of_ TM_8110_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8110_PhysVal	Single physical value.		FAdoxy	43

Table 8-68 Satellite Characterisation GADS List_of_ TM_8111_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8111_PhysVal	Single physical value.		FAdoxy	43

Table 8-69 Satellite Characterisation GADS List_of_ TM_8112_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8112_PhysVal	Single physical value.		FAdoxy	43

Table 8-70 Satellite Characterisation GADS List_of_ TM_8113_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8113_PhysVal	Single physical value.		FAdoxy	43

Table 8-71 Satellite Characterisation GADS List_of_ TM_8114_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8114_PhysVal	Single physical value.		FAdoxy	43

Table 8-72 Satellite Characterisation GADS List_of_ TM_8115_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8115_PhysVal	Single physical value.		FAdoxy	43

Table 8-73 Satellite Characterisation GADS List_of_ TM_8123_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8123_PhysVal	Single physical value.		FAdoxy	43

Table 8-74 Satellite Characterisation GADS List_of_ TM_8124_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8124_PhysVal	Single physical value.		FAdoxy	43

Table 8-75 Satellite Characterisation GADS List_of_ TM_8125_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8125_PhysVal	Single physical value.		FAdoxy	43

Table 8-76 Satellite Characterisation GADS List_of_ TM_8134_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8134_PhysVal	Single physical value.		FAdoxy	43

Table 8-77 Satellite Characterisation GADS List_of_ TM_8135_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8135_PhysVal	Single physical value.		FAdoxy	43

Table 8-78 Satellite Characterisation GADS List_of_ TM_8136_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8136_PhysVal	Single physical value.		FAdoxy	43

Table 8-79 Satellite Characterisation GADS List_of_ TM_8137_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8137_PhysVal	Single physical value.		FAdoxy	43

Table 8-80 Satellite Characterisation GADS List_of_ TM_8142_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8142_PhysVal	Single physical value.		FAdoxy	43

Table 8-81 Satellite Characterisation GADS List_of_ TM_8143_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8143_PhysVal	Single physical value.		FAdoxy	43

Table 8-82 Satellite Characterisation GADS List_of_ TM_8144_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8144_PhysVal	Single physical value.		FAdoxy	43

Table 8-83 Satellite Characterisation GADS List_of_ TM_8145_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8145_PhysVal	Single physical value.		FAdoxy	43

Table 8-84 Satellite Characterisation GADS List_of_ TM_8150_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8150_PhysVal	Single physical value.		FAdoxy	43

Table 8-85 Satellite Characterisation GADS List_of_ TM_8151_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8151_PhysVal	Single physical value.		FAdoxy	43

Table 8-86 Satellite Characterisation GADS List_of_ TM_8152_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8152_PhysVal	Single physical value.		FAdoxy	43

Table 8-87 Satellite Characterisation GADS List_of_ TM_8153_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8153_PhysVal	Single physical value.		FAdoxy	43

Table 8-88 Satellite Characterisation GADS ACDM_Common Content Description

Tag Name	Content Description	Unit	Type	Size
List_of_TM_1_StandardTelVals	List of standard telemetry values for DEU B used for transfer curve 8101. See Table 8-5 for structure definition.		List of 20 structures	1041

Tag Name	Content Description	Unit	Type	Size
List_of_TM_8101_PhysVals	List of physical values for transfer curve 8101. See Table 8-89 for structure definition.		List of 20 structures	913
Total size for XML structure in bytes:				**1954**

Table 8-89 Satellite Characterisation GADS List_of_ TM_8101_PhysVals Content Description

Tag Name	Content Description	Unit	Type	Size
TM_8101_PhysVal	Single physical value.		FAdoxy	43

Table 8-90 Satellite Characterisation GADS Laser_Transmit_Frequency Content Description

Tag Name	Content Description	Unit	Type	Size
Base_Frequency	Base Laser Transmit Frequency	GHz	FAdoxy	42
List_of_Freq_Offsets	Table listing frequency rank TC code and actual transmitter frequency. See **Table 8-95** for structure definition		List of 1001 Structures	36082
Total size for XML structure in bytes:				36124

Table 8-91 Satellite Characterisation GADS List_of_Vertical_Sampling_Times Content Description

Tag Name	Content Description	Unit	Type	Size
Vertical_Sampling_Time	Vertical sampling time coefficient in TMC	TMC	IntAus	51

Table 8-92 Satellite Characterisation GADS List_of_Background_Integration_Times Content Description

Tag Name	Content Description	Unit	Type	Size
Background_Integration_Time	Background Integration time coefficient in TMC	TMC	IntAul	64

Table 8-93 Satellite Characterisation GADS List_of_Ray_Mie_Delays Content Description

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Mie_Delay	Rayleigh Mie Time Delay coefficient in TMC	TMC	IntAul	36

Table 8-94 Satellite Characterisation GADS List_of_Imaging_Integration_Times Content Description

Tag Name	Content Description	Unit	Type	Size
Imaging_Integration_Time	Imaging Integration Time coefficient in TMC	TMC	IntAul	58

Table 8-95 Satellite Characterisation GADS List_of_Freq_Offsets Content Description

Tag Name	Content Description	Unit	Type	Size
Freq_Offset	Frequency offset - 12.5GHz to + 12.5GHz in steps of 0.025GHz	GHz	FAdoxy	36

Table 8-96 Satellite Characterisation GADS Error_Quantifiers Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Error_Quantifier_K1	Mie Error Quantifier K1		FAdoxy	60
Mie_Error_Quantifier_K2	Mie Error Quantifier K2		FAdoxy	60
Mie_Error_Quantifier_K3	Mie Error Quantifier K3		FAdoxy	60
Rayleigh_Error_Quantifier_Ka2	Rayleigh Error Quantifier Ka2		FAdoxy	72
Rayleigh_Error_Quantifier_Ka3	Rayleigh Error Quantifier Ka3		FAdoxy	72
Rayleigh_Error_Quantifier_Kb2	Rayleigh Error Quantifier Kb2		FAdoxy	72
Rayleigh_Error_Quantifier_Kb3	Rayleigh Error Quantifier Kb3		FAdoxy	72
Total size for XML structure in bytes:				468

Table 8-97 Satellite Characterisation GADS List_of_Tripod_Obscuration_Corrections Content Description

Tag Name	Content Description	Unit	Type	Size
Tripod_Obscuration_Correction	Telescope Tripod Obscuration correction for one column		FAdoxy	72

Table 8-98 Satellite Characterisation GADS Laser_Pulse_Time_Delays Content Description

Tag Name	Content Description	Unit	Type	Size
Delay_Dt1_Offset	Offset in TMC used to calculate DT1 delay, as defined in the Transfer Curve Document. It corresponds to the delay of the output signal if the minimun dt is programmed (0ms).	TMC	FAdoxy	46
Delay_Dt2_Offset	Offset in TMC used to calculate DT2 delay, as defined in the Transfer Curve Document. It corresponds to the delay of the output signal if the minimun dt is programmed (0ms).	TMC	FAdoxy	46
Delay_Dt3_Fixed_Offset	Offset in TMC used to calculate DT3_Fixed delay, as defined in the Transfer Curve Document. It corresponds to the delay of the output signal if the minimun dt is programmed (0ms).	TMC	FAdoxy	58
Delay_Dt3_Variable_Offset	Offset in TMC used to calculate DT3_Variable delay, as defined in the Transfer Curve Document. It corresponds to the delay of the output signal if the minimun dt is programmed (0ms).	TMC	FAdoxy	64
Delay_Dt4_Offset	Offset in TMC used to calculate DT4 delay, as defined in the Transfer Curve Document. It corresponds to the delay of the output signal if the minimun dt is programmed (0ms).	TMC	FAdoxy	46
Delay_Dt5_Offset	Offset in TMC used to calculate DT5 delay, as defined in the Transfer Curve Document. It corresponds to the delay of the output signal if the minimun dt is programmed (0ms).	TMC	FAdoxy	46
Total size for XML structure in bytes:				306

Table 8-99 Satellite Characterisation GADS List_of_Rayleigh_Linearity_Corrections Content Description

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Linearity_Correction	See Table 8-100 for structure description		Structure	122

Table 8-100 Satellite Characterisation GADS Rayleigh_Linearity_Corrections Content Description

Tag Name	Content Description	Unit	Type	Size
RLC_Index	Rayleigh Linearity Correction index		IntAus	26
RLC_Value	Rayleigh Linearity Correction value		FAdoxy	32
Total size for XML structure in bytes:				58

Table 8-101 Satellite Characterisation GADS Aisp_Default_Parameters Content Description

Tag Name	Content Description	Unit	Type	Size
Source_Packet_Header	See Table 8-102 for structure description		Structure	272
Data_Field_Header	See Table 8-103 for structure description		Structure	190
Total size for XML structure in bytes:				462

Table 8-102 Satellite Characterisation GADS Source_Packet_Header Content Description

Tag Name	Content Description	Unit	Type	Size
Version_Num	Version number		IntAs	30
Sp_Type	Source Packet Type		IntAs	22
Data_Field_Header_Flag	Data Field Header Flag		IntAs	52
Application_Process_Id	Application Process Identifier		IntAs	52
Process_Category	Process Category		IntAs	40
Sequence_Flags	Sequence Flags		IntAs	36
Total size for XML structure in bytes:				232

Table 8-103 Satellite Characterisation GADS Data_Field_Header Content Description

Tag Name	Content Description	Unit	Type	Size
Secondary_Header_Flag	SP Secondary header flag		IntAs	50
Pus_Version	Indicates the availability of the Packet Error Control Field		IntAs	30
Ack_N	Ack_N		IntAs	18
Service_Type	Service type		IntAs	32
Source_Id	SP Source Identifier		IntAs	26
Total size for XML structure in bytes:				156

Table 8-104 Satellite Characterisation GADS List_of_Harmonic_Bias_Coefficient_As

Tag Name	Content Description	Unit	Type	Size
Harmonic_Bias _Coefficient_A	Coefficent A in the Harmonic Bias Estimation using Fourier transform based interpolation.		FAdoxy	68

Table 8-105 Satellite Characterisation GADS List_of_Harmonic_Bias_Coefficient_Bs

Tag Name	Content Description	Unit	Type	Size
Harmonic_Bias_Coefficient_B	Coefficent B in the Harmonic Bias Estimation using Fourier transform based interpolation.		FAdoxy	68

8.1.4 File Size

The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 8-106 Satellite Characterisation Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~1697 bytes
Auxiliary Data SPH	~504 bytes
Satellite Characterisation GADS	~ 8046704
Product Size:	~8.0 Mbytes

8.2 Level 0 Processing Parameters

8.2.1 Product Structure

The Level 0 Processing Parameters product conforms to the product structure described in Section 3. It is contained in one product file containing Fixed Header and Main Product Header as defined in Sections 3.3.3 and 0 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.

8.2.1.1 File Name

The Level 0 Processing Parameters auxiliary file name has the format defined in Section 3.1:

AE_CCCC_AUX_PAR_0_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, each validity period representing different phases of the ADM-Aeolus mission, over which the properties of the satellite may change. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

8.2.2 Product Structure

The Predicted Rayleigh Response Calibration (PRR) product conforms to the product structure described in Section 3. It is contained in one product file containing Fixed Header as defined in Section 3.3.3 and Main Product Header, Specific Product Header and a Data Set described in following subsections. All headers and data sets are in XML format.

8.2.2.1 File Name

The Predicted Rayleigh Response Calibration product file name has the format defined in Section 3.1:

AE_CCCC_AUX_PRR_1B_ yyyymmddThhmmss_yyyymmddThhmmss_vvvv.EEF

Where the date/times represent the start and stop of the validity period. The start date is generally set to equal the date on which the file becomes valid while the stop date is set to some date in the future when it is deemed this type of calibration data must be classified as invalid. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

8.2.3 Specific Product Header

The Specific Product Header structure for this file is described in Section 8.1.2. The root tag for the Level 0 processing Parameters input auxiliary file is AUX_PAR_0_SPECIFIC_HEADER.

8.2.3.1 Data Set Descriptors

Only a single Data Set appears in the Aeolus Level 0 Processing Parameters data file: Level 0 Processing Parameters GADS, as described in Section 8.2.4.

8.2.4 Data Sets

8.2.4.1 Level 0 Processing Parameters GADS

The root tag for this Data Set is **Level_0_Processing_Parameters**, and the Data Set consists of a single Data Set Record of the structure described in Table 8-107.

Table 8-107 Level 0 Processing Parameters GADS DSR Content Description

Tag Name	Content Description	Unit	Type	Size
FH_Default_Fields	Values responsible for populating the fixed header. See **Table 8-108** for structure definition		Structure	515

Tag Name	Content Description	Unit	Type	Size
Mph_Default_Fields	Values responsible for populating the main product header. See **Table 8-109** for structure definition		Structure	144
Sph_Descriptor	ASCII string describing the product		String	59
Level_0_Error_Thresholds	See Table 8-110 for structure definition		Structure	242
Header_Validity_Checks	See Table 8-111 for structure definition		Structure	355
Transfer_Curve_Selection	See Table 8-112 for structure definition		Structure	91
Total size for XML structure in bytes:				1406

Table 8-108 Level 0 Processing Parameters GADS FH_Default_Fields Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
File_Description	1-line description of the file		String	63
Notes	Multi-lines free text		String	41
Mission	Aeolus		String	45
Mission_Id	AE		String	51
File_Class	1-Line description of the file class		String	51
File_Version	4 digits used to distinguish between versions of a file having the same validity period		IntAs	32
System	‘Aeolus L1bP’		String	43
Creator	‘Aeolus L1bP’		String	45
Creator_Version	Version of the tool, matches version number part of the Software_Ver field.		String	61
Total size for XML structure in bytes:				481

Table 8-109 Level 0 Processing Parameters GADS Mph_Default_Fields Content Description

Tag Name	Content Description	Unit	Type	Size
Software_Ver	Software version number of processing software. Format: name of processor (up to 10 char) version number (4 char)		String	55
Proc_Centre	'AE.PHS’		String	53
Total size for XML structure in bytes:				108

Table 8-110 Level 0 Processing Parameters GADS Level_0_Error_Thresholds Content Description

Tag Name	Content Description	Unit	Type	Size
Error_Isps_Thresh	Threshold at which the number of ISPs containing CRC errors is considered significant	%	FAdoxy	48
Missing_Isps_Thresh	Threshold at which number of missing ISPs is considered significant	%	FAdoxy	52
Rs_Thresh	Threshold at which number of ISPs with Reed Solomon corrections is considered significant	%	FAdoxy	32
Tf_Crc_Error_Isps_Thresh	Threshold at which number of ISPs containing Transfer Frame CRC errors is considered significant	%	FAdoxy	62
Total size for XML structure in bytes:				194

Table 8-111 Level 0 Processing Parameters GADS Header_Validity_Checks Content Description

Tag Name	Content Description	Unit	Type	Size
Sp_Version_No	SP Version number		IntAs	57
Sp_Type	0		IntAs	45
Sp_Data_Field_Header	1		IntAs	71
Sp_Application_Process_ID	Source Packet Application process ID		IntAs	81
Sp_Packet_Cat	Source Packet packet category		IntAs	57
Total size for XML structure in bytes:				311

Table 8-112 Level 0 Processing Parameters GADS Transfer_Curve_Selection Content Description

Tag Name	Content Description	Unit	Type	Size
DEU	DEU unit selection; possible values: “A” or “B”.		IntAuc	12
TLE	TLE unit selection; possible values: “1” or “2”.		IntAuc	12
ACDM	ACDM unit selection; possible values: “A” or “B”.		IntAuc	14
Total size for XML structure in bytes:				38

8.2.5 File Size

The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 8-113 Level 0 Processing Parameters Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~1685 bytes
Auxiliary Data SPH	~504 bytes
Level 0 Processing Parameters GADS	~1406 bytes
Product Size:	~4.2 kbytes

8.3 Level 1A Processing Parameters

8.3.1 Product Structure

The Level 1A Processing Parameters product conforms to the product structure described in Section 3. It is contained in one product file containing Fixed Header and Main Product Header as defined in Sections 3.3.3 and 3.3.4 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.

8.3.1.1 File Name

The Level 1A Processing Parameters auxiliary file name has the format defined in Section 3.1:

AE_CCCC_AUX_PAR_1AyyyymmddThhmmss_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, each validity period representing different phases of the ADM-Aeolus mission, over which the properties of the satellite may change. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

8.3.2 Specific Product Header

The Specific Product Header structure for this file is described in Section 8.1.2. The root tag for the Level 1A Processing Parameters input auxiliary file is AUX_PAR_1A_SPECIFIC_HEADER.

8.3.2.1 Data Set Descriptors

Only a single Data Set appears in the Aeolus Level 1A Processing Parameters data file: Level 1A Processing Parameters GADS, as described in Section 8.3.3.

Table 8-114 Level 1A Processing Parameters Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	Level_1A_Proc_Params	DSD structure for GADS	G	1 DSR per product

8.3.3 Data Sets

The root tag for this Data Set is **Level_1A_Processing_Parameters**, and the Data Set consists of a single Data Set Record of the structure described in Table 8-115.

8.3.3.1 Level 1A Processing Parameters GADS

Table 8-115 Level 1A Processing Parameters GADS DSR Content Description

Tag Name	Content Description	Unit	Type	Size
FH_Default_Fields	Fields responsible for populating the Fixed Header. See **Table 8-116** for structure definition		Structure	472
MPH_Default_Fields	Values responsible for populating the main product header. See **Table 8-117** for structure definition		Structure	183
WVM_Params	Processing parameters for Wind Velocity Measurement. See **Table 8-118** for structure definition		Structure	134
ISR_Params	Processing parameters for Instrument Spectral Registration. See **Table 8-119** for structure definition		Structure	134
IAT_Params	Processing parameters for Instrument Auto Test. See **Table 8-120** for structure definition		Structure	134
DCC_Params	Processing parameters for Dark Current Calibration. See **Table 8-121** for structure definition		Structure	134
IDC_Params	Processing parameters for Instrument Defocus Characterisation. See **Table 8-122** for structure definition		Structure	134
IRC_Params	Processing parameters for Instrument Response Calibration. See **Table 8-123** for structure definition		Structure	134
OWV_Params	Processing parameters for Offline Wind Measurement Calibration. See **Table 8-124** for structure definition		Structure	134
NOU_Params	Processing parameters for the NOP and UDM modes. See **Table 8-125** for structure definition.		Structure	368
DCMZ_Params	Processing parameters for the Dark Current in Memory Zone Calibration. See **Table 8-126** for structure definition.		Structure	136
LBM_Params	Processing parameters for the Laser Beam Monitoring Calibration. See Table 8-127 for structure definition.		Structure	134
Data_Quality	See Table 8-128 for structure definition		Structure	381
Transfer_Curve_Selection	See for structure definition.		Structure	91
Perform_Satellite_Velocity_Correction	The satellite velocity correction can be switched on using setting ‘TRUE’; in that case the veolicity values reported the L0 product will be corrected. For E2S simulated data the setting ‘FALSE’ should be used, as simulated velocities are correct.		Boolean	83
Min_Num_BRC	If number of output BRCs is below this threshold, no output product will be written. This applies to all modes.		IntAuc	30
Total size for XML structure in bytes:				2816

Table 8-116 Level 1A Processing Parameters GADS FH_Default_Fields Content Description

Tag Name	Content Description	Unit	Type	Size
File_Description	1-line description of the file		String	63
Notes	Multi-lines free text		String	41
Mission	Aeolus		String	45
Mission_Id	AE		String	51
File_Class	1-Line description of the file class		String	51
File_Version	4 digits used to distinguish between versions of a file having the same validity period		IntAs	32
System	'Aeolus L1bP'		String	43
Creator	'Aeolus L1bP'		String	45
Creator_Version	Version of the tool, matches version number part of the Software_Ver field.		String	61
Total size for XML structure in bytes:				432

Table 8-117 Level 1A Processing Parameters GADS MPH_Default_Fields Content Description

Tag Name	Content Description	Unit	Type	Size
Software_Ver	Software version number of processing software. Format: name of processor (up to 10 char) version number (4 char)		String	55
Proc_Centre	'AE.PHS'		String	33
Total size for XML structure in bytes:				141

Table 8-118 Level 1A Processing Parameters GADS WVM_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Total size for XML structure in bytes:				108

Table 8-119 Level 1A Processing Parameters GADS ISR_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Total size for XML structure in bytes:				108

Table 8-120 Level 1A Processing Parameters GADS IAT_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Total size for XML structure in bytes:				108

Table 8-121 Level 1A Processing Parameters GADS DCC_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Total size for XML structure in bytes:				108

Table 8-122 Level 1A Processing Parameters GADS IDC_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Total size for XML structure in bytes:				108

Table 8-123 Level 1A Processing Parameters GADS IRC_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Total size for XML structure in bytes:				108

Table 8-124 Level 1A Processing Parameters GADS OWV_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Total size for XML structure in bytes:				108

Table 8-125 Level 1A Processing Parameters GADS NOU_Params Content Descrption

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Dude_Reference_Height_Bin	Altitude reported for this Dude_Reference_Height_Bin has to be below 0.0 m to identify DUDE data.		IntAuc	57
Dude_Instrument_Mode	Instrument mode setting used to distinguish between NOU and DUDE data.		IntAuc	48
Dude_DEU_Detection_Mode	DEU detection mode setting used to identify DUDE measurements		IntAuc	74
Dude_Energy_Threshold	Energy threshold applied to parameter Avg_UV_Energy of Table 5-23 to identify valid DUDE measurements.	mJ	FAdoxy	55
Total size for XML structure in bytes:				342

Table 8-126 Level 1A Processing Parameters GADS DCMZ_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Total size for XML structure in bytes:				108

Table 8-127 Level 1A Processing Parameters GADS LBM_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Total size for XML structure in bytes:				108

Table 8-128 Level 1A Processing Parameters GADS Data_Quality Content Description

Tag Name	Content Description	Unit	Type	Size
FWHM_Thresh	Threshold value of internal reference FWHM for quality check	%	FAdoxy	36
Freq_Var_From_Peak_Thresh	Threshold value where the variance of frequency from peak (determined by curve fit to the sum of all pulses in the measurement) is out of range.	%	FAdoxy	64
Measurement_Data_Missing	Parameter currently not used.		Boolean	57

Tag Name	Content Description	Unit	Type	Size
Disable_RL_Checks	If set to true, the pulse validity check ignores the status of the 'RLH Tuned' and 'RL Locked' flags.		Boolean	44
Meas_Cavity_Lock_Status_Thresh	Maximum allowable occurrence of cavity lock status for measurement	%	FAdoxy	74
Image_Cavity_Lock_Status_Thresh	Maximum allowable occurrence of cavity lock status for image	%	FAdoxy	76
Total size for XML structure in bytes:				351

Table 8-129 Level 1A Processing Parameters GADS Transfer_Curve_Selection Content Description

Tag Name	Content Description	Unit	Type	Size
DEU	DEU unit selection; possible values: "A" or "B".		IntAuc	12
TLE	TLE unit selection; possible values: "1" or "2".		IntAuc	12
ACDM	ACDM unit selection; possible values: "A" or "B".		IntAuc	14
Total size for XML structure in bytes:				38

8.3.4 File Size

The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 8-130 Level 1A Processing Parameters Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~1621 bytes
Auxiliary Data SPH	~504 bytes
Level 1A Processing Parameters GADS	~2816 bytes
Product Size:	~5.7 kbytes

8.4 Level 1B Processing Parameters

8.4.1 Product Structure

The Level 1B Processing Parameters product conforms to the product structure described in Section 3. It is contained in one product file containing Fixed Header and Main Product Header as defined in Sections 3.3.3 and 3.3.4 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.

8.4.1.1 File Name

The Level 1B Processing Parameters auxiliary file name has the format defined in Section 3.1:

AE_CCCC_AUX_PAR_1B _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, each validity period representing different phases of the ADM-Aeolus mission, over which the properties of the satellite may change. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

8.4.2 Specific Product Header

The Specific Product Header structure for this file is described in Section 8.1.2. The root tag for the Level 1B Processing Parameters input auxiliary file is AUX_PAR_1B_SPECIFIC_HEADER.

8.4.2.1 Data Set Descriptors

Only a single Data Set appears in the Aeolus Level 1B Processing Parameters data file: Level 1B Processing Parameters GADS, as described in Section 8.4.3.

Table 8-131 Level 1B Processing Parameters Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	Level_1B_Proc_Params	DSD structure for GADS	G	1 DSR per product

8.4.3 Data Sets

8.4.3.1 Level 1B Processing Parameters GADS

The root tag for this Data Set is **Level_1B_Processing_Parameters**, and the Data Set consists of a single Data Set Record of the structure described in Table 8-132.

Table 8-132 Level 1B Processing Parameters GADS DSR Content Description

Tag Name	Content Description	Unit	Type	Size
FH_Default_Fields	Fields responsible for populating the Fixed Header. See **Table 8-133** for structure definition		Structure	472
MPH_Default_Fields	Values responsible for populating the main product header. See **Table 8-134** for structure definition		Structure	150
WVM_Params	Processing parameters for Wind Velocity Measurement. See Table 8-135 for structure definition		Structure	5921
ISR_Params	Processing parameters for Instrument Spectral Registration. See Table 8-137 for structure definition.		Structure	724
IAT_Params	Processing parameters for Instrument Auto Test. See **Table 8-138** for structure definition		Structure	553
DCC_Params	Processing parameters for Dark Current Calibration. See **Table 8-139** for structure definition		Structure	187
IDC_Params	Processing parameters for Instrument Defocus Characterisation. See **Table 8-140** for structure definition		Structure	631
MRC_Params	Processing parameters for Mie Response Calibration. See **Table 8-141** for structure definition		Structure	2542
RRC_Params	Processing parameters for Rayleigh Response Calibration. See **Table 8-142** for structure definition		Structure	4200
OWV_Params	Processing parameters for Offline Wind Measurement. Currently it is defined identical to WVM_Params. See Error! Reference source not found. for structure definition		Structure	5921
ZWC_Params	Processing parameters for Zero Wind Calibration. See **Table 8-143** for structure definition		Structure	134
DCMZ_Params	Processing parameters for the Dark Current in Memory Zone Calibration. See Table 8-144 for structure definition.		Structure	719
LBM_Params	Processing parameters for the Laser Beam Monitoring Calibration. See Table 8-145 for structure definition.		Structure	1021
Common_Processing_Params	See Table 8-146 for structure definition.		Structure	2909
Total size for XML structure in bytes:				**26084**

Table 8-133 Level 1B Processing Parameters GADS FH_Default_Fields Content Description

Tag Name	Content Description	Unit	Type	Size
File_Description	1-line description of the file		String	63
Notes	Multi-lines free text		String	41
Mission	Aeolus		String	45
Mission_Id	AE		String	51
File_Class	1-Line description of the file class		String	51
File_Version	4 digits used to distinguish between versions of a file having the same validity period		IntAs	32
System	‘Aeolus L1bP’		String	43
Creator	‘Aeolus L1bP’		String	45
Creator_Version	Version of the tool, matches version number part of the Software_Ver field.		String	61
Total size for XML structure in bytes:				432

Table 8-134 Level 1B Processing Parameters GADS MPH_Default_Fields Content Description

Tag Name	Content Description	Unit	Type	Size
Software_Ver	Software version number of processing software. Format: name of processor (up to 10 char) version number (4 char)		String	55
Proc_Centre	'AE.PHS’		String	53
Total size for XML structure in bytes:				**153**

Table 8-135 Level 1B Processing Parameters GADS WVM_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Data_Source	String indicating source of AISP data product. If set to ‘A2D’ equ. 69(b) is used. If set to ‘E2S’ or any other string equ 69(a) is used.		String	31
Line_Of_Sight_Wind_Flag	Flag indicating whether horizontal or line-of-sight wind should be used. This flag can be set to either “true” or “false”. A “true” value indicates that the line of sight wind velocity is computed, and a “false” value indicates that horizontal wind velocity is computed.		Boolean	53

Tag Name	Content Description	Unit	Type	Size
Min_Num_of_Mie_Ground_Echo_Measurements	Minimum number of Mie ground wind measurement bins to validate ground correction factor		IntAul	96
Mie_Land_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates land surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	78
Mie_Water_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates water/sea ice surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	80
Mie_Max_Ground_Echo_Bin_Thickness_Above_DEM	Threshold applied to a bin identified as ground bin candidate. If the threshold is not met, the signal of the bin is not added to the sum of the ground signal on observation level.	m	FAdoxy	95
Mie_SR_Useful_Signal_Lower_Threshold	Useful signal threshold used to flag Mie SR on measurement level valid/invalid. See also parameter Mie_SR_Useful_Signal_Lower_Threshold_Met in Table 6-10.	ACCD counts	FAdoxy	85
Min_Num_of_Rayleigh_Ground_Echo_Measurements	Minimum number of Rayleigh ground wind measurement bins to validate ground correction factor		IntAul	106
Rayleigh_Land_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates land surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	88
Rayleigh_Water_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates water/sea ice surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	90
Rayleigh_Max_Ground_Echo_Bin_Thickness_Above_DEM	Threshold applied to a bin identified as ground bin candidate. If the threshold is not met, the signal of the bin is not added to the sum of the ground signal on observation level.	m	FAdoxy	105
Maximum_Upper_DEM_Offset	Maximum height difference that center of detected ground bin is allowed to be above center of DEM intersection bin.	m	FAdoxy	57
Maximum_Lower_DEM_Offset	Maximum height difference that center of detected ground bin is allowed to be above center of DEM intersection bin.	m	FAdoxy	57
Correction_With_Error_Response_Fit	Flag indicating wether the Rayleigh response correction shall be performed using the array of response errors of the AUX_RRC file or the polynomial fit of the response errors. A “TRUE” value indicates that the polynomial fit parameters are used.		Boolean	79

Tag Name	Content Description	Unit	Type	Size
Root_Selection_Stop_Threshold	If CorrectionWith_Error_Respose_Fit is set to TRUE, the root of a polynomial is retrieved in a Newton iteration that uses this iteration stop threshold.		FAdoxy	63
Mie_Ground_Correction_Weighting_Factor	Mie ground correction weighting factor		FAdoxy	90
Rayleigh_Ground_Correction_Weighting_Factor	Rayleigh ground correction weighting factor		FAdoxy	100
Min_Mie_Ground_Detection_Signal_Derivative	Minimum derivative of Mie signal for ground detection	ACCD counts	FAdoxy	98
Max_Mie_Ground_Detection_Response_Shift	Maximum Mie Response shift for ground detection	ACCD pixel	FAdoxy	92
Min_Rayleigh_Ground_Detection_Signal_Derivative	Minimum derivative of Rayleigh signal shift for ground detection		FAdoxy	108
Max_Rayleigh_Ground_Detection_Response_Shift	Maximum Rayleigh Response shift for ground detection		FAdoxy	102
Ground_Detection_FWHM_Upper_Threshold	Maximum FWHM of Mie signal for ground detection	ACCD pixel	FAdoxy	88
Mie_Rayleigh_Ground_Correction_Offset	Offset between Mie and Rayleigh ground corrections	m/s	FAdoxy	88
Rayleigh_Correction_With_Mie_Ground_Echo_Weighting_Factor	Weighting parameter for correction of Rayleigh with Mie ground echo		FAdoxy	128
Mie_Harmonic_Correction_Factor	Weighting parameter for Mie harmonic correction		FAdoxy	74
Rayleigh_Harmonic_Correction_Factor	Weighting parameter for Rayleigh harmonic correction		FAdoxy	84
Rayleigh_Correction_With_Mie_Harmonic_Weighting_Factor	Weighting parameter for correction of Rayleigh with Mie harmonic		FAdoxy	122
Num_Bad_Pulses_Per_Meas_Threshold	Threshold for the number of bad pulses in each measurement,		IntAul	76
Multimode_Average_Ratio_Obs_Threshold	Threshold for the multimode average ratio over an observation		FAdoxy	88
Wind_Velocity_Threshold	Retrieved wind values above this threshold are flagged invalid.	m/s	FAdoxy	70
Cut_Negative_Mie_Measurement_Data	Flag TRUE/FALSE to indicate whether negative values for the Mie_Measurement_Data should be set to 0.0.		Boolean	76
Use_Fitted_Non_Linearities	Flag TRUE/FALSE to indicate if the fitted non-linearities should be used for the Mie processing instead of non-linearities of the input AUX_MRC_1B.		Boolean	62

Tag Name	Content Description	Unit	Type	Size
Fitted_Non_Linearities	Fitted non-linearities for internal and atmospheric path. See Table 8-136 for structure description.		Structure	2759
Use_Constant_Internal_Response_Rayleigh	Flag TRUE/FALSE to indicate if a constant response value for the internal Rayleigh reference should be used instead of the processed internal Rayleigh reference response.		Boolean	87
Constant_Internal_Response_Rayleigh	Constant internal Rayleigh reference response.		FAdoxy	83
Use_Constant_Internal_Response_Mie	Flag TRUE/FALSE to indicate if a constant response value for the internal Mie reference should be used instead of the processed internal Mie reference response.		Boolean	77
Constant_Internal_Response_Mie	Constant internal Mie reference response.	ACCD pixel index	FAdoxy	73
Total size for XML structure in bytes:				**5896**

Table 8-136 Level 1B Processing Parameters GADS Fitted_Non_Linearities Content Description

Tag Name	Content Description	Unit	Type	Size
Num_Sampling_Points_Internal_Reference	Number of sampling points for the Mie non-linearities for the internal path.		IntAus	84
Num_Sampling_Points_Atmosphere	Number of sampling points for the Mie non-linearities for the atmospheric path.		IntAus	68
Pixel_Positions_Internal_Reference	Num_Sampling_Points_Internal_Reference values of ACCD pixel positions separated by blanks. (For size calculations Num_Sampling_Points_Internal_Reference = 64 has been used.)	ACCD pixel index	Num_Sampling_Points_Internal_Reference * FAdoxy	649
Fitted_Reference_Pulse_Error_Mie_Response	Num_Sampling_Points_Internal_Reference values of ACCD pixel offsets from the linear fit of the internal reference responses. (For size calculations Num_Sampling_Points_Internal_Reference = 64 has been used.)	ACCD pixel	Num_Sampling_Points_Internal_Reference * FAdoxy	663
Pixel_Positions_Atmospheric_Path	Num_Sampling_Points_Atmosphere values of ACCD pixel positions separated by blanks. (For size calculations Num_Sampling_Points_Atmosphere = 61 has been used.)	ACCD pixel index	Num_Sampling_Points_Atmosphere * FAdoxy	618
Fitted_Measurement_Error_Mie_Response	Num_Sampling_Points_Atmosphere values of ACCD pixel offsets from the linear fit of the atmospheric responses. (For size calculations Num_Sampling_Points_Atmosphere = 61 has been used.)	ACCD pixel	Num_Sampling_Points_Atmosphere * FAdoxy	628
Total size for XML structure in bytes:				2710

Table 8-137 Level 1B Processing Parameters GADS ISR_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Min_Num_of_Valid_Mie_Pulses	Minimum number of valid Mie pulses needed to generate valid output data for a frequency step.		IntAl	63
Min_Num_of_Valid_Rayleigh_Pulses	Minimum number of valid Rayleigh pulses needed to generate valid output data for a frequency step.		IntAl	73
Mid_Mie_Response_Pixel	ACCD pixel position expected to be in the middle of the Mie USR.	ACCD pixel index	FAdoxy	57
Apply_Energy_Correction	Flag TRUE/FALSE to indicate if energy correction should be applied to Mie and Rayleigh.		Boolean	56
Energy_Drift_Correction_Factor_Mie	The Energy_Drift_Correction_Factor_Mie describes a difference of the laser energy measured by PD74 and the actual signal level detected by the MSP ACCD		FAdoxy	81
Energy_Drift_Correction_Factor_Channel_A	The Energy_Drift_Correction_Factor_Channel_A describes a difference of the laser energy measured by PD74 and the actual signal level detected by the RSP ACCD for channel A. Such a difference might be caused by slightly different illumination angles of the different optical paths.		FAdoxy	93
Energy_Drift_Correction_Factor_Channel_B	The Energy_Drift_Correction_Factor_Channel_B describes a difference of the laser energy measured by PD74 and the actual signal level detected by the RSP ACCD for channel B. Such a difference might be caused by slightly different illumination angles of the different optical paths.		FAdoxy	93
Num_Energy_Drift_Correction_Steps	Number of frequency steps		IntAul	75
Total size for XML structure in bytes:				691

Table 8-138 Level 1B Processing Parameters GADS IAT_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Lorentz_Refinement_Factor	Lorentz refinement resolution ratio for creating the delta value of the estimate. (delta estimate = estimate / ratio) Given estimated value x, and refinement resolution r. Three adjacent points Lorentz(x), Lorentz(x+x/r), Lorentz(x-x/r) are computed for least squares fit. The refinement resolution r must be greater than 1.0		FAdoxy	64
Lorentz_Refinement_Threshold	Lorentz refinement threshold. If ratio between delta(estimate) / estimate smaller than the threshold, stop the iteration and report the value.		FAdoxy	70
Min_Num_of_Valid_Mie_Pulses	Minimum number of valid Mie pulses needed to generate valid output data for a frequency step.		IntAl	63
Min_Num_of_Valid_Rayleigh_Pulses	Minimum number of valid Rayleigh pulses needed to generate valid output data for a frequency step.		IntAl	73
Mid_Frequency_Range_Lower_Limit	Lower frequency limit that defines the Mie fit range.	GHz	FAdoxy	75
Mid_Frequency_Range_Upper_Limit	Upper frequency limit that defines the Mir fit range.	GHz	FAdoxy	75
Total size for XML structure in bytes:				528

Table 8-139 Level 1B Processing Parameters GADS DCC_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
DSNU_Deviation_Factor	Factor used to count the number of pixels that are more than this factor * DSNU away from the mean		FAdoxy	53
Total size for XML structure in bytes:				161

Table 8-140 Level 1B Processing Parameters GADS IDC_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Image_Row_Max	IDC image summation range maximum row		IntAus	33
Image_Row_Min	IDC image summation range minimum row		IntAus	33

Tag Name	Content Description	Unit	Type	Size
Image_Column_Channel1_Max	IDC image summation range maximum column for channel 1		IntAus	57
Image_Column_Channel1_Min	IDC image summation range minimun column for channel 1		IntAus	57
Image_Column_Channel2_Max	IDC image summation range maximum column for channel 2		IntAus	57
Image_Column_Channel2_Min	IDC image summation range minimun column for channel 2		IntAus	57
DEU_Integration_Upper_Limit	The upper limit integration time used for the verification in IDC mode	TMC	IntAl	68
DEU_Integration_Lower_Limit	The lower limit integration time used for the verification in IDC mode	TMC	IntAl	68
ENC_Std_Dev_Upper_Threshold	Upper threshold for standard deviation of energetic centroid column and row standard deviation.		FAdoxy	67
Total size for XML structure in bytes:				605

Table 8-141 Level 1B Processing Parameters GADS MRC_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Min_Valid_Freq_Per_Cal	Minimum valid frequencies per calibration		IntAul	54
Min_Valid_Reference_Pulse_Freq_Per_Cal	Minimum valid frequencies per reference pulse calibration		IntAul	86
Min_Valid_Measurements_Per_Freq	Minimum valid measurements per frequency		IntAul	72
Min_Valid_Reference_Pulses_Per_Freq	Minimum valid pulses per frequency		IntAul	80
Mie_Response_Calibration_Ranges	See Table 8-148 for structure definition		Structure	1172
Mie_Land_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates land surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	78
Mie_Water_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates water/sea ice surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	80
Mie_Max_Ground_Echo_Bin_Thickness_Above_DEM	Threshold applied to a bin identified as ground bin candidate. If the threshold is not met, the signal of the bin is not added to the sum of the ground signal on observation level.	m	FAdoxy	95
Maximum_Upper_DEM_Offset	Maximum height difference that center of detected ground bin is allowed to be above center of DEM intersection bin.	m	IntAus	57
Maximum_Lower_DEM_Offset	Maximum height difference that center of detected ground bin is allowed to be below center of DEM intersection bin.	m	IntAus	57
Max_Mie_Ground_Detection_Response_Shift	Maximum Mie Response shift for ground detection	ACCD pixel index	FAdoxy	108
Min_Mie_Ground_Detection_Signal_Derivative	Minimum derivative of Mie signal for ground detection	ACCD counts	FAdoxy	115
Ground_Detection_FWHM_Upper_Threshold	If MieCore2 is used and the retrieved FWHM of the ground return signal is above this threshold, the ground detection is flagged invalid.	ACCD pixel	FAdoxy	102
Mie_Ideal_Calibration_Values	Ideal slope and intercept values used for RDB correction.. See **Table 8-154** for structure definition.		Structure	253
Total size for XML structure in bytes:				**2517**

Table 8-142 Level 1B Processing Parameters GADS RRC_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Min_Valid_Freq_Per_Cal	Minimum valid frequencies per calibration, default setting: 30		IntAul	54
Min_Valid_Ground_Freq_Per_Cal	Minimum valid frequencies per calibration, default setting: 25		IntAul	68
Min_Valid_Reference_Pulse_Freq_Per_Cal	Minimum valid frequencies per reference pulse calibration, default setting:30		IntAul	86
Min_Valid_Measurements_Per_Freq	Minimum valid measurements per frequency, default setting: 1		IntAul	72
Min_Valid_Ground_Measurements_Per_Freq	Minimum valid ground measurements per frequency, default setting: 5		IntAul	86
Min_Valid_Reference_Pulses_Per_Freq	Minimum valid pulses per frequency		IntAul	80
Rayleigh_Response_Calibration_Ranges	See Table 8-149 for structure definition		Structure	1888
Error_Fit_Degree	Degree of polynomial used for fitting of frequency step response errors, default setting: 5.		IntAus	39
Lower_Altitude_Limit	RRC lower altitude limit, default setting: 6000.0	m	FAdoxy	54
Upper_Altitude_Limit	RRC upper altitude limit, default setting: 16000.0	m	FAdoxy	54
Rayleigh_Land_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates land surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	88
Rayleigh_Water_Useful_Signal_Lower_Threshold	Threshold applied to coadded gound signal of a measurement if the surface indicates water/sea ice surface. If the threshold is met, the signal is added to the sum of the ground signal on observation level.	ACCD counts	FAdoxy	90
Rayleigh_Max_Ground_Echo_Bin_Thickness_Above_DEM	Threshold applied to a bin identified as ground bin candidate. If the threshold is not met, the signal of the bin is not added to the sum of the ground signal on observation level.	m	FAdoxy	105
Maximum_Upper_DEM_Offset	Maximum height difference that center of detected ground bin is allowed to be above center of DEM intersection bin, default setting: 300.0.	m	FAdoxy	57
Maximum_Lower_DEM_Offset	Maximum height difference that center of detected ground bin is allowed to be below center of DEM intersection bin, default setting: 1000.0	m	FAdoxy	57
Min_Rayleigh_Ground_Detection_Signal_Derivative	Minimum derivative of Rayleigh signal shift for ground detection, default setting: 1.0		FAdoxy	108
Max_Rayleigh_Ground_Detection_Response_Shift	Maximum Rayleigh Response shift for ground detection, default setting: 4.0		FAdoxy	102

Tag Name	Content Description	Unit	Type	Size
Etalon_Temp_Range_Threshold	RRC RSP Etalon range threshold, default setting: 23.0	C	FAdoxy	68
Outlier_Detection_Flag	Apply outlier detection algorithm on response TRUE/FALSE.		Boolean	54
Outlier_Detection_Atmosphere_Threshold	Threshold value for maximum difference between calculated and ideal atmospheric response for a certain frequency step.		FAdoxy	95
Outlier_Detection_Ground_Threshold	Threshold value for maximum difference between calculated and ideal ground response for a certain frequency step.		FAdoxy	91
Outlier_Detection_Reference_Threshold	Threshold value for maximum difference between calculated and ideal reference pulse response for a certain frequency step.		FAdoxy	87
Scattering_Ratio_Quality_Control_Flag	Apply scattering ratio quality control to atmospheric data TRUE/FALSE.		Boolean	84
Scattering_Ratio_Threshold	Threshold for maximum Mie scattering ratio used to discard data of Rayleigh atmospheric measurement bins.		FAdoxy	65
Rayleigh_Ideal_Calibration_Values	Ideal slope and intercept values used for RDB correction and outlier detection.. See Table 8-155 for structure definition.		Structure	435
Total size for XML structure in bytes:				**4175**

Table 8-143 Level 1B Processing Parameters GADS ZWC_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Total size for XML structure in bytes:				108

Table 8-144 Level 1B Processing Parameters GADS DCMZ_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Dude_Reference_Height_Bin	Altitude reported for this Dude_Reference_Height_Bin has to be below 0.0 m to identify DUDE data.		IntAuc	57
Dude_Energy_Threshold	Energy threshold applied to parameter Avg_UV_Energy of Table 5-23 to identify valid DUDE measurements.	mJ	FAdoxy	55
Rayleigh_Solar_Background_Threshold	Rayleigh solar background threshold applied to the summiarized background of each Rayleigh measurement, to identify measurements affected by high solar background.	ACCD counts	FAdoxy	102
Outlier_Threshold	Threshold applied to the absolute zScore values to identify outliers.	ACCD counts	FAdoxy	66
Altitude_Offset_Margin	If the top of a certain height bin in meters + Altitude_Offset_Margin is above 0 meters, retrieved dark current rates are replaced by the dark current rates of the input DCMZ file.	m	FAdoxy	57
Min_Num_Observations_Used	If the number of Mie or Rayleigh observations used to retrieve dark current rates is less than the value stated here, the calibration is flagged invalid in the SPH.		IntAul	65
Sun_Elevation_Threshold	Threshold for sun elevation at DEM intersection to remove measurements within the DUDE period during DCMZ correction for the solar background range gate	deg	FAdoxy	53
Outlier_Threshold_Background	Threshold applied to the absolute zScore values to identify outliers for background rate calculation.	ACCD counts	FAdoxy	69
Min_Num_Measurements_Used	If for a certain background pixel, the number of input measurements for background rate calculation is below the value stated here, the input background value is copied to the output.		IntAul	60
Total size for XML structure in bytes:				692

Table 8-145 Level1B Processing Parameters GADS LBM_Params Content Description

Tag Name	Content Description	Unit	Type	Size
File_Type	File type string		String	49
Sph_Descriptor	ASCII string describing the product		String	59
Mie_Image_Binarization_Factor	Factor used to calculate the binarization threshold		FAdoxy	72
Max_Iterations_Ellipse_Fit	Maximum iterations of least squares ellipse fit.		IntAus	63
Step_Size_Factor	Factor used to vary diagonal elements of transmission matrix.		FAdoxy	46
Max_Step_Factor	Maximum variation of diagonal elements of transmission matrix		FAdoxy	44
Min_Step_Factor	Minimum variation of diagonal elements of transmission matrix		FAdoxy	44
Stop_Tolerance	Tolerance to ckeck convergence of least squares error.		FAdoxy	40
Start_Frequency_Ramp	Lower frequency threshold for frequency steps to be used for the calibration result calculation.		FAdoxy	53
Stop_Frequency_Ramp	Upper frequency threshold for frequency steps to be used for the calibration result calculation.		FAdoxy	51
Min_Num_Valid_Images	Minimum number of valid images required to assume frequency step results valid.		IntAus	51
PD74_UV_Energy_Translation	Factor used to scale the reported PD74 energy.		FAdoxy	65
Image_Row_Max	Maximum row number used to calculate the Rayleigh spot size.		IntAus	37
Image_Row_Min	Minimum row number used to calculate the Rayleigh spot size.		IntAus	37
Image_Column_Channel_1_Max	Maximum column attributed to channel 1.		IntAus	63
Image_Column_Channel_1_Min	Minimum column attributed to channel 1.		IntAus	63
Image_Column_Channel_2_Max	Maximum column attributed to channel 2.		IntAus	63
Image_Column_Channel_2_Max	Minimum column attributed to channel 2.		IntAus	63
Pixel_Size	Edge length of one pixel of the ACCD.	cm	FAdoxy	33
Total size for XML structure in bytes:				996

Table 8-146 Level 1B Processing Parameters GADS Common_Processing_Params Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_PCD_Params	Processing parameters for Mie product confidence params SNR and backscatter-ratio. See **Table 8-147** for structure definition.		Structure	474
Mie_Core_Algorithm_Params	Processing parameters for Mie Core algorithm. See **Table 8-150** for structure definition		Structure	1434
Rayleigh_Algorithm_Params	Processing parameters for Rayleigh algorithm. See Table 8-152 for structure definition		Structure	291
Corrupt_Data_Detection_Params	Parameters for corrupt data detection. See **Table 8-151** for structure definition		Structure	178
DCO_Correction_Params	Processing parameters for DCO correction algorithm. See **Table 8-153** for structure definition		Structure	276
LOS_Velocity_Correct_Nadir	Correct Nadir mode measured data for satellite velocity using ideal RRC/MRC response slopes.		Boolean	62
LOS_Velocity_Correct_Off_Nadir	Correct Off-Nadir mode measured data for satellite velocity.		Boolean	70
Frequency_Change_Settling_Time	Time that laser needs to stabilize after a frequency change.	s	FAdoxy	70
Total size for XML structure in bytes:				2855

Table 8-147 Level 1B Processing Parameters GADS Mie_PCD_Params Content Description

Tag Name	Content Description	Unit	Type	Size
Alpha_Correction	Correction factor for the calculation of the Mie SNR.		FAdoxy	46
Summation_Index	Summation index for calculation of SNR and backscatter ratio.		IntAul	36
SR_Cubic_A_x3	Coefficient for x^3 in cubic correction of refined SR calculation.		FAdoxy	39
SR_Cubic_B_x2	Coefficient for x^2 in cubic correction of refined SR calculation.		FAdoxy	39
SR_Cubic_C_x1	Coefficient for x^1 in cubic correction of refined SR calculation.		FAdoxy	39
SR_Cubic_D_x0	Coefficient for x^0 in cubic correction of refined SR calculation.		FAdoxy	39
Cubic_Correction_Lower_Application_Threshold	Retrieved refined SR value will only be corrected with the cubic correction, if the refined SR is above or equal to this threshold.		FAdoxy	101
Cubic_Correction_Upper_Application_Threshold	Retrieved refined SR value will only be corrected with the cubic correction, if the refined SR is below or equal to this threshold.		FAdoxy	101
Total size for XML structure in bytes:				440

Table 8-148 Level 1B Processing Parameters GADS Mie_Response_Calibration_Ranges Content Description

Tag Name	Content Description	Unit	Type	Size
Min_Mie_Measurement_Mean_Sensitivity	Minimum mean sensitivity of atmosperic echo	ACCD pixel index/GHz	FAdoxy	86
Min_Mie_Measurement_Zero_Freq_Response	Minimum zero frequency response of atmosperic echo	ACCD pixel index	FAdoxy	90
Max_Mie_Measurement_Mean_Sensitivity	Maximum mean sensitivity of atmosperic echo	ACCD pixel index/GHz	FAdoxy	86
Max_Mie_Measurement_Zero_Freq_Response	Maximum zero frequency response of atmosperic echo	ACCD pixel index	FAdoxy	90
Max_Mie_Measurement_Error_Response_Std_Dev	Maximum error response standard deviation of atmosperic echo		FAdoxy	98
Min_Mie_Reference_Pulse_Mean_Sensitivity	Minimum mean sensitivity of internal calibration	ACCD pixel index/GHz	FAdoxy	94
Min_Mie_Reference_Pulse_Zero_Freq_Response	Minimum zero frequency response of internal calibration	ACCD pixel index	FAdoxy	98
Max_Mie_Reference_Pulse_Mean_Sensitivity	Maximum mean sensitivity of internal calibration	ACCD pixel index/GHz	FAdoxy	94
Max_Mie_Reference_Pulse_Zero_Freq_Response	Maximum zero frequency response of internal calibration	ACCD pixel index	FAdoxy	98
Max_Mie_Reference_Pulse_Error_Response_Std_Dev	Maximum error response standard deviation of internal calibration		FAdoxy	106
Mie_Fit_Upper_Frequency_Range	Upper frequency range when computing the best fit	GHz	FAdoxy	82
Mie_Fit_Lower_Frequency_Range	Upper frequency range when computing the best fit	GHz	FAdoxy	82
Total size for XML structure in bytes:				1104

Table 8-149 Level 1B Processing Parameters GADS Rayleigh_Response_Calibration_Ranges Content Description

Tag Name	Content Description	Unit	Type	Size
Min_Rayleigh_Measurement_Mean_Sensitivity	Minimum mean sensitivity of atmosperic echo, default setting: -0,65	1/ GHz	FAdoxy	96
Min_Rayleigh_Measurement_Zero_Freq_Response	Minimum zero frequency response of atmosperic echo, default setting: -0.2		FAdoxy	100
Max_Rayleigh_Measurement_Mean_Sensitivity	Maximum mean sensitivity of atmosperic echo, default setting: 0.65	1/ GHz	FAdoxy	96

Tag Name	Content Description	Unit	Type	Size
Max_Rayleigh_Measurement_Zero_Freq_Response	Maximum zero frequency response of atmosperic echo, default setting: 0.2		FAdoxy	100
Max_Rayleigh_Measurement_Error_Response_Std_Dev	Maximum error response standard deviation of atmosperic echo, default setting:10.0		FAdoxy	108
Min_Rayleigh_Ground_Measurement_Mean_Sensitivity	Minimum mean sensitivity of ground echo, default setting: -0.60	1/ GHz	FAdoxy	110
Min_Rayleigh_Ground_Measurement_Zero_Freq_Response	Minimum zero frequency response of ground echo, default setting: -0.2		FAdoxy	114
Max_Rayleigh_Ground_Measurement_Mean_Sensitivity	Maximum mean sensitivity of ground echo, default setting: 0.60	1/ GHz	FAdoxy	110
Max_Rayleigh_Ground_Measurement_Zero_Freq_Response	Maximum zero frequency response of ground echo, default setting: 0.2		FAdoxy	114
Max_Rayleigh_Ground_Measurement_Error_Response_Std_Dev	Maximum error response standard deviation of ground echo, default setting: 10.0		FAdoxy	122
Min_Rayleigh_Reference_Pulse_Mean_Sensitivity	Minimum mean sensitivity of internal calibration, default setting: -0.60	1/ GHz	FAdoxy	104
Min_Rayleigh_Reference_Pulse_Zero_Freq_Response	Minimum zero frequency response of internal calibration, default setting: -0.2		FAdoxy	108
Max_Rayleigh_Reference_Pulse_Mean_Sensitivity	Maximum mean sensitivity of internal calibration, default setting: 0.60	1/ GHz	FAdoxy	104
Max_Rayleigh_Reference_Pulse_Zero_Freq_Response	Maximum zero frequency response of internal calibration, default setting: 0.2		FAdoxy	108
Max_Rayleigh_Reference_Pulse_Error_Response_Std_Dev	Maximum error response standard deviation of internal calibration, default setting: 10.0		FAdoxy	116
Rayleigh_Fit_Upper_Frequency_Range	Upper frequency range when computing the best fit, default setting: 0.75	GHz	FAdoxy	82
Rayleigh_Fit_Lower_Frequency_Range	Lower frequency range when computing the best fit, default setting: -0.75	GHz	FAdoxy	82
Total size for XML structure in bytes:				1240

Table 8-150 Level 1B Processing Parameters GADS Mie_Core_Algorithm_Params Content Description

Tag Name	Content Description	Unit	Type	Size
Gaussian_Width_A	Gaussian width a. This value should be approximately the fringe FWHM.		FAdoxy	46
Peak_Error_Threshold	Peak error threshold		FAdoxy	54
Peak_Error_Threshold_Reference_Pulse	Peak error threshold for internal reference path signal		FAdoxy	86
Max_Num_Iterations	Maximum number of gaussian iterations		IntAul	46
SNR_Threshold	Threshold to switch Mie-Core processing on/off.		FAdoxy	40

Tag Name	Content Description	Unit	Type	Size
Start_FWHM	Starting value for FWHM	ACCD pixel	FAdoxy	34
Residual_Error_Threshold	Stop threshold for change of quadratic sum of differences between modeled and measured ACCD counts per pixel: if the difference between the quadratic sum from the previous to the next iteration loop is below this threshold, the iteration is stopped.		FAdoxy	62
Max_Iterations_Lorentz_Fit	Maximum number of iterations in Lorentz fit-loop		IntAuc	58
FWHM_Upper_Threshold	upper threshold for FWHM of Lorentz function for quality check	ACCD pixel	FAdoxy	54
FWHM_Lower_Threshold	Lower threshold for FWHM of Lorentz function for quality check	ACCD pixel	FAdoxy	54
Peak_Height_Upper_Threshold	Relative threshold for peak height of Lorentz function	ACCD counts	FAdoxy	68
Peak_Height_Lower_Threshold	Relative threshold for peak height of Lorentz function	ACCD counts	FAdoxy	68
Peak_Location_Threshold	Peak location threshold.	ACCD pixel	FAdoxy	60
Nonlinear_Optimization_Threshold	Stop threshold for Downhill Simplex algorithm merit function		FAdoxy	78
Max_Iterations_Nonlinear_Optimization	Maximum number of iterations of Downhill Simplex algorithm		IntAul	84
Num_Spectral_Sub_Samples	Number of functional evaluations of Lorentz fit function for one pixel		IntAul	58
SNR_Threshold_Reference_Pulse	Threshold to switch Mie-Core processing on/off for internal reference path signal.		FAdoxy	72
Start_FWHM_Reference_Pulse	Starting value for FWHM for internal reference path signal	ACCD pixel	FAdoxy	66
Residual_Error_Threshold_Reference_Pulse	Stop threshold for change of quadratic sum of differences between modeled and measured ACCD counts per pixel: if the difference between the quadratic sum from the previous to the next iteration loop is below this threshold, the iteration is stopped for internal reference path signal.		FAdoxy	94
Max_Iterations_Lorentz_Fit_Reference_Pulse	Maximum number of iterations in Lorentz fit-loop for internal reference path signal		IntAuc	90
FWHM_Upper_Threshold_Reference_Pulse	upper threshold for FWHM of Lorentz function for quality check for internal reference path signal	ACCD pixel	FAdoxy	86
FWHM_Lower_Threshold_Reference_Pulse	Lower threshold for FWHM of Lorentz function for quality check for internal reference path signal	ACCD pixel	FAdoxy	86
Peak_Height_Upper_Threshold_Reference_Pulse	Relative threshold for peak height of Lorentz function for internal reference path signal	ACCD counts	FAdoxy	100
Peak_Height_Lower_Threshold_Reference_Pulse	Relative threshold for peak height of Lorentz function for internal reference path signal	ACCD counts	FAdoxy	100

Tag Name	Content Description	Unit	Type	Size
Peak_Location_Threshold_Reference_Pulse	Peak location threshold for internal reference path signal.	ACCD pixel	FAdoxy	92
Nonlinear_Optimization_Threshold_Reference_Pulse	Stop threshold for Downhill Simplex algorithm merit function for internal reference path signal		FAdoxy	110
Max_Iterations_Nonlinear_Optimization_Reference_Pulse	Maximum number of iterations of Downhill Simplex algorithm for internal reference path signal		IntAul	116
Num_Spectral_Sub_Samples_Reference_Pulse	Number of functional evaluations of Lorentz fit function for one pixel for internal reference path signal		IntAul	90
DownHill_Simplex_On	Flag showing if the downhill simplex is on or off. If it is off (FALSE) a method using least squares minimization is used instead of DownHill Simplex.		Boolean	49
Total size for XML structure in bytes:				1378

Table 8-151 Level 1B Processing Parameters GADS Corrupt_Data_Detection_Params Content Description

Tag Name	Content Description	Unit	Type	Size
Max_Signal_Derivative	Max signal derivative. Maximum valid pixel intensity difference between adjacent CCD pixels	ACCD counts	IntAus	52
Pixel_Saturation_Threshold	Pixel saturation threshold	ACCD counts	IntAus	62
Total size for XML structure in bytes:				114

Table 8-152 Level 1B Processing Parameters GADS Rayleigh_Algorithm_Params Content Description

Tag Name	Content Description	Unit	Type	Size
Channel_A_Start_Pixel	Define start pixel for useful signal calculation of channel A.	ACCD pixel index	IntAus	50
Channel_A_Stop_Pixel	Define stop pixel for useful signal calculation of channel A.	ACCD pixel index	IntAus	48
Channel_B_Start_Pixel	Define start pixel for useful signal calculation of channel B.	ACCD pixel index	IntAus	50
Channel_B_Stop_Pixel	Define stop pixel for useful signal calculation of channel B.	ACCD pixel index	IntAus	48
SNR_Threshold	Threshold used to set validity bit of Rayleigh useful signal Data_Quality Flag.		FAdoxy	39
Total size for XML structure in bytes:				235

Table 8-153 Level 1B Processing Parameters GADS DCO_Correction_Params Content Description

Tag Name	Content Description	Unit	Type	Size
Use_Pixel_1	The DCO correction uses a mean offset value. If set to TRUE, pixel 1 is used to derive the mean offset value. If set to FALSE pixel 1 is not used.		Boolean	32
Use_Pixel_2	The DCO correction uses a mean offset value. If set to TRUE, pixel 2 is used to derive the mean offset value. If set to FALSE pixel 2 is not used.		Boolean	32
Use_Pixel_19	The DCO correction uses a mean offset value. If set to TRUE, pixel 19 is used to derive the mean offset value. If set to FALSE pixel 19 is not used.		Boolean	32
Use_Pixel_20	The DCO correction uses a mean offset value. If set to TRUE, pixel 20 is used to derive the mean offset value. If set to FALSE pixel 20 is not used.		Boolean	32
Use_Imaging_Pixel_17	The DCO correction uses a mean offset value. If set to TRUE, imaging pixel 17 is used to derive the mean offset value. If set to FALSE imaging pixel 17 is not used.		Boolean	50
Use_Imaging_Pixel_18	The DCO correction uses a mean offset value. If set to TRUE, imaging pixel 18 is used to derive the mean offset value. If set to FALSE imaging pixel 18 is not used.		Boolean	50
Total size for XML structure in bytes:				228

Table 8-154 Level 1B Processing Parameters GADS Mie_Ideal_Calibration_Values Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Internal_Slope	Ideal internal reference pulse mean sensitivity (slope of the best straight line of channel response)		FAdoxy	49
Mie_Internal_Offset	Ideal internal reference pulse zero frequency response (y-intercept of the best straight line of channel response)		FAdoxy	51
Mie_Ground_Slope	Ideal ground measurement mean sensitivity (slope of the best straight line of channel response)		FAdoxy	45
Mie_Ground_Offset	Ideal ground measurement zero frequency response (y-intercept of the best straight line of channel response)		FAdoxy	47
Total size for XML structure in bytes:				**192**

Table 8-155 Level 1B Processing Parameters GADS Rayleigh_Ideal_Calibration_Values Content Description

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Atmospheric_Slope	Ideal atmospheric measurement mean sensitivity (slope of the best straight line of channel response)		FAdoxy	65
Rayleigh_Atmospheric_Offset	Ideal atmospheric measurement zero frequency response (y-intercept of the best straight line of channel response)		FAdoxy	67
Rayleigh _Internal_Slope	Ideal internal reference pulse mean sensitivity (slope of the best straight line of channel response)		FAdoxy	59
Rayleigh _Internal_Offset	Ideal internal reference pulse zero frequency response (y-intercept of the best straight line of channel response)		FAdoxy	61
Rayleigh _Ground_Slope	Ideal ground measurement mean sensitivity (slope of the best straight line of channel response)		FAdoxy	55
Rayleigh _Ground_Offset	Ideal ground measurement zero frequency response (y-intercept of the best straight line of channel response)		FAdoxy	57
Total size for XML structure in bytes:				**364**

8.4.4 File Size

The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 8-156 Level 1B Processing Parameters Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~1697 bytes
Auxiliary Data SPH	~504 bytes
Level 1B Processing Parameters GADS	~26084 bytes
Product Size:	~ 29025 kbytes

8.5 Orbit Scenario Auxiliary File

The L1bP processor tasks require an Orbit Scenario File to calculate orbit properties for the FH and MPH, such as absolute orbit, relative orbit, phase and cycle, as described in Document A-24.

This file is read directly by Earth Explorer CFI functions, and as such the definition of this structure is provided by the Earth Explorer CFI. (See R-9 for Orbit Scenario File definition.)

8.6 Digital Elevation Model Auxiliary File

The L1bP processor tasks require a Digital Elevation Model (DEM) to calculate LOS and geolocation information for various L1bP products. Like the Orbit Scenario File, the file that describes this DEM is read directly by Earth Explorer Earth Explorer CFI functions, and as such the definition of this structure is provided by the Earth Explorer CFI.

8.7 Predicted Rayleigh Response Calibration

Purpose, generation and format of the Predicted Rayleigh Response are described in R-3. Some information is recalled here for completeness.

8.7.1 Specific Product Header

The Specific Product Header structure for this file is described in R-3. The list of data set descriptors differs from the RRC as the origin of the AUX_PRR is the calibration software and not the L1B operational processor.

8.7.2 Data Sets

There is one data set for the PRR product, the Predicted Rayleigh Response Calibration GADS, whose structure is defined inR-3.

8.7.2.1 Predicted Rayleigh Response Calibration GADS

The root tag for this Data Set is **Auxiliary_Calibration_PRR**, and the Data Set consists of a single Data Set Record. The structure of the GADS is a copy of the structure for Rayleigh Response Calibration GADS as described in Table 7-73.

8.8 Harmonic Bias Estimation Parameters

8.8.1 Product Structure

The Harmonic Bias Estimation Parameters product conforms to the product structure described in Section 3. It is contained in one product file containing Fixed Header and Main Product Header as defined in Sections 3.3.3 and 3.3.4 respectively. All headers and data sets are in XML format.

8.8.1.1 File Name

The Harmonic Bias Estimation Parameters auxiliary file name has the format defined in Section 3.1:

AE_CCCC_AUX_HBE_1B _yyyymmddThhmmss_yyyymmddThhmmss_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, each validity period representing different phases of the ADM-Aeolus mission. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

8.8.2 Specific Product Header

The Specific Product Header structure for this file is described in Section 8.1.2. The root tag for the Harmonic Bias Estimation input auxiliary file is HBE_CHAR_SPECIFIC_HEADER.

8.8.2.1 Data Set Descriptors

Only a single Data Set appears in the Harmonic Bias Estimation Parameters data file: Harmonic Bias Estimation Parameters GADS, as described in Section 8.8.3.

Table 8-157 HBE Parameters Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	Harmonic_Bias_Char	DSD structure for GADS	G	1 DSR per product

8.8.3 Data Sets

8.8.3.1 Harmonic Bias Estimation Parameters GADS

The root tag for this Data Set is **Harmonic_Bias_Characterisation**, and the data set consists of a single Data Set Record of the structure described in Table 8-158.

Table 8-158 HBE Parameters GADS Content Description

Tag Name	Content Description	Unit	Type	Size
NF_Order	Number of Fourier terms used in the Harmonic Bias Estimation (NF). The A and B coefficient lists for both Mie and Rayleigh below must be NF_Order+1 elements in size.		IntAul	26
List_of_Mie_Harmonic_Bias_Coefficient_As	See **Table 8-159** for structure definition. It should include at least NF+1 elements. NF represents the number of Fourier terms. The maximum size NF+1 of this array is 1024.		List of NF+1 Structures (0<NF+1< 1024	69718
List_of_Mie_Harmonic_Bias_Coefficient_Bs	See **Table 8-160** for structure definition. It should include at least NF+1 elements. NF represents the number of Fourier terms. The maximum size NF+1 of this array is 1024. Note that the first B coefficient in this array (i.e. b_0) is not used by the L1bP. This is done so that the A and B coefficient arrays are both the same size. Only the last NF coefficients are used in the B coefficient array (for A, all NF+1 coefficients are used).		List of NF+1 Structures (0<NF+1< 1024	69718
List_of_Ray_Harmonic_Bias_Coefficient_As	See **Table 8-159** for structure definition. . It should include at least NF+1 elements. NF represents the number of Fourier terms. The maximum size NF+1 of this array is 1024.		List of NF+1 Structures (0<NF+1< 1024	69718
List_of_Ray_Harmonic_Bias_Coefficient_Bs	See **Table 8-160** for structure definition. It should include at least NF+1 elements. NF represents the number of Fourier terms. The maximum size NF+1 of this array is 1024. Note that the first B coefficient in this array (i.e. b_0) is not used by the L1bP. This is done so that the A and B coefficient arrays are both the same size. Only the last NF coefficients are used in the B coefficient array (for A, all NF+1 coefficients are used).		List of NF+1 Structures (0<NF+1< 1024	69718
Total size for XML structure in bytes:				278898

Table 8-159 HBE Parameters GADS List_of_ Mie_Harmonic_Bias_Coefficient_As Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Harmonic_Bias _Coefficient_A	Coefficent A in the Harmonic Bias Estimation using Fourier transform based interpolation.		FAdoxy	68

Table 8-160 HBE Parameters GADS List_of_ Mie_Harmonic_Bias_Coefficient_Bs Content Description

Tag Name	Content Description	Unit	Type	Size
Mie_Harmonic_Bias_Coefficient_B	Coefficent B in the Harmonic Bias Estimation using Fourier transform based interpolation.		FAdoxy	68

Table 8-161 HBE Parameters GADS List_of_ Ray_Harmonic_Bias_Coefficient_As Content Description

Tag Name	Content Description	Unit	Type	Size
Ray_Harmonic_Bias_Coefficient_A	Coefficent A in the Harmonic Bias Estimation using Fourier transform based interpolation.		FAdoxy	68

Table 8-162 HBE Parameters GADS List_of_ Ray_Harmonic_Bias_Coefficient_Bs Content Description

Tag Name	Content Description	Unit	Type	Size
Ray_Harmonic_Bias_Coefficient_B	Coefficent B in the Harmonic Bias Estimation using Fourier transform based interpolation.		FAdoxy	68

8.8.4 File Size

The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 8-163 Harmonic Bias Estimation Parameters Typical Product Size

Structure	Product Size
FH	~740 bytes
MPH	~1697 bytes
Auxiliary Data SPH	~504 bytes
Harmonic Bias Estimation Parameters GADS	~278898 bytes
Product Size:	~ 28.2 kbytes

8.9 Range Dependent Bias Parameters

8.9.1 Product Structure

The Range Dependent Bias Parameters product conforms to the product structure described in Section 3. It is contained in one product file containing Fixed Header and Main Product Header as defined in Sections 3.3.3 and 3.3.4 respectively. All headers and data sets are in XML format.

8.9.1.1 File Name

The Range Dependent Bias Parameters auxiliary file name has the format defined in Section 3.1:

AE_CCCC_AUX_RDB_1B _yyyymmddThhmmss_yyyymmddThhmmss_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, each validity period representing different phases of the ADM-Aeolus mission. The version number combined with the date makes this a unique instance of the file.

The product file has an extension .EEF to designate a single file in XML format.

8.9.2 Specific Product Header

The Specific Product Header structure for this file is described in Section 8.1.2. The root tag for the Range Dependent Bias Parameters input auxiliary file is RDB_CHAR_SPECIFIC_HEADER.

8.9.2.1 Data Set Descriptors

Only a single Data Set appears in the Range Dependent Bias Parameters data file: Range Dependent Bias Parameters GADS, as described in Section 8.9.3.

Table 8-164 RDB Parameters Data Sets

Num.	Data Set Descriptor Name	Content Description	Data Set Type	Update Frequency
1	Rdb_Characterisation	DSD structure for GADS	G	1 DSR per product

8.9.3 Data Sets

8.9.3.1 Range Dependent Bias Parameters GADS

The root tag for this Data Set is **Range_Dependent_Bias_Characterisation**, and the data set consists of a single Data Set Record of the structure described in Table 8-165.

Table 8-165 Range Dependent Bias Parameters GADS Content Description

Tag Name	Content Description	Unit	Type	Size
Rayleigh_Slope_OffNadir	Bias for the off-nadir Rayleigh measurements.	MHz/km	FAdoxy	64
Mie_Slope_OffNadir	Bias for the off-nadir Mie measurements.	MHz/km	FAdoxy	54
Rayleigh_Slope_Nadir	Bias for the nadir Rayleigh measurements.	MHz/km	FAdoxy	54
Mie_Slope_Nadir	Bias for the nadir Mie measurements.	MHz/km	FAdoxy	44
Zero_Reference_Range_OffNadir	Reference range with 0 MHz/km bias for off-nadir pointing measurements.	km	FAdoxy	74
Zero_Reference_Range_Nadir	Reference range with 0 MHz/km bias for nadir pointing measurements.	km	FAdoxy	68
Total size for XML structure in bytes:				358

8.9.4 File Size

The size of the XML file will not necessarily be fixed, so the sizes given are only rough approximations.

Table 8-166 Range Dependent Bias ParametersTypical File Size

Structure	Product Size
FH	~740 bytes
MPH	~1697 bytes
Auxiliary Data SPH	~504 bytes
Range Dependent Bias Parameters GADS	~358 bytes
Product Size:	~ 3299 bytes

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9 EXAMPLE STRUCTURES

9.1 Fixed Header (XML)


```xml
<Fixed_Header>
  <File_Name>AE_TEST_ALD_U_N_1B_20190105T011602023_008364010_002143_0001</File_Name>
  <File_Description>Level 1B Product</File_Description>
  <Notes>File used for L1B testing</Notes>
  <Mission>Aeolus</Mission>
  <File_Class>TEST</File_Class>
  <File_Type>ALD_U_N_1B</File_Type>
  <Validity_Period>
    <Validity_Start>UTC=2019-01-05T01:16:02</Validity_Start>
    <Validity_Stop>UTC=2019-01-05T03:35:26</Validity_Stop>
  </Validity_Period>
  <File_Version>0001</File_Version>
  <Source>
    <System>APF</System>
    <Creator>AE_RAW_L1B_WIND_CAL / IPF1_L1A_L1B</Creator>
    <Creator_Version>07.11</Creator_Version>
    <Creation_Date>UTC=2021-05-19T13:24:00</Creation_Date>
  </Source>
</Fixed_Header>
```

9.2 Main Product Header (XML)


```
<Main_Product_Header>

<Product>AE_TEST_ALD_U_N_1B_20190105T011602023_008364010_002143_0001</Product>
      <Proc_Stage>X</Proc_Stage>
      <Ref_Doc>SD-DoRIT-L1B-006 v4.15</Ref_Doc>
      <Spare_1>                                        </Spare_1>
      <Acquisition_Station>SVA_AS              </Acquisition_Station>
      <Proc_Center>APF</Proc_Center>
      <Proc_Time>UTC=2021-05-19T13:23:07.224396</Proc_Time>
      <Software_Ver>ADM_L1bP/07.11</Software_Ver>
      <Baseline>1B03</Baseline>
      <Sensing_Start>UTC=2019-01-05T01:16:02.023864</Sensing_Start>
      <Sensing_Stop>UTC=2019-01-05T03:35:26.034439</Sensing_Stop>
      <Spare_3>                                        </Spare_3>
      <Phase>1</Phase>
      <Cycle>19</Cycle>
      <Rel_Orbit>21</Rel_Orbit>
      <Abs_Orbit>2143</Abs_Orbit>
      <State_Vector_Time>UTC=2019-01-05T01:16:02.221864</State_Vector_Time>
      <Delta_UT1 unit="s">+.000000</Delta_UT1>
      <X_Position unit="m">1121219.460</X_Position>
      <Y_Position unit="m">873778.070</Y_Position>
      <Z_Position unit="m">-6547693.698</Z_Position>
      <X_Velocity unit="m/s">-2271.142934</X_Velocity>
      <Y_Velocity unit="m/s">-7291.902494</Y_Velocity>
      <Z_Velocity unit="m/s">-1361.564473</Z_Velocity>
      <Vector_Source>GP</Vector_Source>
      <Spare_4>                                        </Spare_4>
      <Utc_Sbt_Time>UTC=1970-01-01T12:00:00.000000</Utc_Sbt_Time>
      <Sat_Binary_Time>0</Sat_Binary_Time>
      <Clock_Step unit="ps">0</Clock_Step>
      <Spare_5>                                </Spare_5>
      <Leap_Utc>UTC=2031-09-21T00:00:00.000000</Leap_Utc>
      <Gps_Utc_Time_Difference>+018</Gps_Utc_Time_Difference>
      <Leap_Sign>+001</Leap_Sign>
      <Leap_Err>FALSE</Leap_Err>
      <Spare_6>          </Spare_6>
      <Product_Err>FALSE</Product_Err>
      <Tot_Size unit="bytes">162057169</Tot_Size>
      <Sph_Size unit="bytes">7466</Sph_Size>
      <Num_Dsd>20</Num_Dsd>
      <Dsd_Size unit="bytes">288</Dsd_Size>
      <Num_Data_Sets>8</Num_Data_Sets>
      <Spare_7>                                        </Spare_7>
    </Main_Product_Header>
```

9.3 Main Product Header (KVT)

```
PRODUCT="AE_TEST_ALD_U_N_1B_20190105T011602023_008364010_002143_0001   "
PROC_STAGE=X
REF_DOC="SD-DoRIT-L1B-006 v4.15 "

ACQUISITION_STATION="SVA_AS              "
PROC_CENTER="APF   "
PROC_TIME="19-MAY-2021 13:23:07.224396"
SOFTWARE_VER="ADM_L1bP/07.11"
BASELINE="1B03                          "
SENSING_START="05-JAN-2019 01:16:02.023864"
SENSING_STOP="05-JAN-2019 03:35:26.034439"

PHASE=1
CYCLE=+019
REL_ORBIT=+00021
ABS_ORBIT=+02143
STATE_VECTOR_TIME="05-JAN-2019 01:16:02.221864"
DELTA_UT1=+.000000<s>
X_POSITION=+1121219.460<m>
Y_POSITION=+0873778.070<m>
Z_POSITION=-6547693.698<m>
X_VELOCITY=-2271.142934<m/s>
Y_VELOCITY=-7291.902494<m/s>
Z_VELOCITY=-1361.564473<m/s>
VECTOR_SOURCE="GP"

UTC_SBT_TIME="01-JAN-1970 12:00:00.000000"
SAT_BINARY_TIME=+0000000000
CLOCK_STEP=+0000000000<ps>

LEAP_UTC="21-SEP-2031 00:00:00.000000"
GPS_UTC_TIME_DIFFERENCE=+018
LEAP_SIGN=+001
LEAP_ERR=0

PRODUCT_ERR=0
TOT_SIZE=+00000000000162057169<bytes>
SPH_SIZE=+0000007466<bytes>
NUM_DSD=+0000000020
DSD_SIZE=+0000000288<bytes>
NUM_DATA_SETS=+0000000008
```

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