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SMOS DPGS Maintenance

SMOS Level 2 and Auxiliary Data Products Specifications

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Document Change Log

Iss./Rev.	Date	Section / Page	Change Description
1/0	19-May-2006	All	First edition of the document
1/1	24-Aug-2006	All	Update document to be submitted to L2P-PDR. Major update to align operational products specifications with L2PP's new release
		1.3	Removed Product Definition Baseline as reference
		1.4	Reference documents updated
			Added a File class for Reprocessing REPR, as per L1OP-CDR RID NW-92
		2.2.1	Noted that the auxiliary products do not have MPH
			Noted that ZIP files will be delivered only to Users but not to Processors
		2.2.2	Updated of Product Schema version information accordingly to new product list
			Fixed Header "Creator" completed as per L1OP-CDR RID RC-65
			Corrected the format for the UTC in the table 3-1 as per RID NW-6
		3.1.1	AUX_SOILPR is renamed as AUX_SP__ as per RID NW-8
			Corrected L2 OS products to only two products: MIR_UDP_OS and MIR_DAP_OS as per RID NW-9
		3.2	Further clarification that Reference Data Sets are not included in the product

Iss./Rev.	Date	Section / Page	Change Description
			Update of MPH after harmonisation with other processing levels.
			Value for Acquisition Station specified to harmonise with L0 specifications.
			ID code of the Logical Processing Centre added, as per RID SP-01.
		4.1.1	Product Confidence eliminated as conclusion of L1OP-CDR
			Added explanation to clarify that the state vector is given at the ascending crossing node, as per L1OP-CDR RIDs RC-68 and SP-02
			Leap_Second field added to the MPH, as per RID DM-02
			Total_Size units specified, as per L1OP-CDR RID SP-03
		4.1.2	Modification of SPH naming convention
			Endianness for L1 products is fixed to little-endian.
		4.1.2.1	Update of SPH Main Info after harmonisation between products
			Levels. MDS and RDS separated in two different structures to avoid filling with null values
		4.1.2.2	Update of RDS names
			New fields (Mid_Lat, Mid_Lon) added to the product location structure in order to express correctly the swath location, following S.Delwart suggestion by e-mail on 18-Jul-06.
		4.2.1.1.2	Gaps removed and missing points added as conclusion of discussion with J. Closa by e-mail on 28-Jul-06
			Sensing Time information redundant with Fixed Header's; removed.
			Unit and Precision fields corrected in Table 4-8
		4.2.1.1.3	Unit and Prcecision fields corrected in table 4-14
			New Flags added in Table 4-15
		5.1.2	List of SPH_Descriptor updated following document changes
		5.1.2.1	Ref_Doc and Total_Size fields moved from MPH to SPH Main Info since MPH has been deleted in all Auxiliary Data Products
		5.2	Harmonisation between Soil Moisture and Ocean Salinity Auxiliary Products as per RID NW-10
		6	Product Sizes Updated
1/2	27-Oct-2006	All	Field numbering corrected, as per RID RV-01
		All	AUX_CNFSM2 and AUX_CNFOS2 products added

Iss./Rev.	Date	Section / Page	Change Description
		All	Type, Precision and C Format columns in binary datablocks changed to Type, Element Precision and Variable Format, and systematically defined consistently all along the document, as per DPGS-CDR RID RC-17
		All	Document integer fields corrected and explanation about coding included in section 2.1.1
		All	Document updated according to the new versions of IODD
		All	C Format corrected in all the products, as per RID RV-06
		All	DAR name changed by DAP to avoid confusion, as per RID RV-24
		2.2.3	A fourth column has been added in order to indicate the section where file format of each product is specified.
		3	The string fields limited to 200 characters, as per RID RV-13
		3.1.1	Validity_Start and Validity_Stop specified with a resolution of seconds, as per RID NW-31
		4.1.1 & 4.1.2	Origin Column corrected in SPH/MPH, as per RID RV-02
		4.1.1	Type_of_processing in the MPH removed, as per DPGS CDR RID
		4.1.1	Logical_Processing_Center code corrected from integer to string, as per DPGS-CDR RIDRC-16
		4.1.1	Main Product Header harmonized with MPH L0 and MPH L1, as per DPGS-CDR RID NW-27
		4.1.1	Reason_for_Reprocessing removed, as per DPGS-CDR RID NW-27
		4.1.1	Removed Byte_Order field in the MPH in order to harmonize it with the L1 MPH
		4.1.1	Phase field format changed from character to integer
		4.1.2.1	In the SPH_Descriptor field, the 28 character string corrected to 14 character, as per DPGS CDR RID-NW28
		4.1.2.1	Precise_Validity_Start and Precise_Validity_Stop added in the SPH product info, in microseconds resolution, added to the SPH Product Info, as per DPGS-CDR RID NW-31
		4.1.2.2	Ref_Filename removed, as per RID RV-03
		4.1.2.2	List_of_Reference_File_Structs opening and closing tags removed, as per RID RV-05
		4.1.2.2	DSD structure specified as in the Standard, as per DPGS-CDR RID-NW-28
		4.1.2.2	Byte_Order per DSD and not per DBL, as per DPGS_RID NW_28
		4.2	A new column added to specify flag's size
		4.2.1.1.2	"Origin column" corrected in Product Location Field, as per RID RV-07
		4.2.1.1.2	Origin column in Table 4-7, Fields #36 to 39 corrected, since they pertain to the quality of the L2 SM, as per RID RV-31

Iss./Rev.	Date	Section / Page	Change Description
		4.2.1.1.2 , 4.2.2.1.2 & 5.3.16.2	C Format changed in lat/ lon fields from integer to float, as per DPGS CDR RID RC-38
		5	Two different SPH considered for the Auxiliary Data Products, attending to the Data Blocks
		5.1.2.3	SPH Additional Information for Auxiliary products removed, as per DPGS-CDR RID RC-34
		5.2.3	Included ECMWF Format specified by ESA, as per RID RV-20
		5.3.1-5.3.3	Product names corrected in order to follow the convention, as per RID RV-37
		5.3.14	Sky Radiation Product Format added
		5.4.6	Galaxy Map Product Format added
		5.4.11.1	Hope Model information removed, as per RID RV-22
		5.4.11.1.2	C format corrected to ul, as per RID RV-23
1/3	10-Nov-2006	All	References updated
		All	Document updated according to the new versions of IODD for the SMPPD
		3.1.1	Validity_Start and Validity_Stop and Creation_Date C Format corrected to %23s
		4 & 5	Data sets included in data blocks have been reorganized
		4.1.2.1	Checksum string length corrected from 4 to 10 characters
		4.1.2.2	List_of_Data_Sets structure reviewed
		5.1.2.1	Precise_Validity_Start and Precise_Validity_Stop string Lengh corrected to 30 bytes
		5.3.14	Sky Radiation Auxiliary Data Product renamed as SM Galaxy Map Product
		5.4.6	Galaxy Map Product renamed as OS Galaxy Map Product
		5.4.10	Neural network definition removed, as there is no such product because coefficients will not be defined before Launch
		6	Product's sizes updated
		All	Limite for the variable string length corrected from 200 bytes to 300 bytes
		All	Name of degree unit expressed as "deg" instead of "o"
		3.1.1	File_Version String length corrected to 4 digits in order to follow the EE Standard
		3.1.1	AUX_DGGRFI Product added to Table 3-2
		4.1.2.2	DSR_Size C Format corrected from %+08d to %08d since the sign is not relevant
		4.1.2.2	Type File of the Configuration File PostProcessing (AUX_CNFPOS) corrected.
		5.3.5.2	"Counter" field removed since it is fixed.

Iss./Rev.	Date	Section / Page	Change Description
		5.3.16	Decission_Tree_Model_Selection_Tag (field # 330) corrected to Prior_SD_2nd_Decission_Tree_Data Tag
		5.4.2.2	String Length for the Flat Sea Coefficients corrected
		5.4.9	Lists added to structure the fields of the Atmosphere constants product
		5.4.10.3	Data_Sets reviewed
2/0	24-Nov-2006	All	Final issue for DPGS-V1 after a review meeting between ESA, GMV and Indra.
2/1	15-Dec-2006		Document updated after L2 PM-3
		4.2.2.1.3	"Altitude" field removed from MIR_OSUDP2 Datablock "Control_Flags" Element Precision corrected from 8 bytes to 4 bytes Scientific_Flags renamed as Science_Flags
		4.2.2.2.3	"Altitude" field removed from MIR_OSUDAP Datablock Tau and TBatm_emission Element precissin corrected from unsigned integer (2 bytes) to float (4 bytes) "Na" counter field replaced by Dg_num_meas_l1c since it was twice in the datablock
		5	AUX_RFI Auxiliary Data Product removed
		5	C Format changed from %f to %g for the Ocean Salinity Auxiliary Data
		5.4.2.2	AUX_RGHNS1 Datablock coded as in prototype document
		5.4.3.2	AUX_RGHNS2 Datablock coded as in prototype document
		5.4.4.2	AUX_RGHNS3 File Format corrected from binary to XML/ ASCII
		5.4.6.2	AUX_FOAM__ Datablock coded as in prototype document
		5.4.7.2	AUX_SGLINT Datablock coded as in prototype document
		5.4.9.1.2	"N_Grid_Points" field removed. It is not needed since AUX_DISTAN is an array fixed. "Flags_Data" tag removed in order to code the Datablock as in prototype document
		5.4.9.2.2	"N_Grid_Points" field removed. It is not needed since AUX_SSS___ is an array fixed. "SSS_Climato_Data" tag removed in order to code the Datablock as in prototype document.
		5.4.9.3.2	"N_Grid_Points" field removed. It is not needed since AUX_DGGVER is an array fixed.
		5.4.9.4.2	AUX_AGDPT_ coded as AUX_SST___ specified in prototype document.
		5.4.9.5.2	itMax C Format corrected from float to integer Switch_foam C Format corrected from integer to string

Iss./Rev.	Date	Section / Page	Change Description
			Switch_err_mode C Format corrected from integer to string
			“Tg_num_meas_min" field added
			“Tg_quality_SSS” field removed
			AUX_GPDEF (as called in prototype document) added to AUX_CNFOS2
		6	Size’s table updated
2/2	01-Mar-2007		Minor changes
		4.2.1.2.3	Residual field expressed as array of four elements, both for full pol and dual pol.
		4.2.2.2.3	Missing parameters added to the Datablock
		5.1.2.1	Ref_Doc precision corrected from 300 bytes to 17 bytes.
		5.4.4.1	Remove the sentence: “Contains the List of Data Sets included in Table 4-5”
		5.4.9.4.2	Colum Type corrected from Real value to Real Array
		6	Product Size’s updated
2/3	22-Aug-2007	All	"AUX_DGGVER" Auxiliary Data Product has been removed since it is not needed neither L2SM processing nor L2OS processing.
		2.2	Reference documents updated.
		3.1.1	Origin fields corrected in Headers
		4.2.1.1.3 & 4.2.1.2.3	“Latitude”, “Longitude” and “Altitude” precision fields corrected from unsigned integer to signed integer. A Clarification about how to fill the fields included in the .DBL has been added.
		4.2.1.1.2	“Westernmost_Longitude” and “Westernmost_Gridpoint_ID” added to SM SPH. Clarified that “M_AVA0” and “M_AVA” fields refer to the number of TB measurements available, not views available.
		4.2.1.1.3.1	Clarified that “Mean_Acq_Time” and “Spatial_Resolution” fields refer to all valid TB measurements instead of to all valid views (over HH polarization only). “FL_Current_Flood” Flag added to the list of DAP Flags. X_Swath (Field #40) corrected to signed integer (2 bytes). Specified X_Swath value in km = integer value * 1050 / (215-1).
		4.2.1.2.3.1	Clarified that “M_AVA” field refers to “TB measurements” instead of“views”. Clarified that “N_TB_Range”, “N_RFI_H” and “N_RFI_V,” fields refer to “TB measurements” instead of “views”.
		4.2.2.1.2 & 4.2.2.1.2	C Format, for all the fields associated to Grid Pint identifiers, corrected from integer to unsigned integer.

Iss./Rev.	Date	Section / Page	Change Description
		4.2.2.1.3 & 4.2.2.2.3	Scaling factor removed from Latitude and Longitude units.
		5.2.3	“Quality_Flag” field specification added.
		5.2.3	Added Flag’s specification to AUX_ECMWF Auxiliary Data
		5.2.3	“Rain_Rate” units changed from mm/h to m/3h
		5.3.13.1	“Scaling_Factor_FO” renamed as “Scaling_Factor_FC”. “Ecosystem_Code” and “Num_Classes” type corrected from integer to unsigned integer.
		5.3.15	“TT_H” C Format has been corrected from %10.8f to %10.7f. DLCC unit corrected to N/A. Several field types corrected from integer to string in AUX_CNFSM2.
		5.3.16.2	TH_Fit (Field #389) corrected to Type real, String Length of 10 and C Format of %f. TH_W2 unit corrected to %. “FL_Big_Water” precision corrected from byte-8 to unsigned byte-8
		5.3.17	Clarifications about “Num_Columns” field added. Num_Columns default value corrected from 1600 to 200.
		5.4.5.2	AUX_GAL_OS Data Block changed according ACRI IODD v1.1 instead of S.P Specification in order to keep ACRI schemas.
		5.4.7.2	Indexing changed in accordance with ACRI schemas.
		5.4.9.3.2	Datablock has been reordered in accordance with ACRI schemas and”IODD Clarifications” Note. List of “Index known by the processor” added to Data block structure as is specified in “ACRI IODD clarifications”
		5.4.9.4.2	“nRetrievedParam” field added. “Guess_prior” type corrected to string
3/0	25-Sep-2007		Draft version for DPGS-V2
		All	New product”AUX_GAL2OS“has been added.
		1.3 & 1.4	Reference and Applicable documents have been updated.

Iss./Rev.	Date	Section / Page	Change Description
		4.2.1.1.3	"Latitude" and "Longitude" types changed from signed integer to Float in order to harmonize L1 and L2 products. "Physical_Temperature" field renamed as "Surface_Temperature" and a clarification added in the description column associated to it. "Physical_Temperature_DQX" renamed as "Surface_Temperature_DQX" "AFP" units corrected to Km In Table 4-9 "FL_Views_T" and "FL_Retrieved_T" flags have been removed. A clarification about when the flags included in table 4-11 will be set to True. "Confidence_Flags" and "Processing_Flags" type changed from unsigned short to unsigned byte.
		4.2.1.2.3	"Latitude" and "Longitude" types changed from signed integer to Float in order to harmonize L1 and L2 products. The following fields have been added to the Data block: "Num_Incidence_Angles", "Tau_Litter", "T_Phys". Several list of datas have been restructured in order to define correctly the counters associated to these lists. "Residual" variable format has been corrected from 4 elements to 1 element. "N_MR2_Cond" field has been removed. "TPhys_Init_Val" field has been renamed as "TSurf_Init_Val" "TPhys_Init_Std" has been renamed as "TSurf_Init_Std".
		4.2.2.1.3	"Control_Flags" field has been restructured as "Control_Flags1", "Control_Flags2", "Control_Flags3" and "Control_Flags4" "Dg_chi2_Acard" field has been added. "Dg_chi2_P_Acard" has been added "Dg_num_iter_4" field has been added. Types from field #42 (Dg_num_meas_L1c) to field #54 "Dg_moonglint" have been changed from unsigned short to unsigned byte. "Science_Flags" field has been restructured as "Science_Flags1", "Science_Flags2", "Science_Flags3" and "Science_Flags4" "Dg_sky" type has been changed from unsigned short to unsigned byte.

Iss./Rev.	Date	Section / Page	Change Description
		4.2.2.2.3	New “Out_of_LUT_Flags” has been added to the Data block, “Diff_TB_4”, “Tb_gal_H”, “Tb_gal_V”have been added to the DBL. Types from field #10 to #13 have been changed from unsigned short to unsigned byte. Geophysical_parameters_prior and Geophysical_parameters_post have been added to the list
		5.2.3.2	“Grid_Point_Flag” field has been removed “Land_Sea_Mask” flag has been added to the list of flags.
		5.3.6.2, 5.3.7.2, 5.3.8.2, 5.3.9.2 & 5.3.10.2	“Latitude” and “Longitude” fields have been added, as is requested in SM IODD v2.0
		5.2.3.2	Land_Sea_Mask_Flag added to the list of flags according to SMOS ECMWF Pre-processing v1.0
		5.3.3	Origin Column has been corrected in the AUX_DFFLAI SPH
		5.3.16.2	“Use_TAU_L_In_Inv”, “TH_TAU_FN” and “DGG_Intercell_Distance” have been added, as is requested in SM IODD v2.0
		5.4.2.2	LUT dimensions have been changed.
		5.4.10.1.2	“Max2” field has been removed.
		5.4.10.2.2	“SSS_prior” and”“Acard_prior” fields have been added to the .DBL
		5.4.10.4	“Tm_angle_sun” field has been removed. “Ind_Acard” field has been added. Tg_num_meas_min, Tg_WS_roughness, Tg_WS_foam put in the iterative conf. structure (because depend on retrieval model). “Ucard” and “Bcard” fields have been added to AUX_CNFOS2
		5.4.10.3	Bias1/bias2/sigabs/sigrel/first_Acard added in AUX_AGDPT and types.
		5.4.10.4.2	“retrievedParamId” type changed to string. “nMin” field has been removed. “deltaP” and “landaMax”types have been changed from float (4 bytes) to double (8 bytes). “Switch_retr” and “Switch_cond” types changed from unsigned short to string, “Tg_num_mes_min”, “Tg_WS_roughness” and “Tg_WS_foam” fields added. New indexes added to the list_of_Geophysical_parameters structure. “Overall¨_Quality_Threshold_High” and “Overall_Quality_Threshold_Low” included into Threshold structure. “Ucard” and “Bcard” added to the Physical_Constants structure.
		6	Product Sizes have been updated.

Iss./Rev.	Date	Section / Page	Change Description
3/1	19-Oct-2007	All	AUX_BIGWBF Auxiliary Data Product removed. It is no longer used in L2 SM processing.
		2.2.2	"Precise_Validity_Stop_Time" changed to "Precise_Validity_Start_TIme" in the paragraph which referes to the Sensing Start Time, as per SP and JCD email.
			The reference to the "Confidence_Flags" corrected to Table 4-9
			"S_Tree_1" and "Flag_Retrieval" Comments changed.
			"Confidence_Flags" element precision changed from unsigned byte to unsigned integer (2 bytes)
			The list of Confidence_Flags has been restructured.
		4.2.1.2.3	"N_Border_FOV" field removed.
			"Processing_Flags" element precision has been changed from unsigned byte to unsigned integer (2 bytes).
			"FL_WINTER_FOREST" and "FL_DUAL_RETR_FNO_FFO" flags have been added to the list of Science_Flags.
			Clarified that "FL_Current_FLood" is a Place holder.
			"Tb_42.5X", "Sigma_Tb_42.5X", "Tb_42.5Y"and "Sigma_Tb_42.5Y" fields added to the Datablock.
		4.2.2.1.3	"Dg_quality_Acard" field added.
			"Fg_ctrl_ECMWF" flag added to the list of "Control_Flags"
		4.2.2.2.3	"Fg_oor_LUT_param" flag removed from the list of "Out of LUT_Flags". Instead of, a spare bit is considered.
		5.1.2	The Reference to the List of Data sets has been corrected from Table 4-5 to Table 4-4
		5.2.3.2	"Roughness_Lenght" tag name corrected to "Roughness_Length"
		5.3.3.1	"Digits_to_Shift" comment has been corrected, as per SP and JCD e-mail (2007-10-18)
		5.3.3.2	"LAI_QC" description has been corrected, as per SP and JCD e-mail (2007-10-18)
		5.3.8.2	"DT_Branc_HR" tag has been renamed as "DT_Branch_HR"
		5.3.13.1	"Scaling_Factor_SDB", "Scaling_Factor_W0", "Scaling_Factor_BW0", "Scaling_Factor_XMVT" and "Scaling_Factor_FC" String Length changed from 10 to 12.
		5.3.14.1	The string Length from field #15 "Min_RA" to field #20 "DELTA_DEC", changed to 7.

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		5.3.16.2	"Efective_Temperature_of_Soil_Data" renamed as "Effective_Temperature_of_Soil_Data" Fields#83 C_OW_1 to #114 C_OW_32, #162 k0_Tau_O2 to #170 k2_Tau_H2O, #173 k0_DT_O2 to #181 k2_DT_H2O, #184 C_GSTO_0 to #187 C_GSTO_4, #353 F_Con, #474 CCX0 to #480 CCX6 string Length corrected to variable. Field#205 Num_Thresholds and Fields#209 TH_W2_R, #213 TH_W1_R, #217 TH_TS_R, #221 TH_TM_R, #225 TH_S2W_R, #229 TH_S2M_R, #233 TH_S1W_R, #237 TH_S1M_R, #241 TH_R2_R, #245 TH_R1_R, #249 TH_F2_R C Formats corrected to %2d. Fields #254 TH_WL, #258 TH_EB, #262 TH_EI units changed to %. A dividing line added between TH_EU and TH_EU_N Column Comment. "TH_WL" type corrected to Real. "Forward_Model" C Format corrected to %s "TH_Tau_R_23" and "TH_Tau_R_34" unit s corrected to neper. "List_of_Modes_Datas" tag renamed as "List_of_Models_Datas". Similarlly in the comment cell. "Negative_Retrieval_Output" field added to the "Algorithm_Control_Data" structure.
		5.4.2	The order of the dimensions of the LUT has been changed.
		5.4.10.1.2	"Max" field renamed as "Tg_resol_max_ocean"
		5.4.10.4.2	"Deltasig", "Tg_num_meas_min", "RetrievalMode", "Delta_sn", "Switch_af", "Tg_num_outliers_max" fields added to AUX_CNFOS2 DBL "Nsig" type corrected to %02d "Switch_gal" and "Switch_roug" comment changed. "Index" fields have been reordered. "Overall_Quality_Thresholds" put outside "Thresholds" structure.
		6	Product size's updated.
3/2	09-Nov-2007	2.2.1	Table 2-1 has been updated according to XML Schema Guidelines document.
		3.1.1	Origin field has been reviewed and corrected.
		4.1.1	MPH fields reviewed and corrected during meeting held on 25th October 2007.
		4.2.1.1.3	"Chi_2" (field #44) and "Chi_2_P" (field #45) types changed from Real Value to Integer Value. Comments located below Table 4-8 have been reviewed and corrected.
		4.2.1.1.3.1	The number of Spare Bits detailed in table 4-9 has been corrected.
		4.2.1.1.3.2	The Numbering and the number of Spare bits have been corrected.
		4.2.1.1.3.3	The Numbering and the number of Spare bits have been corrected.

Iss./Rev.	Date	Section / Page	Change Description
		4.2.1.2.3	The “Grid_Point_ID” origin has been corrected to MIR The coded included in the description associated of each Cover Fraction has been corrected.
		4.2.1.3.2.1	“FL_MVAL0”, “FL_MVAL”, “FL_R4_NITM” and “FL_R4_KDIA” flag descriptions have been corrected
		4.2.2.1.2	New “L2_Product_Description”structure added to the SPH
		4.2.2.1.3	“Grid_Point_ID” origin has been corrected to MIR
		4.2.2.1.3.1	“Control_Flags” numbering and the number of Spare bits have been corrected. “Fg_ctrl_reach_Maxister” field renamed as “Fg_ctrl_reach_Maxiter”
		4.2.2.1.3.2	“Science_Flags” numbering and the number of Spare bits have been corrected.
		4.2.2.2.3	“Grid_Point_ID” origin corrected to MIR. Corrected that the number of place holders for PXX is seven.
		4.2.2.2.3.1	“Out_of_Range” flags numbering and number of Spare bits corrected.
		4.2.2.2.3.2	“Measurement” flags numbering and number of Spare bits corrected.
		5.1.2.1	“Datablock_Schema” type included into Main SPH for XML ADFs changed from “string_42_Type” to “string_31_Type”.
		5.2.3.2	“Land_Sea_Mask” precision corrected from unsigned char to unsigned byte. “Land_Sea_Mask” flag moved to the end of the list.
		5.3.3	Clarified that the first time missing LAI are filled with “NULL” values
		5.3.4.1	“Digits_to_Shift” description has been corrected.
		5.3.4.2	Clarified the “LAI_Max” description.
		5.3.6	Clarified that for the very first AUX_DGGTLV retrieval in the cycle, for which no previous retrieval data exists, all parameters are set to “NULL
		5.3.6.2, 5.3.7.2 & 5.3.8.2	“Tau_Nad_FO_DQX”, “DT_Branch_FO”, “Tau_Nad _LV_DQX”, “DT_Branch_LV”, “HR_DQX”, “DT_HR“precision corrected from unsigned char to unsigned byte.
		5.3.8.2	“HR” and “HR_DQX” units corrected to dimensionless
		5.3.10.2	“Fl_Flood_Prob” precision changed from unsigned char to unsigned byte.
		5.3.13.1	“Scaling_Factor_SDB”, “Scaling_Factor_W0”, “Scaling_Factor_BW0”, “Scaling_Factor_XMVT” and “Scaling_Factor_FC” Format changed to %012f
		5.3.13.2	“PC_Sand” and “PC_Clay” precision changed to unsigned byte.
		5.4.5.1	“Coordinates_Info” types changed to %+7.2f according to François indications (e-mail 09/11/2007)
		5.4.6.1	AUX_GAL2OS SPH defined according to François indications (e-mail 08/11/2007)

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		5.4.10.4.2	“dT_dS_0” and “dT_dS_1” new fieds added to AUX_CNFOS2 Data block as was required in François e-mail 07/11/2007
3/3	31-Jan-2008		New version of L2 Product Specs after SM Core-V3 FAT and OS Core-V3 FAT.
		1.4 & 1.5	Reference and Applicable documents updated.
		4.1.2.2 & 4.2.2.1.2	AUX_GAL2OS Referente Data Set name renamed as “GALAXY_2OS_FILE”.
		4.2.1.1.3 & 4.2.1.2.3	Clarified that “AFP” field will be only filled when there is a retrieval, as per SM Core- V3 SPR-FAT-10. Clarified that the “Science_Flags” are set to OFF in the event of no retrieval, as per SM Core- V3 SPR-FAT-10. Clarified that the sign of the “X_Swath”values depends on the direction of the satellite. Clarified that the Chi_2_P values should be divided by 255 to obtain the values comprised between [0, 1] range. Removed “Fl_Chi_2 Flag” description since it is no longer included in Confidence_Data Flags.
		4.2.1.1.3.1	Clarified that “FL_ChI2_P” flag will be set in case Chi_2_P values are outside [TH_CHI2_P_Min, TH_CHI2_P_Max] range.
		4.2.2.1.2	Specified the C Format of “Name”, “unit” and “Description” fields included into List_of_models structure.
		5.2.3	Clarified the meaning of -9998/-9999 values in AUX_ECMWF data, per SM Core-V3 SPR-FAT-08 action.
4/0	20-Jan-2009		New version of L2 Product Specs applicable to DPGS-V3
		1.3 & 1.4	Applicable and Reference documents have been updated.
		2.2.3	Updated the ftp address where the DPGS schemas and XML RW API can be found.
		3.1.1	Corrected the origin of the fileds “Validity_Start” and “Validity_Stop” from INT to MIR.
		4.1.1	“Product_Confidence” description has been updated
		4.1.2.1	“Polarisation_Flag” added to the Main_Info structure
		4.1.2.2	An explanation about the Measurement Data Set names to be included in the SPG_Data_Set structure has been added, as it was requested by J.C Deburyn (See e-mail 01/08/08)
		4.2.1.1.2	SPH.Quality_Information of the MIR_SMUDP2 and MIR_SMDAP2 has been updated according to [RD.6] “Latitude”, “Longitude” and “Altitude” formats have been changed from integer to float.
		4.2.1.1.3	“Confidence_Descriptors_Data” structure has been updated according to [RD.6] “DGG_Current_Data” structure has been added according to [RD.6].

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		4.2.1.2.3	"Latitude", "Longitude" and "Altitude" formats have been changed from integer to float. The content of the Data Block has been re-organized according to [RD.6].
		4.2.2.1.2	"SPH.Quality_Information" structure has been updated according to [RD.9] "Mid_Lat" and "Mid_Lon" descriptions have been updated according to [RD.9].
		4.2.2.1.3	Data block updated according to [RD.9].
		4.2.2.2.3	Data block updated according to [RD.9].
		5.2	AUX_TIME__ specification has been removed since this file is no longer used by the L2 processors. The MPL_ORBSCT specification has been added since this file is used by the L2 Cores instead of the AUX_TIME__
		5.2.2	AUX_ECMWF_ specification has been updated according to [RD.18]: "Degradation__Flags" field has been added to the Data block.
		5.3.3	AUX_DFFLAI specification has been updated according to [RD.19]
		5.3.6, 5.3.7, 5.3.8, 5.3.9 &5.3.10	Clarified that "Date stamp" corresponding to the number of elapsed days from the start of year 2000
		5.3.15	AUX_LANDCL Data block specification has been modified in accordance with [RD.6]
		5.3.16	Two Auxiliary Configuration Files with the same format have been defined: One for Dual Pol (AUX_CNFSMD) and the other for Full Pol (AUX_CNFSMF). The format of the Data Block has been updated according to [RD.6]
		5.4.6	AUX_GAL_OS Data Block format has been updated according to [RD.9]
		5.4.7	AUX_GAL2OS Data Block format has been updated according to [RD.9]
		5.4.11.3	AUX_AGDPT_ Data block has been updated according to [RD.9]
		5.4.11.4	Two Auxiliary Configuration Files with the same format have been defined: One for Dual Pol (AUX_CNFOSD) and the other for Full Pol (AUX_CNFOSF). The format of the Data Block has been updated according to [RD.9]
		5.5.1	AUX_ECOLAI product specification has been added, according to [RD.20]
		5.5.2	AUX_BNDLST product specification has been added, according to [RD.18].
		6	Products Sizes updated according to [RD.6] and [RD.9].
4/1	27-Feb-2009		New version of the document after L2SM Core V4 FAT
		1.4	Reference docs have been updated.

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		5.2.2	Specified how the nodes are ordered in the AUX_ECMWF Data block, as per Norrie e-mail (2009/02/26)
		5.3.6.2	"Date_Stamp_LV" description has been modified following the comments sent by Norrie Wright (2009/02/23) "DT_branch_LV" has been renamed as "DT_Branch_LV", according to the comments sent by Norrie Wright (2009/02/23) "Tau_Nad_LV" description has been modified following the comments sent by Norrie Wright (2009/02/23) "Tau_Nad_LV_DQX" description has been modified following the comments sent by Norrie Wright (2009/02/23) Specified how the nodes are ordered in the AUX_DGGTLV Data block, as per Norrie e-mail (2009/02/26)
		5.3.7.2	"Date_Stamp_FO" description has been modified following the comments sent by Norrie Wright (2009/02/23) "Tau_Nad__FO_DQX" has been renamed as "Tau_Nad_FO_DQX", according to the comments senf by Norrie Wright (2009/02/23) "Tau_Nad_FO" description has been modified following the comments sent by Norrie Wright (2009/02/23) "Tau_Nad_FO_DQX" description has been modified following the comments sent by Norrie Wright (2009/02/23) Specified how the nodes are ordered in the AUX_DGGTFO Data block, as per Norrie e-mail (2009/02/26)
		5.3.8.2	"Date_Stamp_HR" description has been modified following the comments sent by Norrie Wright (2009/02/23) "Tau_Nad_HR" description has been modified following the comments sent by Norrie Wright (2009/02/23) "Tau_Nad_HR_DQX" description has been modified following the comments sent by Norrie Wright (2009/02/23) Specified how the nodes are ordered in the AUX_DGGROU Data block, as per Norrie e-mail (2009/02/26)
		5.3.9.2	"N_Snap" description has been modified following the comments sent by Norrie Wright (2009/02/23) Specified how the nodes are ordered in the AUX_DGGRFI Data block, as per Norrie e-mail (2009/02/26)
		5.3.10.2	Specified how the nodes are ordered in the AUX_DGGFLO Data block, as per Norrie e-mail (2009/02/26)

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			TH_MR2_Cond, C_VAL_2, C_VAL_4, Mag_Perm_Water, SM_LV, SM_FV,TH_LSM, TH_MMin1/2/3, Parameters_for_Snow_Model_Data, Galactic_Contribution_Parameters_Data, Standard_User_Mode, General_DAP, TH_TEC, CQX43, Use_Current_Flood descriptions have been modified as per Norrie e-mail (2009/02/26)
		5.3.16.2	TH_Cur_*_Period units have been modified to days. Blank space in tags 176-180 name has been removed as per Norrie e-mail (2009/02/26) Overall_QualityThreshold_low/high tag has been renamed as Overall_Quality_Threshold_Low/High, as per Norrie e-mail (2009/02/26) TH_TEC unit has been changed from N/A to 10**16 electrons/m**2, as per Norrie e-mail (2009/02/26)
4/2	04-May-2009		New version of the document after L2OS Core V4 FAT
		1.3 & 1.4	Applicable and Reference documents have been updated.
		4.1.1	“Acquisition_Station” values aligned with L0 Products Specifications v3.2, as requested by NW (DPGS-PR-1511).
		4.2.1.1.3	Ouput values description has been added for the fields defined from #31 to #38, as per Array’s e-mail sent on 2009/03/20.
		4.2.2.1	Clarified the definition of Missing_ECMWF_Rejected
		4.2.2.1.2	Clarified that *most_Latitude/Longitude values correspond to grid points where retrieval is attempted, as per Norrie e-mail (2009/02/26) Field #88 renamed as Quality_Record as per Norrie e-mail (2009/02/26) Added description of All to Grid_Point_Type
		4.2.2.1.3	Added default values for MIR_SMUDP2 product
		4.2.2.2.3	Added default values for MIR_SMDAP2 product
		5.2.2.1, 5.3.3.1, 5.3.6.1, 5.3.7.1, 5.3.8.1, 5.3.9.1, 5.3.10.1	Reference Data Set Names included for the raw data used in pre-processing and post-processing.
		5.3.6.2, 5.3.7.2, 5.3.8.2 & 5.3.9.2	Clarified that the current file values take on the maximum possible value when there is no fresh updates available, as per DPGS-PR-1473
		5.3.16.2	The descriptions corresponding to TH_Cur_Tau_Nad_LV_Val_Period, TH_Cur_Tau_Nad_FO_Val_Period, TH_Cur_HR_Val_Period, SM_LV, SM_FV, SRC and TH_TEC have been modified according to Array’s e-mail sent on 10/03/2009
		5.4.11.4.2	ACRI has been removed from the Origin Column, as per Norrie e-mail (2009/02/26)
4/3	29-May-2009		New version of the document including the changes requested by ARGANS after OS-Core V4 Delta FAT
		4.2.2.1.2	Clarified relations for SPH quality information

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		4.2.2.1.3	Updated default values for MIR_OSUDP2 product
		4.2.2.2.3	Updated default values for MIR_OSDAP2 product
		5.4.11.4.2	Corrected description of Tg_low_SST_ice (should be Kelvin, was Celcius); revised descriptions of Tg_ice_concentration & Tg_suspect_ice – both now percentages
4/4	08-Jul-2009	1.3 & 1.4	Applicable docs and Reference docs have been updated.
		All	Clarified that the AUX_AGDPT_ is not currently used by the L2OS operational processor (DPGS-PR-1637)
		All	A comment has been added to the tags which contain spelling errors to indicate that the tag name is as actually written (NW-01 comment).
		4.2.1.1.3	N_Wild, M_AVA0, M_AVA, N_AF_FOV, N_Sun_Tails, N_Sun_Glint_Area, N_Sun_FOV, N_Software_Error, N_Instrument_Error, N_ADF_Error, N_Calibration_Error, N_X_Band, N_Sky, N_RFI_X, N_RFI_Y formats have been changed from 1 byte to 2 bytes, as per Cecilia's e-mail sent on 11/06/2009.
		4.2.1.2.3	N_TB_Range, N_Cleaned, M_AVA0, Num_Incidence _Angles formats have been changed from 1 byte to 2 bytes, as per Cecilia's e-mail sent on 11/06/2009.
		4.2.2.1.3	Default values have been changed from -9999 to -999 (see Paul Spurgeon e-mail sent on June, 18th).
		4.2.2.2.3	Default values have been changed from -9999 to -999 (see Paul Spurgeon e-mail sent on June, 18th).
		5.4.11.4.2	Tm_DT_ice description has been updated according to [RD.9]
		6	MIR_SMUDP2 and MIR_SMDAP2 sizes have been updated.
4/5	25-Sep-2009	1.3 & 1.4	Applicable docs and Reference docs have been updated.
		4.2.1.1.3	"Tar_Cur_DQX" has been renamed as "Tau_Cur_DQX" according to cecilia@array.ca e-mail sent on 06-Aug
		4.2.1.1.3.1	"FL_FARADAY_ROTATION_ANGLE" flag has been added to the "Confidence Flags", according to [RD.6]
		4.2.2.1.2	"Total_Close_To_Land_Rejected" has been renamed as "Too_Close_To_Land_Rejected" according to according to [RD.9] (L2 Specs bug correction)
		4.2.2.1.3	"Dg_Sky" element precision has been changed from 1 byte to 2 bytes according to [RD.9] (L2 Specs bug correction)
		4.2.2.1.3.1	"Fg_ctrl_used_faraTEC" and "Fg_Ctrl_retriev_fail" has been added, according to [RD.9]

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		4.2.2.2.3.2	“Fm_l1c_error” has been added to Meas_Flags, according to [RD.9] “Fm_moon_spec_dir” spelling error has been corrected, according to [RD.9] Field numbering has been reorganized, according to [RD.9] “Fm_fara_interp” has been added, according to [RD.9]
		5.1.2	AUX_TIME has been removed from Table 5-1 since this file is no longer used in the SMOS Ground Segment (DPGS-PR-1705)
		5.3.16.2	“Current_Tau_ASTD” comment has been corrected according to cecilia@array.ca e-mail sent on 06-Aug
		5.4.11.3	“ParamName” data set structure has been added, according to [RD.9] “nsig” units have been changed from us to float, according to [RD.9]
		5.4.11.4.2	“Switch_store_gal”, “Switch_rough_harmonics”, “Tg_fara_meas_min” and “Tm_fara_delta_angle_max” have been added, according to [RD.9]. “Switch_retr” has been removed, according to [RD.9] “Generate_DAP” flag has been inserted, according to [RD.9].
		6	AUX_DFFFRA, AUX_DFFXYZ, AUX_DFFLAI and AUX_DFFLMX products sizes have been changed, according to [RD.6]
4/6	06-Nov-2009		New version after Rehearsal tests.
		5.3.3.2	Fill value legend table has been removed since it does not make sense for the AUX_DFFLAI products (DPGS-PR-1724 fixed)
4/7	14-Jan-2010	1.4	Reference docs have been updated.
		4.2.1.1.3	Added comment to Chi_2 field, according to Array request (e-mail sent on Nov 10th).
		4.2.2.2.3	Corrected prior & post parameters for models 2 & 3 (fields 33-41, 46-57, 90-97 & 102-107) in accordance with SO-TN-ARG-GS-0009_L2OS-IODD_v2.14
		5.4.5.2	Roughness model 3 extended to cubic dependency on incidence angle in accordance with SO-TN-ARG-GS-0009_L2OS-IODD_v2.14.
4/8	26-Mar-2010	1.3 & 1.4	Applicable docs and Reference docs have been updated.
		4.2.1.1.2	"Chi_2_Scale" field has been added in accordance with IODD v2.8 Clarified definition of sea state flags. Clarified definitions of Fg_ctrl_num_meas_min, Fg_ctrl_num_meas_low
		4.2.2.1	Corrected units for Equiv_ftprt_diam (now km, was m) Corrected definition of WS, Sigma_WS, SST & Sigma_SST (now from ECMWF)

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		4.2.2.2	Added Fm_ott & Fm_l1c_rfi. Corrected definition of Fm_resol & Fm_l1c_sun. Clarified definitions of Fm_moon_spec_dir, Fm_gal_noise_error, Fm_high_gal_noise, Fm_gal_noise_pol. Added Fg_oor_OTT_xi & Fg_oor_OTT_eta
		5.2.2.1	Table 5-5: Filename convention of ECMWF raw data has been changed in accordance with ECMWF-DPGS ICD v4.1
		5.3.16.2	"Chi_2_Scale" field has been added in accordance with IODD v2.8
		5.4.2	AUX_BFP___ file specification has been added since it is a needed input in L2OS processing.
		5.4.3	AUX_MISP__ file specification has been added since it is a needed input in L2OS processing.
		5.4.13.5 5.4.13.6	AUX_OTT1D_, AUX_OTT2D_, AUX_OTT3D_, AUX_OTT1F_, AUX_OTT2F_. AUX_OTT3F specification has been added in accordance with L2OS-IODD_v2.16.
		5.4.3.14	“Switch_ott”, “Tg_swell”, “Tg_old_sea”, “Tg_young_sea “ fields have been added in accordance with L2OS-IODD_v2.16
4/9	06-Apr-2010		New version to correct some discrepancies between L2 Specs v4.8 and L2SM IODD v2.8
		4.2.1.1.3	Corrected from #10 to #07 the description of the rules to fill the fields included in table 4-9
		4.2.1.1.3.1	“FL_Chi2_P” description has been updated.
		4.2.1.1.3.4	“FL_Current_Tau_Nadir_LV” and “FL_Current_Tau_Nadir_FO” positions have been exchanged.
		4.2.1.2.2	Clarified that MIR_SMUDP2 and MIR_SMDAP2 have different SPH.
5/0	29-Apr-2010		New version to fix DPGS-PR-1758.
		4.2.2.1.3	SST and Sigma_SST units have been corrected from K to Celsius.
		5.1.2	AUX_OTT* file types corrected (DPGS-PR-1758)
5/1	09-Jul-2010		New version issued to include improvements requested by Array on June 18th and specifed in SO-ID-ARR-GS-4406_IODD_V2.9
		1.3 & 1.4	Reference documents have been updated.
		2.2.3	Ftp addresses where schemas and XML RW API will be found from July 13th have been updated, as it was requested in DPGS CCB 29 The current adresses (ftp://193.146.123.166/smos/schemas/ and ftp://193.146.123.166/smos/software/XML_RW_API/) will be operative until Sept.

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		4.2.1.1.3	The description of the following fields has been updated in accordance with SO-ID-ARR-GS-4406_IODD_V2.9: Mean_Acq_Time, Soil_Moisture, Soil_Moisture_DQX, Optical_Thickness_Nad, Optical_Thickness_Nad_DQX, Surface_Temperature, Surface_Temperature_DQX, TTH, TTH_DQX, RTT, RTT_DQX, Scattering_Albedo_H, Scattering_Albedo_H_DQX, DIFF_Albedos, DIFF_Albedos_DQX, Roughness_Param, Roughness_Param_DQX, Dielect_Const_MD_RE, Dielect_Const_MD_RE_DQX, Dielect_Const_MD_IM, Dielect_Const_MD_IM_DQX, Dielect_Const_Non_MD_RE, Dielect_Const_Non_ MD_RE_DQX, Dielect_Const_Non_MD_IM, Dielect_Const_Non_MD_IM_DQX, TB_ASL_Theta_B_H, TB_ASL_Theta_B_H_DQX, TB_ASL_Theta_B_V, TB_ASL_Theta_B_H_DQX, TB_ASL_Theta_B_V, TB_ASL_Theta_B_V_DQX, TB_TOA_Theta_B_H, TB_TOA_Theta_B_H_DQX, TB_TOA_Theta_B_V, TB_TOA_Theta_B_V_DQX, GQX, Chi_2, Chi_2_P, N_Wild, M_AVA, AFP, N_AF_FOV, N_Sun_Tails, N_Sun_Glint_Area, N_Sun_FOV, N_Sky, S_Tree_1, N_RFI_X, N_RFI_Y
		4.2.1.1.3.1	Comment associated to possible values for fields from #07 to #22 have been updated. Descriptions associated to these Confidence_Flags have been updated: FL_RFI_Prone_H, FL_RFI_Prone_V, FL_NO_PROD, FL_RANGE, FL_DQX
		4.2.1.1.3.2	Descriptions associated to these Science_Flags have been updated: FL_Non_Nom, FL_Scene_T, FL_Barren, FL_Topo_S, FL_Topo_M, FL_OW ,FL_Snow_Mix, FL_Snow_Wet, FL_Snow_Dry, FL_Forest, FL_Nominal, FL_Frost, FL_Ice, FL_Wetlands, FL_Flood_Prob, FL_Urban_Low, FL_Urban_High, FL_Sand, FL_Sea_Ice, FL_Coast, FL_Occur_T, FL_Litter, FL_PR, FL_Intercep, FL_External,FL_Rain, FL_TEC, FL_TAU_FO
5/2	30-Aug-2010	1.4	Reference documents have bee updated.

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		4.2.1.1.2	The descriptions of the following fields have been updated in accordance with SO-ID-ARR-GS-4406_IODD_V2.10_100716: Soil Moisture, Optical_Thickness_Nad, Surface_Temperature, TTH, RTT, Scattering_Albedo_H, DIFF_Albedos, Roughness_Param, TB_ASL_Theta_B_H, TB_ASL_Theta_B_V, TB_TOA_Theta_B_H, TB_TOA_Theta_B_V. Comment included after table 4-9 and referred to fields from #07 to #22 has been updated in accordance with SO-ID-ARR-GS-4406_IODD_V2.10_100716.
5/3	23-Dec-2010	 1.3 & 1.4 5.2.3 5.5.3 6	New version of the document issued to collect all the updates included in IODDs (SO-ID-ARR-GS-4406 v2.11 and SO-TN-ARG-GS-0009 v2.18) Applicable and Reference documents have been updated. AUX_BULL_B format specification has been added to the document. AUX_ECMCDF format specification has been added to the document. Products sizes have been updated.
6/0	18-May-2011	 1.3 & 1.4 4.2.1.1.3 2.2.2 4.2.2.1.2 4.2.2.1.3 4.2.2.1.3.1 4.2.2.2.3.2 5.3.6.2	New version of the document to reflect updates in L2OS and L2SM IODD associated to v500 of the processors. Applicable and Reference documents have been updated "RFI_Prob" field has been added to MIR_SMUDP2 Data Block Numbering of Table 4-11, Table 4-12 and Table 4-13 has been corrected Sentence "from the last retrieval" has been removed from the Comment Column in fields "N_AF_FOV", "N_Sun_Tails", "N_Sun_Glint_Area", "N_Sun_FOV", "N_RFI_Mitigations", "N_Strong_RFI", "N_Point_Source_RFI" and "N_Tails_Point_Source_RFI" s : is the site instance ID, where… Sentence "Total Grid Points L1c" replaced by "Total_Selected_L1c_Grid_Points" "Dg_eaf_fov" field has been removed "Dg_RFI_L2" field has been added "Fg_ctrl_suspect_rfi" flag has been added "Fm_l2_rfi" flag has been added "fm_xi_eta", "fm_keepXpol", "fm_keepYpol" and "fm_keepST34" have been renamed as "Fm_xi_eta", "Fm_keepXpol", "Fm_keepYpol" and "Fm_keepST34" "Date_Stamp_LV" field description has been updated according to L2SM IODD v3.0

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		5.3.7.2	"Date_Stamp_FO" field description has been updated according to L2SM IODD v3.0
		5.3.8.2	"Date_Stamp_HR" field description has been updated according to L2SM IODD v3.0
		5.5.3.2	Clarification requested by ESA (R. Crapolicchio) on March 7th related with AUX_ECMCDF description has been added.
		6	Products sizes have been updated
6/1	09-Feb-2012		New version of the document to include changes comprised in L2OS IODD v2.20 (associated to L2OS v550 SW) and L2SM IODD v3.1 (associated to L2SM v550 SW)
		2.1 & 2.2	Applicable documents and reference documents have been updated
		4.2.1.1.3	MIR_SMUDP2 Datablock has been updated accoding to L2SM v3.1 IODD (no field has been added, only changes in "Description" column)
		4.2.2.1.3.2	Definitions of Fg_sc_sea_state_5 and Fg_sc_sea_state_6 have been corrected (was > Tg_old_sea, should be > Tg_young_sea)
		5.3.16.2	AUX_CNFSMD/F Datablock has been updated according to L2SM v3.1 (new fields have been added)
		5.4.13.5	AUX_OTT1D_, AUX_OTT2D_, AUX_OTT3D_ have been updated according to L2OS v2.20 IODD (new fields have been added)
		5.4.13.6	AUX_OTT1F_, AUX_OTT2F_, AUX_OTT3F_ have been updated according to L2OS v2.20 IODD(new fields have been added)
		6	Product sizes have been updated
7/0	14-Dec-2012		New version of the document issued to include the changes comprised in L2OS-IODD v2.21 and L2SM-IODD v4.0
		1.3 & 1.4	Applicable and Reference documents have been updated
		4.2.1.1.3	X_Swath field is added to MIR_OSUDP2 product
		4.2.2.1.3	"Science descriptors" structure is removed "Geophysical_Parameters_Data" description is added "Sigma_WS" field is removed "Sigma_SST" is removed "Dg_RFI_L2" field is removed "Dg_Galactic_Noise_Pol" is removed "Dg_sky" field is added "Dg_RFI_L1" is added "Dg_RFI_X" is added "Dg_RFI_Y" is added "Dg_RFI_probability" is added "X_swath" is added "Control_Flags" are modified at bit level

Iss./Rev.	Date	Section / Page	Change Description
		4.2.2.2.3	Changes in MIR_OSDAP2: "Grid_Point_Descriptors" comment is modified Sigma_SST field is added Sigma_WS field is added X_swath field is removed Dg_RFI_L1 is removed Dg_user is added Removed 2 pairs of prior & post values and sigmas for roughness models 2 & 3 (omega & phi_wsn for model 2, phi_wsn & HS for model 3). "Measurement_Flags" are modified at bit level: Removed Fm_gal_noise_pol; added Fm_l2_rfi_outlier, Fm_l2_rfi_snapshot_out_of_range, Fm_l2_rfi_high_snapshot_std, Fm_l2_rfi_high_snapshot_stokes3, Fm_l2_rfi_high_snapshot_stokes4
		5.2.5	AUX_DGGRFI specification is moved to section 5.2 because it is used both in L2OS and L2SM processing tasks. The content of AUX_DGGRFI is modified to differenciate fields between ascending and descending orbits.
		5.3.3.1	"Digits_To_Shift" Comment and Origin contents are modified in AUX_DFFLAI data
		5.3.4.1	"Digits_To_Shift" Comment is modified in AUX_DFFLMX data
		5.3.6.2	The content of AUX_DGGTLV is modified to differenciate fields between ascending and descending orbits.
		5.3.7.2	The content of AUX_DGGTFO is modified to differenciate fields between ascending and descending orbits.
		5.3.8.2	The content of AUX_DGGROU is modified to differenciate fields between ascending and descending orbits.
		5.3.9.2	The content of AUX_DGGFLO is modified to differenciate fields between ascending and descending orbits.
		5.3.12	AUX_SOIL_P product replaced by AUX_DFFSOI product.
		5.3.13	New product AUX_DFFSNO is added
		5.3.16.2	Indicated that "TH_RFI_ST4" is no longer used by the processor. Added a clarification in "E0PU" comment "Standard_User_Mode" description is modified "Use_AUX_DFFSNO" field is added "TH_ Snow" is added "TH_Theta_B" is added
		5.4.9.2	AUX_GAL2OS is modified to differenciate between fields in ascending and descending orbits
		5.4.13.4.2	Added Switch_OTT_AscDes in AUX_CNFOSX

Iss./Rev.	Date	Section / Page	Change Description
		6	Product Sizes section has been updated
		All	Tables that specify the Reference and Measurement data set names are modified to be consistent with the updates introduced in the current version of the document
7/1	20-May-2013		New version of the document issued to include an IDEAS request agreed on IPF-CCB #057 09.05.2013.
		5.4.13.4.2	Tg_num_meas_outliers_min, Tg_num_meas_RFI_outliers_min and Tg_num_RFI_outlier_max fields have been added.
8/0	13-Nov-2013		New version issued for L2 v6xx baseline
		1.3 & 1.4	Applicable documents and reference documents have been updated
		3.1.1	AUX_DTBXY_ and AUX_DTBCUR have been incorporated to Table 3-2
		4.1.2	AUX_DTBXY__SPH added to the Level 2 SPH accepted names table
		4.2.1.1.3	Added "/" in the description of field X_Swath "Maximum swath extent is 525km" removed from X_Swath description
		4.2.1.2.3	"Maximum swath extent is 525km" removed from X_Swath description
		4.2.1.1.3.1	"UPF" replaced by "AUX_CNFSMX"
		4.2.1.1.3.2	"FL_Non_Nom" Type description is corrected. Bits 60.x instead of 56.x are referenced
		4.2.2.2.3	Restructured DAP by moving measurements structure to after grid points structure: fields 128 onwards modified; new fields Snapshot_ID, xi, eta added; field Diff_TB_1 renamed Diff_TB and clarified description.
		4.2.2.2.3.2	Replaced "Fm_xi_eta" by "Fm_LO_calibration"
		5.1.2	AUX_DTBXY__SPH and AUX_DTBCUR_SPH added to the L2 ADP SPH accepted names table
		5.3.15.2	AUX_DGGRFI_Window_Size parameter is added
		5.4.13.4.2	min, max limits associated to counters of List_of_L1c_measurement_flags, List_of_L2OS_science_flags, List_of_L2OS_out_of_range_flags and List_of_tests have been removed OTTPP and A3TEC structures have been added Switch_iterative_scheme parameter has been added under Threshold structure Replaced "computation" by "global quality index"
		5.4.13.7	AUX_DTBXY_ specification has been included
		5.4.13.8	AUX_DTBCUR specification has been included
		6	Section updated to take into account AUX_DTBXY_ and AUX_DTBCUR products

Iss./Rev.	Date	Section / Page	Change Description
8/1	10-Sep-2014		New version issued for L2 v620 baseline
		1.3 & 1.4	Applicable and reference documents have been updated
		4.2.1.2.3.1	The following DAP flags have been renamed: “FL_R4_RSTD” renamed as “FL_R4_DQX” “FL_R3_RSTD” renamed as “FL_R3_DQX” “FL_R2_RSTD” renamed as “FL_R2_DQX” FL_MDA_RSTD renamed as “FL_MDA_DQX”
		4.2.21.3.1	“Fg_ctrl_ignore” flag added at the beginning of the table
		5.3.6.2	“Chi_2_LV_Asc” and “Chi_2_LV_Desc” fields have been added
		5.3.7.2	“Chi_2_FO_Asc” and “Chi_2_FO_Desc” fields have been added
		5.3.8.2	“Chi_2_HR_Asc” and “Chi_2_HR_Desc” fields have been added
		5.3.16.2	“TH_MVAL0_UC” field has been added
		5.413.7.2	“Count“ field has been added for List_of_Regions structure “sanps_count” has been added for the List_of_Snapshots structure “Snap_OBET_secs” field has been added “Flags” field has renamed as “Snap_Flags” “List_of_FOV_stats”, “List_of_pol_types” and “List_of_models” containing “modelTB”, “ottTB”, “deltaTB” and “meas_count” field have been added “A3TEC_stats” structure, containing “fovLatitude”, “fovLongitude”, “geoLatitude”, “geoLongitude”, “latTEC”, “I1cTEC”, “tecres” and “signpost” fields, has been added
		5.4.13.7.2.2	“Snap_Flags” content has been specified in table 5-66
		5.4.13.8.2	“Count” field is adde for the List_of_Orbits
		6	Products Sizes have been updated
8/2	01-Apr-2016		New version issued for L2 v660 baseline
		1.4	Reference documents have been updated
		3.1.1	AUX_MSOTT_ and AUX_SUN_BT Files description added to table 3-2
		4.1.2.2	SUN_BT_FILE and MSOTT_FILE Reference data set names added to table 4-5
		4.2.2.1.2	SUN_BT_FILE and MSOTT_FILE added to the L2OS Data Set Reference List
		4.2.2.1.3	SSS1 renamed as SSS_corr, SSS2 renamed as SSS_uncorr, SSS3 renamed as SSS_anom (fields #07,08,09,10,11,12, 37, 38, 39) Renamed Control_Flags_1-3, Dg_chi2_1-3, Dg_chi2_P_1-3, Dg_num_iter_1-4, Dg_quality_1-3, Science_Flags_1-3 and updated descriptions.

Iss./Rev.	Date	Section / Page	Change Description
		4.2.2.1.3.1	Fg_ctrl_mixed_scene added to Control_Flags structure
		4.2.2.1.3.2	Fg_sc_ecmwf_land flag added to Science_Flags structure
		4.2.2.2.3	Replaced Sigma_SST (field #09) by X_swath; Replaced Sigma_WS (field #10) by Dg_af_fov. Modified field names & descriptions for fields #17-128 Modified field types for fields #28-29, 43-44, 57-58, 71-72, 83-86, 97-100, 111-115, 125-128
		4.2.2.2.3.1	Removed Fg_oor_LUTAGDPT_lat/lon/month/param & Fg_oor_OTT_xi/eta
		4.2.2.2.3.2	Fm_mixed_scene added to the Measurement Flags structure Removed Fm_l1c_error (merged with Fm_l1c_software_error) from Measurement Flags Fm_scene_contamination added to Measurement Flags structure
		5.1.2	AUX_SUN_BT_SPH and AUX_MSOTT_ added to the list of L2 SPH auxiliary accepted names
		5.4.11.2	New AUX_SGLINT_ format for sun glint correction
		5.4.12	Added new section for Sun brightness (AUX_SUN_BT) specification
		5.4.14.2	New definition of AUX_SSS___ climatology schema
		5.4.14.4.2	List_of_Iterconf count updated from 4 to 1-8 UDP_slot ,DAP_slot, Switch_ms, Switch_sunglint , Switch_A3msOTT, Switch_A3ms, Ts_scene_std1_XX, Ts_scene_std1_YY, Ts_scene_std1_eaf_XX, Ts_scene_std1_eaf_YY, Ts_scene_std3_XX, Ts_scene_std3_YY, Ts_scene_std3_eaf_XX, Ts_scene_std3_eaf_YY, Ts_scene_high_TB, TB_sun, Tg_coast, Tg_near_land, Anomaly_SSS, Anomaly_Ref and SSS_Climatology new fields have been added
		5.4.14.7	New section added to include the Mixed scene (land-sea) correction specification (AUX_MSOTT_)
		5.4.15.1	Corrected definition of Ocean, Ice, Rain, Low_Wind_Speed, High_Wind_Speed fields Updated description of RFI_L1 to match v62x L1c
		5.4.15.2	Corrected definition of std_deltaTB field
		5.4.16.2	Corrected definition of std and std_deltaTB fields
		6	Products sizes updated
8/3	13-May-2016		New version updated according to SO-TN-ARG-GS-0009_L2OS-IODD_v2.30
		1.4	Reference documents have been updated
		4.2.2.1.3	Sigma_SSS_anom, Dg_quality_SSS_anom, Science_Flags_anom and Control_Flags_anom descriptions updated according to SO-TN-ARG-GS-0009_L2OS-IODD_v2.30

Iss./Rev.	Date	Section / Page	Change Description
		4.2.2.1.3.1	Typo fixed: Fg_ctrl_mixed_scene flag moved from position 6 to position 10. Fg_ctrl_range_Acard and Fg_ctrl_sigma_Acard descriptions updated according to SO-TN-ARG-GS-0009_L2OS-IODD_v2.30 Fg_ctrl_quality_Acard removed according to SO-TN-ARG-GS-0009_L2OS-IODD_v2.30
		5.4.14.4.2	SC57 unit and description updated according to SO-TN-ARG-GS-0009_L2OS-IODD_v2.30
8/4	30-Aug-2016		New version of the document aligned to SO-TN-ARG-GS-0009_L2OS-IODD_v2.32_160708 (delivered by R. Crapolicchio on 04/07/2016)
		1.4	Reference documents have been updated
		4.2.2.1.3	SSS_anom description has been updated in accordance with SO-TN-ARG-GS-0009_L2OS-IODD_v2.32_160708
		4.2.2.1.3.2	Fg_sc_ice_Acard and Fg_sc_ecmwf_land descriptions have been corrected according to SO-TN-ARG-GS-0009_L2OS-IODD_v2.32_160708 Descriptions of fields from 63.24 to 63.32 have been corrected, according to SO-TN-ARG-GS-0009_L2OS-IODD_v2.32_160708
		4.2.2.2.3.2	Table 4.24: fixed spelling mistake in table caption Fm_l2_rfi_outlier, Fm_l2_rfi_snapshot_out_of_range, Fm_l2_rfi_high_snapshot_std, Fm_l2_rfi_high_snapshot_std_stokes3 and Fm_l2_rfi_high_snapshot_std_stokes4 have been added, according to SO-TN-ARG-GS-0009_L2OS-IODD_v2.32_160708
		5.4.11.2	Max_Valid and Min_Valid descriptions (LUT params order) have been corrected according to SO-TN-ARG-GS-0009_L2OS-IODD_v2.32_160708 Sigma_HH, Sigma_HV, Sigma_VH and Sigma_VV types have been corrected from 5 dimensional to 4 dimensional in accordance with SO-TN-ARG-GS-0009_L2OS-IODD_v2.32_160708
		5.4.14.2.2	Description SSSa, SSb from Climatology_A and Climatology_D data sets have been updated in accordance with SO-TN-ARG-GS-0009_L2OS-IODD_v2.32_160708 MaxValid variable format has been corrected from 2 elements to 4 elements in accordance with SO-TN-ARG-GS-0009_L2OS-IODD_v2.32_160708
		5.4.14.7.2	Size type has been corrected from real array to int array in accordance with SO-TN-ARG-GS-0009_L2OS-IODD_v2.32_160708 Bias_Index Type has been corrected from real value to integer value in accordance with SO-TN-ARG-GS-0009_L2OS-IODD_v2.32_160708
		5.4.16	Table 5-70: fs_scene_contamination, fs_eaf_scene_contamination and fs_max_scene_contamination fields have been added in accordance with SO-TN-ARG-GS-0009_L2OS-IODD_v2.32_160708

Iss./Rev.	Date	Section / Page	Change Description
8/5	03-Feb-2017		New version of the document aligned to SO-ID-ARR-GS-4406_IODD_v4.3_161207 (delivered by R. Crapolicchio on 20/12/2016)
		1.4	Reference documents have been updated
		5.3.6.2	Tau_Nad_LV_Asc and Tau_Nad_LV _DQX_Asc Comments are updated in accordance with SO-ID-ARR-GS-4406_IODD_v4.3_161207
		5.3.7.2	Tau_Nad_FO_Asc and Tau_Nad_FO _DQX_Asc Comments are updated in accordance with SO-ID-ARR-GS-4406_IODD_v4.3_161207
		5.3.8.2	HR_Asc and HR _DQX_Asc Comments are updated in accordance with SO-ID-ARR-GS-4406_IODD_v4.3_161207
		5.3.15.2	New parameters Chi_2_Rescale_factor and Chi_2_Rescale_offset are added inside the existing tag General_Data, in accordance with SO-ID-ARR-GS-4406_IODD_v4.3_161207 TH_FLOOD units updated to m3/m3 in accordance with SO-ID-ARR-GS-4406_IODD_v4.3_161207 New parameters TH_Curr_Min_DQXTLV, TH_Curr_Min_DQXTFO and TH_Curr_MinDQXROU are added inside DGG_Current_Controls_Data, in accordance with SO-ID-ARR-GS-4406_IODD_v4.3_161207 New parameters Fixed_Tau_Nad_ASTD, Fixed_T_Surf_ASTD, Fixed_TT_H_ASTD, Fixed_RTT_ASTD, Fixed_OM_H_ASTD, Fixed_Diff_Omega_ASTD and Fixed_HR_ASTD are added inside the new tag Fixed_Parameter_ASTDs, in accordance with SO-ID-ARR-GS-4406_IODD_v4.3_161207

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1. INTRODUCTION

1.1 OBJECTIVE

The purpose of this document is to present the structure, syntax, file naming and use of the different L2 SMOS operational Products and the related Auxiliary Data Products.

1.2 SCOPE

The scope of this document is the DPGS Phase C/D/E1 project, affecting to all the DPGS subsystems that produce, archive, analyse or disseminate L2 products and related auxiliary data products.

1.3 APPLICABLE DOCUMENTS

The applicable documents are approved by ESA and represent the current project baseline in terms of requirements and/or technical/administrative specifications and mandatory practices. The specifications contained in the applicable documents have to be considered as mandatory; in the case that these specifications can not be met or a discrepancy is found, a report shall be prepared and sent to ESA.

Ref.	Title	Code	Ver.	Date
[AD.1]	SMOS System Requirements Document	SO-RS-ESA-SYS-0555	4.1	28-Sep-04
[AD.2]	Earth Explorer CFI Software Mission Conventions Document	CS-MA-DMS-GS-0001	1.3	15-Jul-03
[AD.3]	Earth Explorer Ground Segment File Format Standard	PE-TN-ESA-GS-0001	1.4	13-Jun-03
[AD.4]	SMOS Tailoring of the Earth Explorer File Format Standard for the SMOS Ground Segment	XSMS-GSEG-EOPG-TN-05-0006	1.0	30-Jun-05
[AD.5]	SMOS Level 1 and Auxiliary Data Products Specifications	SO-TN-IDR-GS-0005	5.31	29-Aug-14
[AD.6]	Earth Explorer Mission CFI Software EXPLORER_DATA_HANDLING SOFTWARE USER MANUAL	EE-MA-DMS-GS-0007	3.7	13-Jul-07

Table 1-1 Applicable documents

1.4 REFERENCE DOCUMENTS

The reference documents contain useful information related to the subject of the project. The reference documents complement the applicable documents. The list of reference documents is included in the following table.

Ref.	Title	Code	Version	Date
[RD.1]	EE XML and Binary Schema Standard	PE-TN-ESA-GS-121	1.0	01-Jul-05
[RD.2]	EE XML/Binary File Handling Library User Manual	SO-UM-DME-L1PP-0005	1.5	02-May-05
[RD.3]	XML Schema Guidelines	SO-MA-IDR-GS-0004	2.1	09-Jul-10
[RD.4]	SMOS DPGS Acronyms	SO-TN-IDR-GS-0010	1.11	13-Jun-08
[RD.5]	SMOS XML Read-Write API Software User Manual	SO-ID-IDR-GS-0009	2.2	09-Jul-10
[RD.6]	Input/Output Data Definition Document for the SMOS Level 2 Soil Moisture Prototype Processor Development	SO-ID-ARR-GS-4406	4.3	07-Dec-16
[RD.7]	Table Generation Requirement Document for the SMOS Level 2 Soil Moisture Prototype Processor Development	SO-TN-ARR-GS-4405	6.20	31-Jul-14
[RD.8]	SMPPD Algorithm Theoretical Baseline Document	SO-TN-ARR-L2PP-0037	3.7	01-Mar-13
[RD.9]	SMOS L2 SSS Processor Input /Output Data Definition	SO-TN-ARG-GS-0009	2.32	08-Jul-16
[RD.10]	SMOS SSS L2 Table Generation Requirements Document	SO-TN-ARG-GS-0014	3.10	13-Sep-13
[RD.11]	SMOS SSS L2 Architecture Design Document	SO-DD-ARG-GS-0017	3.2	10-Nov-08
[RD.12]	SMOS SSS L2 Algorithm Theoretical Baseline Document	SO-TN-ARG-GS-0007	3.10	31-Jul-13
[RD.13]	Galaxy Maps Usage for SMOS-DPGS	XSMS-GSEG-EOPG-TN-06-0023	1.1	08-Nov-06
[RD.14]	Removed			
[RD.15]	SMOS L2 MODIS-LAI Auxiliary Data Format Specification	XSMS-GSEG-EOPG-TN-06-0010	Removed	Removed
[RD.16]	DPGS Master Interface Control Document	SO-ID-IDR-GS-0016	3.9	31-Jan-14
[RD.17]	Level 2 Processor ICD and Operational Constraints	SO-ID-IDR-GS-0003	6.0	05-Jul-13
[RD.18]	SMOS ECMWF Pre-processing	SO-TN-GMV-GS-4405	1.7	13-Apr-09
[RD.19]	SMOS LAI Pre-processing	SO-TN-GMV-GS-4406	1.2	31-Oct-08
[RD.20]	SMOS ECOCLIMAP Pre-processing	SO-TN-GMV-GS-4407	1.1	31-Oct-08
[RD.21]	ALGORITHM THEORETICAL BASELINE DOCUMENT FOR ECMWF SWVL1 RESCALING	SO-TN-CBSA-GS-0027	0.d	07-Dec-10

Table 1-2 Reference documents

1.5 ACRONYMS AND TERMS

The acronyms used in this document are compiled in the following document: DPGS Acronyms [RD.4].

1.6 DOCUMENT STRUCTURE

The SMOS Level 2 and Auxiliary Data Products Specification Document is structured as follows:

→ Chapter 1 is the introduction you are currently reading.

→ Chapter 2 introduces the conventions of this document and specifies the work done to adapt L2SMPP and L2OSPP products formats to the operational environment. It also details the products files structures, names and references the document stated in the XML schema guidelines

→ Chapter 3 describes the generic structure of the L2 Products headers, specifying the common features to all products

→ Chapter 4 provides a formal Specification for all types of Level 2 Products derived from instrument in-orbit measurements, including the particularities for each product's specific product header

→ Chapter 5 provides a formal Specification for all the Auxiliary Data Products types needed to perform the processing of L2 Products, including the particularities for each product's specific product header

→ Chapter 6 provides estimations of the sizes of each Level 2 and Auxiliary Data Products, based on a typical number of dataset records assumed for each product

2. SMOS L2 PRODUCTS

2.1 GENERAL CONSIDERATIONS ON THIS DOCUMENT

This document is based mainly in the Level 2 Soil Moisture Processor Prototype's and Level 2 Sea Surface Salinity Processor Prototype's Input/Output Data Definition Documents (see [RD.6] and [RD.9]). Most of the specifications and scientific explanations included here are based on what is contained in those documents, but has been kept instead of referencing it in order to have a stand-alone reference for L2 operational products formats. Where it is considered necessary, further scientific details extracted from the ATBD and the TGRD have been added in order to clarify the scope and usage of each type of product.

Work has been done in order to fit the L2 specifications in the operational environment and the requirements put to the DPGS and more specifically to Level 2 Operational Processor. The main difference between L2PPs and L2OP is that the L2PPs are stand-alone SW packages that are fed with inputs provided interactively by the user, while the L2OP is integrated in a very much automated system, interfacing the DPGS PDPC-Core that delivers inputs and receives ouputs to/from L2OP. This means that work needs to be done to make the products contain the information necessary to be handled automatedly in a proper way.

The work done for this document release includes:

- Checking fulfilment of ESA requirements (mainly asking to follow the Earth Explorer Ground Segment File Format Standard –see [AD.3]- and its ESA's adaptation to the SMOS Mission needs –see [AD.4]-) on DPGS Products, as their specifications are inherited from L2PP Prototype's, which are not necessarily fulfilling the standard.
- Adding a column with Source or Origin of data to be printed in each field (e.g. specific L2OP module internal processing, specific L1 product's header or datablock, specific auxiliary data product, etc.)
- Adaptation of tables to XML standards for clarification purposes. That is, tables follow the hierarchical tagging based in the format of an XML file.
- Define a convention on the C format and precision used to print the fields, and apply it to each of the fields in the L2OP Specifications, based on what has been defined in L2PP documents. Whenever there is a doubt, the policy followed has been being conservative and forcing more precision than the one specified in the L1PP Specifications.
- Give a C format specification to the fields in the L2OSP XML ASCII products' datablocks, as the one given in the L2OSPP's IODD is specified as if they were binary datablocks. By default, all float fields have been given a C format %+012.6f and the integer fields have been given a C format %05d. They will be changed when a finer specification is given by the L2OSPP team.
- Adaptation of products with lists of multidimensional variables –particularly look-up tables (LUTs)- to multidimensional nested arrays. Some considerations follow on this approach:

- The change has been made because the DPGS Prime's XML R/W API package allows implementing this philosophy, eliminating the limitations experienced by the Prototypes' developers when using existing libraries.
- The effort in finding a certain set of elements in these arrays is now on XML R/W API side. In the original Prototype's approach, reading the variables is faster, but a search algorithm needs to be applied to get the position of the particular element in the multidimensional variable.
- Both approaches have been assumed to provide the same total performance, but in this new approach the limiting factor of the performance is the XML R/W API as it assumes more responsibility in finding the elements. In case this slowdown of performance in the API is considered not acceptable by ESA, the implementation of the original approach should be reconsidered.
- In case that the application of the new approach proves to noticeably slow down the total performance of the navigation through the multidimensional arrays, the original approach should be reconsidered.

- Refinement and proposal of several new fields in Products' headers regarding what is needed to fit the Products in an automated operational environment that shall be using the header information as metadata to be stored in databases for consultancy.
- Calculation of data set record sizes and estimation of operational Products sizes, based on assumptions on the number of data set records in each of the datasets of Products.
- Renaming many of the products from the convention proposed in the Prototype's IODD documents. The purpose of this renaming is:
  - aligning Field Descriptor shapes of the L2 Processors main output products to the operational L1 Specifications convention (first letters describing the OS or SM type, then if it is a product oriented to the end-user or to DPGS analysis team, finally the level of processing –always 2-).
  - In Level 2 Ocean Salinity, the analysis data products Cathegory has been changed from AUX_ to MIR_ as they are output products derived by main process from MIRAS measurements.
  - In Level 2 Ocean Salinity, the auxiliary products Field Descriptor has been changed to more descriptive strings not strictly related to the modules they are integrated in (allowing thus more flexibility to move the usage of these products to other modules in case of potential algorithm changes).

2.1.1 Conventions

This section contains lists of conventions used in these specifications:

- The tables for headers start and end with a ***Fixed_Header***, ***Main_Product_Header*** and ***Specific_Product_Header*** tags to make clear which are the fields enclosed within. The same applies for datablocks, which are enclosed within ***Data_Block*** tags.

- Binary data blocks are specified following the XML syntax, although obviously they are not in XML format. The Field#, Type, Unit, Precision, C format and Origin columns for the pseudo-XML tags are in gray colour, so as to make clear that they are not fields contained in the product. A note has been added in any case in the Comments column highlighting this issue.
- A wider line specifies which is the beginning and the end of a dataset. Adjacent datasets are then separated by this wider line, but this also applies to DataBlock tags that are separated from datasets.

The tables have the following columns:

- Field #: numbering applied to each field appearing in the table.
- Field Name: tag used in the schemas to identify the field
- Type: variable type, this is the concept of the variable instead of its actual implementation in the product. It can be either Tag (enclosing XML structures), string, integer, identifier, real value, matrix of complex values, etc.
- Unit: specification of the unit type according to EEF convention. N/A is applied to unitless fields.
- The following column is different for binary and ASCII XML structures. In ASCII XML the columns are:
    - Element Precision: this column specifies the implementation of an element of the field, in C-like specification (float, unsigned integer, etc), specifying also the element's size in bytes.
    - String Length (ASCII XML): number of bytes in which the field value is written.
- The following column is different for binary and ASCII XML structures. In binary data blocks the columns are:
    - C Format (ASCII XML): specifies in C language fwrite function the format in which field is written to a file. Note that %+08.3f means that the number has always 8 digits, one of which is the sign, another is the dot and 3 of them are decimals, being the remaining digits at the left of the dot.
    - Variable Format (Binary): specifies the format of the variable from the elements defined in the previous column (number of elements, sorting, etc)
- Comments: clarifications on the meaning of the product's field.
- Origin: this column specifies which is the origin of the information filling the product field
    - [ICNF]: Internal configuration file (for both processors, pre-processors and post-processors)
    - [INT]: Internal processing.
    - [AUX_XXXXXX]: data coming from auxiliary data files
    - [MIR]: data coming from a L1C input product

2.2 L2 FILE STRUCTURE

2.2.1 Logical File vs Physical File

A SMOS Level 2 Product Logical File is compliant with [AD.3] and [AD.4]; its structure, shown in Figure 2-1, comprises

→ An ASCII XML Fixed Header, whose structure is identical for all file types,

→ An ASCII XML Variable Header, which allows to define and structure different information for each file type, and is split into:

- a Main Product Header (MPH)
- a Specific Product Header (SPH)

It must be noticed that SMOS measurements products' headers (i.e. those Specified in Chapter 4 of this document) follow the structure described above, while the auxiliary data products (specified in Chapter 5) do not have MPH, as most of that information does not make sense in these products. Whenever a field is still needed, it has been moved to the SPH.

→ A Data Block, containing one or more Data Sets. Each Data Set contains a number of identical Data Set Records.

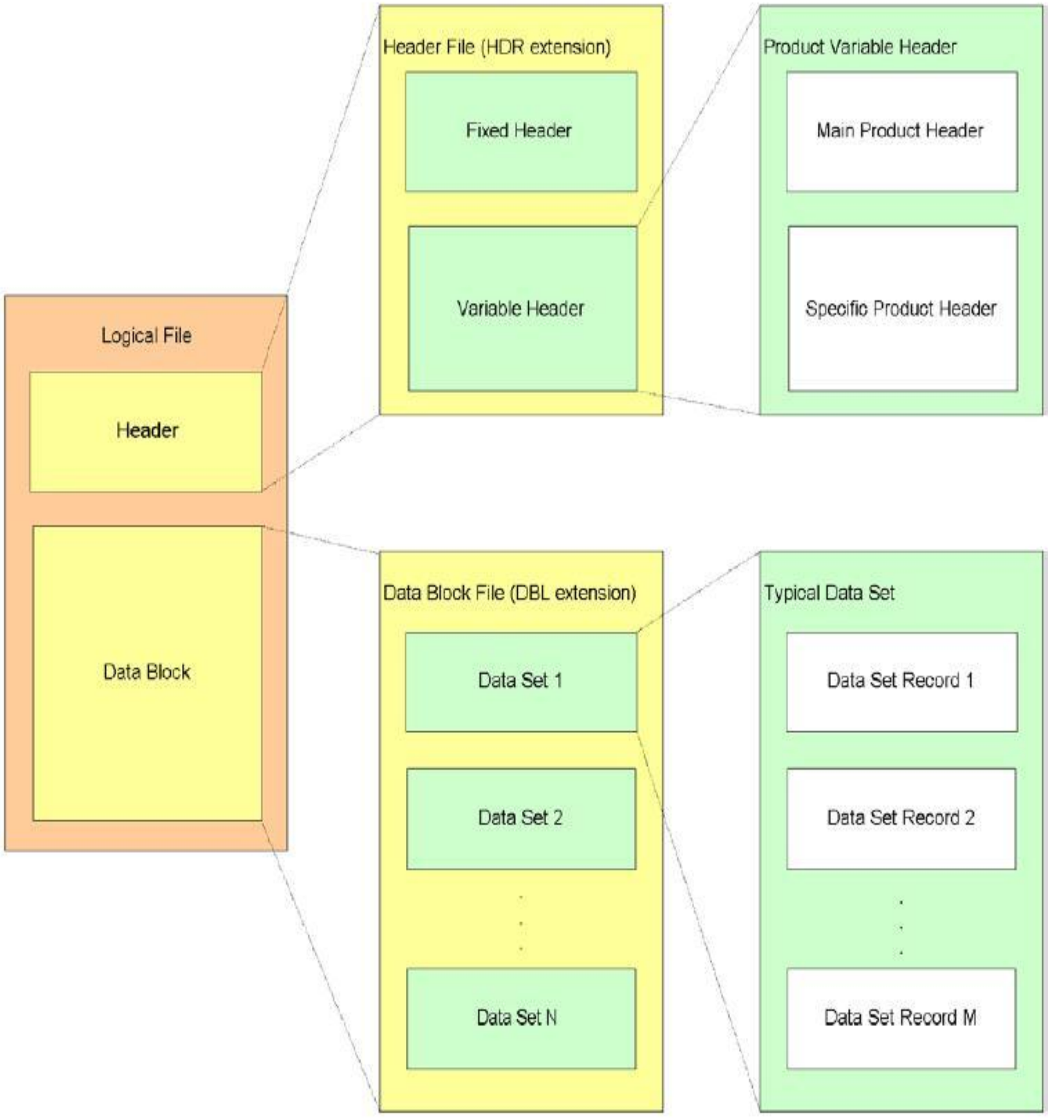

Figure 2-1 Level 2 Product Structure (taken from Deimos Eng. for L1PP Product format)

In terms of computer "Physical Files", the L2 Logical File is structured as two separate Physical Files:

→ a Header file

→ a Data Block file

The L2 Physical files related to the same Logical File shall share the file name, only differentiating each Physical File using a different extension:

- .HDR for the Header file.
- .DBL for the Data Block file.
- when Data Block is XML, it is structured as one unique Physical File, all in XML ASCII format following EEF convention, with .EEF extension.

The L2 Physical files related to the same Logical File shall share the file name, only differentiating each Physical File using a different extension, as specified above.

The high level file syntax for these files is as defined in [AD.3], i.e.

```
Header File (file_name.HDR):
<?xml version="1.0" ?>
<Earth_Explorer_Header Validation-Schema-Reference>
     <Fixed_Header>
        Fixed Header contents
     </Fixed_Header>
     <Variable_Header>
        <Main_Product_Header>
             Main Product Header contents
        </Main_Product_Header>
        <Specific_Product_Header>
             Specific Product Header contents
        </Specific_Product_Header>
     </Variable_Header>
</Earth_Explorer_Header >

Data Block File (file_name.DBL): ad-hoc ASCII syntax
```

Table 2-1 Non-XML ASCII File Syntax

The packaging mechanism for users external to the DPGS is the .ZIP one, as described in [RD.3]. For internal users, it is as described in [RD.16].

The "Validation-Schema-Reference field is to be filled as specified in [RD.3] section 3.2.1. In the operational processor, this field is filled by the XML R/W library.

2.2.2 L2 File Names

The Logical File Name of the SMOS L2 Product consists of 60 characters, with the following layout:

MM_CCCC_TTTTTTTTTT_<instance_ID>

Where each field of the filename is as follows:

→ ***MM***: is the Mission identifier, for the SMOS case it shall be always **SM**

→ ***CCCC***: is the File Class, which has three alternatives:

- **TEST:** for internal testing purposes only (e.g. products generated as input to or output from acceptance testing, GSOV, etc.)
- **OPER** : for all files generated in automated processing during mission operation phases
- **REPR**: for all the reprocessed files.

→ ***TTTTTTTTTT***: is the File Type, consisting of two sub-fields:

TTTTTTTTTT=FFFFDDDDDD

Where:

- ***FFFF*** : is the File Category.
  - For all product obtained from MIRAS measurements, this shall be always **MIR_**.
  - For auxiliary data products, this shall be always **AUX_**.
- ***DDDDDD***: is the Semantic Descriptor, described in Table 4-5 for L2 measurements products and auxiliary data products.

→ ***<instance_ID>***: the instance ID for the L2 product matches Shape 1 defined in [AD.4]:

<instance_ID>= yyyymmddThhmmss_YYYYMMDDTHHMMSS_vvv_ccc_s

- ***yyyymmddThhmmss*** : is the SMOS sensing start time of the data contained in the product, in CCSDS compact format. As SMOS sensing time values will typically have greater precision than a second, the sensing start time shall be rounded up (this way the period specified in the filename is completely covered by the time period of the data actually contained in it). The origin for this time is the Precise_Validity_Start_time specified in the Specific Product Header.
- . in case of auxiliary data products it is the start time of the period in which the product is valid –i.e. it can be used as supporting product in the processing of a SMOS measurement product to an upper level-. As possibly the values will typically have greater precision than a second, the start time shall be rounded up (this way the period specified in the filename is completely covered by the time period of the data actually contained in it)
- ***YYYYMMDDTHHMMSS*** : is the SMOS sensing stop time of the data contained in the product, in CCSDS compact format. As SMOS sensing time values will typically have greater precision than a second, the sensing stop time shall be rounded down (this way the period specified in the filename is completely covered by the time period of the data actually contained in it). The origin for this time is the Precise_Validity_Stop_time specified in the Specific Product Header.
- in case of auxiliary data products it is the stop time of the period in which the product is valid –i.e. it can be used as supporting product in the processing of a SMOS measurement product to an upper level-. As possibly the values will typically have greater precision han a second, the stop time shall be rounded down (this way the period specified in the filename is completely covered by the time period of the data actually contained in it).

- ***vvv*** : is the version number of the processor generating the product.

- ***ccc*** : is the file counter (used to make distinction among products having all other filename identifiers identical). The counter shall start at `001` and not `000`.
- ***s*** : is the site instance ID, where
  - **0**: Test data generated outside SMOS GS
  - **1**: SMOS DPGS Fast Processing / Fast Reprocessing Centre @ ESAC
  - **2**: SMOS DPGS LTA @ ESRANGE in Kiruna
  - **3**: SMOS DPGS Calibration & Expertise Centre @ ESAC
  - **4**: SMOS DPGS Integration and Maintenance Platform @ Indra
  - **5**: Grid on-demand Processing Centre
  - **6**: NRTP
  - **7**: L1 Expert Support Laboratory
  - **8**: L2 OS Expert Support Laboratory
  - **9**: L2 SM Expert Support Laboratory

2.2.3 L2 XML Schemas Guidelines

XML schema Guidelines will follow the conventions and format indicated in [RD.3].The schemas of the L2 products specified in this document can be found in URL:

ftp://131.176.251.166/smos/schemas/

The XML Read/Write API tool implemented by DPGS Prime to read, write and modify the SMOS products, using the BinX recommendation to deal with binary data, is available in URL:

ftp://131.176.251.166/smos/software/XML_RW_API/

The L2OP Product Format Specifications document release that describes the products received by the user is identified by reading the ***Ref_Doc*** field in SMOS products headers

3. LEVEL 2 PRODUCTS GENERIC STRUCTURE

3.1 LEVEL 2 HEADERS

The Level 2 Headers will be an XML file and as any other Earth Explorer File will have a common structure divided in two main parts:

- a Fixed Header (FH), with identical structure for all files
- a Variable Header (VH), which allows to define and structure different information for each file type.

Further information about Headers is specified in the following sections.

3.1.1 Level 2 Earth Explorer Fixed Header

The ***Fixed Header*** is common to all Earth Explorer Mission products, therefore it is compliant with [AD.3] and [AD.4].

The following table specifies the fields in the Fixed Header.

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Fixed_Header***	Tag				Tag starting the Fixed Header of all SMOS products.	
02	***File_Name***	String	N/A	60 bytes	%60s	It is a repetition of the Logical File Name, i.e. the File Names excluding the extension.	INT (except for file counter provided by Job Order for the products and by CEC for the Auxiliary Files)
03	***File_Description***	String	N/A	variable (limited to 300 bytes)	%s	A 1-line description of the File Type. Each Mission shall define the list of official file descriptions (per File Type). See text below the tables to find a complete list of the descriptions.	Hard-coded value in the Processor
04	***Notes***	String	N/A	variable (limited to 300 bytes)	%s	Multi-lines free text. This can be used for any type of comment, relevant that instance of the file. The Operational Processor generates no notes and this field remains always empty.	Generated by User
05	***Mission***	String	N/A	4 bytes	%4s	A 1-word description of the Mission, coherent with the Mission element in the File Name. For this Mission, this string shall be always "SMOS" in upper case letters.	Hard-coded
06	***File_Class***	String	N/A	4 bytes	%4s	A 1-line description of the file class, coherent with the File Class element in the File Name. Each Mission shall define the list of official file classes. For the SMOS Mission, this string shall be "TEST" for testing purposes, "OPER" for products generated during Satellite orbiting, all in upper case letters and "REPR" for all the reprocessed files.	Job Order
07	***File_Type***	String	N/A	Variable	%10s	It is a repetition of the File Type element in the File Name, including File Category and Semantic Descriptor	INT

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
08	***Validity_Period***	Tag				Tag starting a structure to specify the period of time during which the file contents are valid	
09	***Validity_Start***	String	N/A	23 bytes	%23s	This is the UTC Validity Start Time, coherent with the Validity Start Time in the File Name, but in CCSDS ASCII format with time reference. Note that this can have the special value indicating "beginning of mission" (without an absolute time specified) as defined in Tailoring of EEFF Standard for SMOS GS [AD.4]. "UTC=yyyy-mmddThh:mm:ss." The Validity Start Time shall be the start time of the period in which the product is valid –i.e. can be used as supporting input to the processing- in case the product is an auxiliary file.	MIR
10	***Validity_Stop***	String	N/A	23 bytes	%23s	This is the UTC Validity Stop Time, coherent with the Validity Stop Time in the File Name, but in CCSDS ASCII format with time reference. Note that this can have the special value indicating "end of mission" (without an absolute time specified) as defined in Tailoring of EEFF Standard for SMOS GS [AD.4]. "UTC=yyyy-mmddThh:mm:ss" The Validity Stop Time shall be the stop time of the period in which the product is valid –i.e. can be used as supporting input to the processing- in case the product is an auxiliary file.	MIR
11	***Validity_Period***	Tag				Tag ending a structure to specify the period of time during which the file contents are valid	
12	***File_Version***	Integer	N/A	4 bytes	%04d	It is a repetition of the File Counter element in the File Name instance ID, plus 1 additional digit (most significant, always set to 0 to be the same as file counter in filename; it appears here as 4 digits for compliancy with EEFF convention –see [AD.3]-). Must start at 0001 (not 0000), only digits allowed.	Job Order for products (CEC for ADF)

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
13	***Source***	Tag				Tag starting a structure to specify the GS element that has created the product	
14	***System***	String	N/A	4 bytes	%s	Name of the Ground Segment element creating the file. For the Data Processing Ground Segment, this string shall be "DPGS"	ICNF
15	***Creator***	String	N/A	4 bytes	%s	Name of the tool, within the Ground Segment element, creating the file . For L2 Operational Processor, this string shall be "L2OP" For the auxiliary data products, this string can be "RPC" for Reference Processing Centre, "CEC" for Calibration & Expertise Centre, "L2PP" for L2P Prototypes Development Teams.	ICNF
16	***Creator_Version***	Integer	N/A	3 bytes	%03d	Version of the tool. This shall be the same as version number in Filename's instance ID "vvv". Only digits allowed	ICNF
17	***Creation_Date***	String	N/A	23 bytes	%23s	This is the UTC Creation Date, in CCSDS ASCII format with time reference, as defined in Mission Conventions Document [AD.2]. "UTC=yyyy-mmddThh:mm:ss"	INT from machine's clock
18	***Source***	Tag				Tag ending the structure to specify the GS element that has created the product	
19	***Fixed_Header***	Tag				Tag ending the Fixed Header of all SMOS products.	

Table 3-1 Fixed Header particularized for L2OP

The following table contains a list of the strings to be used for the ***File_Description*** field, for each product type.

Product Type	File_Description
Level 2 Products	
MIR_SMUDP2	L2 Soil Moisture Output User Data Product
MIR_SMDAP2	L2 Soil Moisture Output Data Analysis Product
MIR_OSUDP2	L2 Ocean Salinity Output User Data Product
MIR_OSDAP2	L2 Ocean Salinity Output Data Analysis Product
AUX_DTBXY_	Delta Brightness Temperature generated optionally by the L2OS processor. This file is the main input for the L2OS OSCOTT post-processor
Input Data products	
AUX_DGG___	ISEA4-9 Discrete Global Grid used in geolocation
MPL_ORBSCT	Mission planning file used to initialise the EE CFI orbit_id and/or time_id. It is read and used by the EE CFI (format defined in [AD.6]
AUX_ECMWF_	ECMWF data on the ISEA 4-9 DGG corresponding to SMOS half-orbit
AUX_DFFFRA	Land Cover Classes Fractions over the Discrete Flexible Global Grid
AUX_DFFXYZ	Earth Centered Earth Fixed Cartesian coordinates for each Discrete Flexible Fine Global Grid point
AUX_DFFLAI	Leaf Area Index derived from MODIS Data at Discrete Flexible Fine Global Grid point
AUX_DFFLMX	Maximum value for the Leaf Area Index derived from ECOCLIMAP Data at Discrete Flexible Fine Global Grid point
AUX_DFFSOI	Soil Properties for each Discrete Flexible Fine Global Grid point
AUX_DFFSNO	Percentage of snow coverage for each Discrete Flexible Global Grid Point
AUX_DGGXYZ	Earth Centered Earth Fixed Cartesian coordinates for each Discrete Global Grid point
AUX_DGGTLV	Current Low Vegetation Optical Thickness at the Discrete Global Grid point from the L2 Soil Moisture product.
AUX_DGGTFO	Current Forest Optical Thickness at the Discrete Global Grid point from the L2 Soil Moisture product.
AUX_DGGROU	Current land Roughness at the Discrete Global Grid point from the L2 Soil Moisture product.

Product Type	File_Description
AUX_DGGRFI	Current Radio Frequency Interference Probability at the Discrete Global Grid point from the L2 Soil Moisture product.
AUX_DGGFLO	Current Flood Flag Probability at the Discrete Global Grid point from the ECMWF precipitation forecast
AUX_WEF___	Weighting Function for Brightness Temperature derived from SMOS Apodization Function
AUX_MN_WEF	Weighting Function for Brightness Temperature derived from the Mean Apodization Function
AUX_GAL_SM	AUX_GALAXY Map convolved with the Mean Weighting Function AUX_MN_WEF
AUX_LANDCL	Land Cover parameters associated to each Land Cover classes used in the AUX_DFFFRA file
AUX_CNFSMD	Processor Configuration parameters for L2 Soil Moisture for Dual Polarization
AUX_CNFSMF	Processor Configuration parameters for L2 Soil Moisture for Full Polarization
AUX_FLTSEA	Physical Constants needed by Flat Sea Model
AUX_RGHNS1	Look Up Tables needed by L2 Processorfor the IPSL Ocean Roughness Model
AUX_RGHNS2	Look Up Tables needed by L2 Processorfor the IFREMER Ocean Roughness Model
AUX_RGHNS3	Look Up Tables needed by L2 Processorfor the ICM-CSIC Ocean Roughness Model
AUX_GAL_OS	AUX_GALAXY Map convolved with the Weighting Function AUX_ WEF___
AUX_GAL2OS	Galactic Map Product
AUX_FOAM__	Physical Constants used by Foam Model
AUX_SGLINT	Bi-Static Scattering Coefficients Look Up Table used in Sun glint correction
AUX_SUN_BT	Estimated sun L-Band Brightness temperature. It is used in L2 Ocan Salinitiy processing and specifically needed in sun glint model.
AUX_ATMOS_	Physical Constants used by Atmospheric Model
AUX_DISTAN	Distance to the coast and monthly Sea/Ice Flag information over Discrete Global Grid
AUX_SSS___	Monthly Sea Surface Salinity over Discrete Global Grid
AUX_CNFOSD	Processor Configuration Parameters for L2 Ocean Salinity for Dual Polarization processing.

Product Type	File_Description
AUX_CNFOSF	Processor Configuration Parameters for L2 Ocean Salinity for Full Polarization processing.
AUX_OTT1D_	Ocean Target Transformation Look Up Table needed by L2 Processor, derived from the IPSL Ocean Roughness Model. It is used to process dual pol data.
AUX_OTT1F_	Ocean Target Transformation Look Up Table needed by L2 Processor, derived from the IPSL Ocean Roughness Model. It is used to process full pol data.
AUX_OTT2D_	Ocean Target Transformation Look Up Tables needed by L2 Processor, derived from the IFREMER Ocean Roughness Model. It is used to process dual pol data.
AUX_OTT2F_	Ocean Target Transformation Look Up Tables needed by L2 Processor, derived from the IFREMER Ocean Roughness Model. It is used to process full pol data.
AUX_OTT3D_	Ocean Target Transformation Look Up Tables needed by L2 Processor, derived from the ICM-CSIC Ocean Roughness Model. It is used to process dual pol data.
AUX_OTT3F_	Ocean Target Transformation Look Up Tables needed by L2 Processor, derived from the ICM-CSIC Ocean Roughness Model. It is used to process full pol data.
AUX_MSOTT_	Mixed scene land-sea correction OTT Look Up Tables needed by L2 Processor, derived by ESL using several years of data to compute a correction for the mean error near land (< 1000 km) between forward model and L1c TBs in 4D lat/long/xi/eta bins
AUX_DTBCUR	Current Delta Brightness Temperature generated by the OSCOTT post-processor
AUX_BFP___	Best Fit Plane used in geolocation
AUX_MISP__	Mispointing angles between the Body Frame referenced in the Proteus quaternions and the Antenna Plane defined by the MIRAS instrument
AUX_AGDPT_	Look Up Tables used by processor to olarizati Geophysical Parameters. Currently, this ADF is not used by the L2OS operational processor.
AUX_ECOLAI	Leaf Area Index derived from 36 ECOCLIMAP Data 10-Day periods at Discrete Flexible Fine Global Grid point.
AUX_BNDLST	Binding Lists to propagate ECMWF parameters.
AUX_ECMCDF	ECMCDF file containing CDF coefficients to be used in AUX_ECMWF data generation with the aim of correcting inherent biases and improve the quality of the retrieved soil moisture on mixed surfaces where SWVL1 plays a role for the default fixed contributions.
AUX_FARA_P	Predicted Faraday Rotation ADF used by L2P in correction of ionospheric effects (created from AUX_VTEC_P data). It is used in LTA Reprocessing Centre.
AUX_FARA_C	Analysis Rapid Faraday Rotation ADF used by L2P in correction of ionospheric effects (created from AUX_VTEC_R data). It is used in LTA Reprocessing Centre.

Product Type	File_Description
AUX_FARA_R	Analysis Consolidated Faraday Rotation ADF used by L2P in correction of ionospheric effects (created from AUX_VTEC_C data). It is used in LTA Reprocessing Centre.
AUX_BULL_B	This field will take value "IERS Bulletin B file used by the EE CFI to get very precise computations of geolocation".

Table 3-2 File Description string for each type of L2 product

3.1.1 Level 2 Earth Explorer Variable Header

The Variable Header is specific to each File Type. It is written in XML ASCII format and it is constituted by two structures, Main Product Header (MPH) and a Specific Product Header (SPH). Further information on the VH for each product will be provided in next chapters.

3.2 LEVEL 2 DATA BLOCK

The Data Block content for L2 products consist of one or several Measurement Data Sets. However, the possible several Reference Data Sets are not included in the Data_Block but instead their filenames and dataset names are referenced in the header.

Each Measurement Data Set should contain a number of Data set Records, preferably of identical structure. References Data Sets are only references to other required files but they will not be included in the Product.

The Data Blocks for each of the Level 2 Products are specified in Section 4 for SMOS products processed from MIRAS instrument measurements and in Section 5 for auxiliary data products.

4. LEVEL 2 PRODUCT TYPES SPECIFICATIONS

4.1 LEVEL 2 PRODUCTS COMMON HEADER

Different Level 2 Products share common information for the Header. This common information will be presented in the following sections and will be referenced by other sections in the document.

4.1.1 Main Product Header

The Main Product Header of any SMOS Product Level 2 will be written in XML ASCII. It contains the information about:

- Product identification
- XML schemas, XML headers schemas and binary schemas
- Processing information
- Product Data Time Information
- Orbit information
- Product Confidence Data (PCD) and Size Information

The Main Product Header is defined as in [RD.6] and [RD.9], although some fields redundant with Fixed Header have been suppressed. The following table shows the specification of the Main Product Header.

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Main_Product_Header***	Tag				Tag starting the Main Product Header structure	
02	***Ref_Doc***	string	N/A	17 bytes	%17s	Name of the document containing the specifications for the current product (this document). SO-TN-IDR-GS-0006	ICNF
03	***Acquisition_Station***	string	N/A	4 bytes	%4s	Acquisition Station ID. Left justified with trailing blanks. Currently, the possible values are: • ESAC" : acquisition station for SMOS at ESAC • "SVLD" : acquisition station for SMOS at Svalbard • "ES-S": the product contains data from ESAC (first segment of data) and Svalbard (latest segment of data) • "SV-E": the product contains data from Svalbard (first segment of data) and ESAC (latest segment of data) In L2OP processing, the value in this field shall be obtained from the lower level input product (the origin for L2 being the L1c products).	MIR
04	***Processing_Centre***	string	N/A	4 bytes	%4s	ID code of the Processing Centre that has generated the product {ESAC, others TBD –e.g. LTA location-}. This is the physical location where the product is generated.	ICNF
05	***Logical_Proc_Centre***	string	N/A	3 bytes	%3s	ID code of the Logical Processing Centre that has generated the product. The Logical Processing Centre is the group of subsystems within the Processing Centre working co-ordinately to generate the product. Possible values, per each site instance ID, are:	ICNF

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						0: 3 blanks 1: FPC (in the FPC) RPC (in the reprocessing platform @ ESAC) 2: LTA 3: CEC 4: IMP 5: GPC 6: NRT 7: L1E 8:OSE 9: SME	
06	***Orbit_Information***	Starting Tag				Tag starting an Orbit Information structure.	
07	***Phase***	integer	N/A	4 bytes	%+04d	Phase number, at sensing start time of the first packet in the corresponding Level 0 product. If not used set to +000	MIR
08	***Cycle***	Integer	N/A	4 bytes	%+04d	Cycle number, at sensing start time of the first packet in the corresponding Level 0 product. If not used set to +000	MIR
09	***Rel_Orbit***	Integer	N/A	6 bytes	%+06d	Relative orbit, at sensing start time of the first packet in the corresponding Level 0 product. If not used set to +00000	MIR
10	***Abs_Orbit***	Integer	N/A	6 bytes	%+06d	Absolute orbit, at sensing start time of the first packet in the corresponding Level 0 product. If not used set to +00000. First crossing of ascending node after launch determines the beginning of absolute orbit 1.	MIR

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
11	***OSV_TAI***	string	Tag TAI	30 bytes	%30s	TAI date and time of vector from field 15 to 20 TAI=yyyy-mm-ddThh:mm:ss.uuuuuu	MIR
12	***OSV_UTC***	string	Tag UTC	30 bytes	%30s	UTC date and time of vector from field 15 to 20 UTC=yyyy-mm-ddThh:mm:ss.uuuuuu	MIR
13	***OSV_UT1***	string	Tag (UT1)	30 bytes	%30s	UT1 date and time of vector from field 15 to 20 UT1=yyyy-mm-ddThh:mm:ss.uuuuuu	MIR
14	***Leap_Second***	string	Tag (s)	30 bytes	%30s	UTC time of the occurrence of the leap second. If the leap second occurred in the corresponding L0 product window, the field is set. Otherwise it is set to 30 blanks. It corresponds to the time of the Leap Second occurrence (i.e. midnight of the day after the leap second) UTC=yyyy-mm-ddThh:mm:ss.uuuuuu	MIR
15	***X_Position***	Real	m	12 bytes	%+012.3f	X Position in Earth Fixed Reference corresponding to the last vector in the POF before the sensing start time in L0.	MIR
16	***Y_Position***	Real	m	12 bytes	%+012.3f	Y Position in Earth Fixed Reference corresponding to the last vector in the POF before the sensing start time in L0.	MIR
17	***Z_Position***	Real	m	12 bytes	%+012.3f	Z Position in Earth Fixed Reference corresponding to the last vector in the POF before the sensing start time in L0.	MIR
18	***X_Velocity***	Real	m/s	12 bytes	%+012.6f	X Velocity in Earth Fixed Reference	MIR
19	***Y_Velocity***	Real	m/s	12 bytes	%+012.6f	Y Velocity in Earth Fixed Reference	MIR
20	***Z_Velocity***	Real	m/s	12 bytes	%+012.6f	Z Velocity in Earth Fixed Reference	MIR
21	***Vector_Source***	string	N/A	2 bytes	%2s	Source of the Orbit State Vector record: FP = FOS predicted	MIR

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
22	*Orbit_Information*	Ending Tag				Tag ending an Orbit Information structure	
23	*Product_Confidence*	string	N/A	Variable (limited to 200 bytes)	%s	Product confidence value. Enumerated: NOMINAL: for no errors DEGRADED: L2SM processor: SPH Overall_Quality_Flag set to ≥1. L2OS processor: if errors reported (return code > 0 and < 255)	INT
24	*Main_Product_Header*	Tag				Tag ending a Main Product Header structure	

Table 4-1 Main Product Header of SMOS L2 Products

4.1.2 Specific Product Header

The Specific Product Header of any SMOS Product Level 2 will be written in XML ASCII. The SPH is composed of several structures depending on the product type. The following two sub-elements are common to all Level 2 Measurement products:

- XML Specific Product Header Product Info
- XML Specific Product Header Data Sets

While the SPH Product Info contains generic information about the Product, the SPH Data Sets contains the list of names of Data Sets either of Reference or of Measurement.

The Reference Data Sets contain the reference to any file containing relevant information for the Product, and also the filenames of the products used as inputs to the generation process of the Level 2 Measurement Product. The Measurement Data Sets contain relevant information about the binary information linked directly to the product.

Amongst the fields in the Specific Product Header Main Info section, its second Field, the ***SPH_Descriptor*** will be different for every type of Level 2 Products. All the accepted types and names are presented in the following table:

Accepted Name	Description
MIR_SMUDP2_SPH	SPH for L2 SM User Data Product containing soil moisture and other data
MIR_SMDAP2_SPH	SPH for L2 SM Analysis Data Product containing science data for analysis purpose
MIR_OSUDP2_SPH	SPH for L2 OS User Data Product
MIR_OSDAP2_SPH	SPH for L2 OS Data Analysis Product
AUX_DTBXY__SPH	SPH for Delta TB Product

Table 4-2 Level 2 SPH Accepted Names

4.1.2.1 SPH Product Info

The XML SPH Product Info contains the information about:

- Product Description and Identification Information
- Product Time Information
- Instrument Configuration
- Product Confidence Data
- Product Location Information

The following table presents the parameters for the SPH Product Info.

- Main Info SPH Table

The fields in the Main SPH Product Info table will be present in all Level 2 products. In all cases, the SPH will be enclosed between the ***Specific_Product_Header*** Tag.

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
02	***Main_Info***	Starting Tag				Tag starting a Main_Info structure	
03	***SPH_Descriptor***	string	N/A	14 bytes	%14uc	Name describing SPH, as per table 4-2	Hard-coded
04	***Time_Info***	StartingTag				Tag starting a Time_Information structure	
05	***Precise_Validity_Start***	String	N/A	Variable	%30s	This is the UTC Validity Start Time, coherent with the Validity Start Time in the File Name, but in CCSDS ASCII format with time reference and microseconds. It is copied from L1c Precise_Validity_Start_Time "UTC=yyyy-mm-ddThh:mm:ss.uuuuuu"	MIR
06	***Precise_Validity_Stop***	String	N/A	Variable	%30s	This is the UTC Validity Stop Time, coherent with the Validity Stop Time in the File Name, but in CCSDS ASCII format with time reference and microseconds. It is copied from L1c Precise_Validity_Stop Time "UTC=yyyy-mm-ddThh:mm:ss.uuuuuu"	MIR
07	***Abs_Orbit_Start***	Integer	N/A	6 bytes	%+06d	Absolute orbit of the Precise_Validity_Start	MIR
08	***Start_Time_ANX_T***	Real	S	11 bytes	%011.6f	Time in seconds between Precise_Validity_Start and closest previous crossing of the ascending node	MIR
09	***Abs_Orbit_Stop***	Integer	N/A	6 bytes	%+06d	Absolute orbit of the Precise_Validity_Stop	MIR
10	***Stop_Time_ANX_T***	Real	S	11 bytes	%011.6f	Time in seconds between Precise_Validity_Stop and closest previous crossing of the ascending node from the Precise_Validity_Start	MIR
11	***UTC_at_ANX***	string	N/A	30 bytes	%30s	UTC time of the ascending node of the orbit containing the Precise_Validity_Start	MIR

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
						UTC=yyyy-mm-ddThh:mm:ss.uuuuuu	
12	***Long_at_ANX***	real	deg	11 bytes	%+011.6f	Longitude of the ascending node of the orbit containing the Precise_Validity_Start (positive if east of Greenwich)	MIR
13	***Ascending_Flag***	String	N/A	1 byte	%c	Orbit orientation along product. A for ascending, D for descending	MIR
14	***Polarisation_Flag***	String	N/A	1 byte	%c	The olarization of the L1c product. D for dual olarization F for full polarisation	MIR
15	***Time_Info***	Closing Tag				Tag closing Time_Info structure	
16	***Checksum***	Integer	N/A	10 bytes	10*uc	Checksum of the datablock, obtained from the algorithm in the IEEE Std 1003.1.2004 , using function ***cksum*** in POSIX.	INT
17	***Header_Schema***	string	N/A	31 bytes	%31s	Name of the XSD to be use for the validation of the product Header. The format is as specified in [RD.3]. In the operational processor, the value will be provided by an XML R/W API method.	CNF
18	***Datablock_Schema***	string	N/A	42 bytes	%42s	Name of the validation xml schema for the binary product's datablock Name of the binX schema for the validation of the product datablock. The format is as specified in [RD.3]. In the operational processor, the value will be provided by an XML R/W API method.	CNF
19	***Header_Size***	Integer	bytes	6 bytes	%06d	Size of the Header of the product	INT
20	***Datablock_Size***	Integer	Bytes	11 bytes	%011d	Size of the product Datablock	INT
21	***HW_Identifier***	String	N/A	4 bytes	%4s	Unique identifier of the hardware involved in the processing. "nnnn" where n are digits or characters	ICNF
22	***Main_Info***	Closing Tag				Tag closing a Main_Info structure	

Table 4-3 Level 2 Main Info SPH

4.1.2.2 SPH Data Sets

The fields in the SPH Data Sets table are present in all Level 2 products. Moreover some other fields are included between the SPH Product Location fields and the SPH Data Sets fields.

The XML SPH Data Sets present the list of the different Data Sets in the Product.

There are two types of Data Sets: Reference Data Sets (containing filename linking the product to a reference auxiliary file) and Measurement Data Sets (containing binary contents as described in its associated XML schema).

The following table presents the XML specification of the Data Sets contained in a SMOS product's Data Block:

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
N+01	***List_of_Data_Sets***	Starting Tag		2	%02d	List containing the number of ***Data_Set*** structures, with "count" field as attribute. It is an XML structure containing a number of the Data_Set structures	
N+02	***Data_Set***	Starting Tag				Tag starting a ***Data_Set*** structure	
N+03	***DS_Name***	string	N/A	30 bytes	%30s	Name describing the Data Set.. See Table 4-5	INT
N+04	***DS_Type***	character	N/A	1	%c	Type of Data Set: M for measurement R for reference	INT
N+05	***DS_Size***	integer	N/A	10 bytes	%10d	Size in bytes of the Data Set. Filled with zeroes for the Reference Data Sets	INT
N+06	***DS_Offset***	integer	N/A	10 bytes	%10d	Offset in bytes since the beginning of Data Block file until the beginning of the data set. Filled with zeroes for the Reference Data Sets	INT
N+07	***Ref_Filename***	string	N/A	60 bytes	%60s	Name of reference file if Data_Set_Type is R. Otherwiswe blanks	Job Order +INT
N+08	***Num_DSR***	integer	N/A	10	%10d	Number of measurement records in the Data Set (filled only for Measurement Data Sets). Filled with zeroes for the Reference Data Sets	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
N+09	***DSR_Size***	integer	N/A	8	%08d	Size in bytes of each binary measurement data set record. For variable size DSR, the value is -1. Filled with zeroes for the Reference Data Sets	INT
N+10	***Byte_Order***	string	N/A	4	%4s	Type of ordering of the binary data. ▪ For Data Sets contained in the product's datablock, the Order will be "0123" (little-endian) ▪ For referenced data Sets, the order will be "0000"	INT
N+11	***Data_Set***	Ending Tag	N/A	N/A	N/A	Tag ending a ***Data_Set*** structure	N/A
N+12	***List_of_Data_Sets***	Ending Tag	N/A	N/A	N/A	End of list containing the number of ***Data_Set*** structures	N/A

Table 4-4 Level 2 SPH Data Set List

The Data Set list can make reference to several the type of product that contains the SPH. The following table provides a summary of the possible References used.

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
L1C_SM_FILE	`MIR_SCLD1C_`, `MIR_SCLF1C_`
L1C_OS_FILE	`MIR_SCSD1C_`, `MIR_SCSF1C_`
DGG_FILE	`AUX_DGG___`
ORBIT_SCENARIO_FILE	`MPL_ORBSCT`
ECMWF_FILE	`AUX_ECMWF_`
DFFG_FRACTIONS_FILE	`AUX_DFFFRA`
DFFG_XYZ_FILE	`AUX_DFFXYZ`
DFFG_LAI_FILE	`AUX_DFFLAI`

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
DFFG_LAI_MAX_FILE	AUX_DFFLMX
DFFG_SOIL_PROPERTIES_FILE	AUX_DFFSOI
DFFG_SNOW_ FILE	AUX_DFFSNO
DGG_XYZ_FILE	AUX_DGGXYZ
DGG_CUR_TAU_NAD_LV_FILE	AUX_DGGTLV
DGG_CUR_TAU_NAD_FO_FILE	AUX_DGGTFO
DGG_CUR_ROUGHNESS_H_FILE	AUX_DGGROU
DGG_CUR_RFI_FILE	AUX_DGGRFI
DGG_CUR_FLOOD_FILE	AUX_DGGFLO
WEIGHTING_FUNCTION_FILE	AUX_WEF___
MEAN_WEIGHTING_FUNCTION_FILE	AUX_MN_WEF
GALAXY_SM_FILE	AUX_GAL_SM
LAND_COVER_CLASSES_FILE	AUX_LANDCL
SOIL_MOISTURE_CONFIG_FILE	AUX_CNFSMD, AUX_CNFSMF
FLAT_SEA_FILE	AUX_FLTSEA
ROUGHNESS_IPSL_FILE	AUX_RGHNS1
ROUGHNESS_IFREMER_FILE	AUX_RGHNS2
ROUGHNESS_ICM_CSIC_FILE	AUX_RGHNS3
GALAXY_OS_FILE	AUX_GAL_OS
GALAXY_2OS_FILE	AUX_GAL2OS
FOAM_FILE	AUX_FOAM__

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
SUNGLINT_FILE	AUX_SGLINT
SUN_BT_FILE	AUX_SUN_BT
ATMOS_FILE	AUX_ATMOS_
DISTAN_FILE	AUX_DISTAN
CLIMATOLOGY_SSS_FILE	AUX_SSS___
OCEAN_SALINITY_CONFIG_FILE	AUX_CNFOSD, AUX_CNFOSF
OS_GEOPHYSICAL_PARAMETERS_FILE	AUX_AGDPT_ (Currently this file is not used by the L2OS operational processor)
OTT1D_FILE	AUX_OTT1D_
OTT1F_FILE	AUX_OTT1F_
OTT2D_FILE	AUX_OTT2D_
OTT2F_FILE	AUX_OTT2F_
OTT3D_FILE	AUX_OTT3D_
OTT3F_FILE	AUX_OTT3F_
MSOTT_FILE	AUX_MSOTT_
BEST_FIT_PLANE_FILE	AUX_BFP___
MISPOINTING_ANGLES_FILE	AUX_MISP__
DFFG_ECOLAI_FILE	AUX_ECOLAI
BNDLST_FILE	AUX_BNDLST
FARA_P_FILE	AUX_FARA_P (It is used in LTA Reprocessing Centre)
FARA_C_FILE	AUX_FARA_C (It is used in LTA Reprocessing Centre)
FARA_R_FILE	AUX_FARA_R (It is used in LTA Reprocessing Centre)

Table 4-5 L2 Data Set Reference List

The Measurement Data Set names to be included in the "SPH_Data_Sets" structure of the MIR_SMUDP2, MIR_SMDAP2, MIR_OSUDP2 and MIR_OSDAP2 products are detailed in the next table:

Measurement Data Set Name	File Type (File Category + Semantic Descriptor)
SM_SWATH	MIR_SMUDP2
SM_SWATH_ANALYSIS	MIR_SMDAP2
SSS_SWATH	MIR_OSUDP2
SSS_SWATH_ANALYSIS	MIR_OSDAP2

Table 4-6 L2 Measurement Data Set List

Note that this information is also contained at the beginning of each L2 product Data block.

4.2 LEVEL 2 DATA TYPES SPECIFICATIONS

4.2.1 Level 2 Soil Moisture data types

As is written in [RD.6] , the L2 SM Processor generates two types of products:

- The Level 2 Soil Moisture User Data Product (MIR_SMUDP2) , whose content consist on SM values, optical thickness, physical temperature, simulated TB, dielectric constants, flags, etc.
- The Level 2 Soil Moisture Data Analysis Product (MIR_SMDAP2) containing information about the retrieval process that is not intended for the external users, but rather for some specific users such as ESL.

Using TB components (can be either in dual or full polarisation), the incidence angles, as well as Level 1c processor auxiliary data products such as TEC, geomagnetic correction values, and a set of quality flags produced by the Level 1c processor, L2 SM output products are generated for each DGG point and physically consolidated in pole-to-pole segments.

Both the L2 Soil Moisture User Data Product and the L2 Soil Moisture Data Analysis Product contain the same number of DGG points as their input Level 1c product.

4.2.1.1 Level 2 Soil Moisture User Data Product (MIR_SMUDP2)

As is written in [RD.6], this product consists on Swath-based retrieved information over land surfaces (and sea ice) from SMOS L1c product. The basic product contains fields for soil moisture, vegetation water contents, computed brightness temperatures at 42.5°, and the dielectric constant of the surface from pole to pole. It has a spatial resolution of 43 Km on average and geo-location of 400 m.

4.2.1.1.1 Main Product Header

See section 4.1.1

4.2.1.1.2 Specific Product Header

The following table lists the data elements in the SPH of the L2SM UDP that are in addition to those in the common SPH (see section 4.1.2.1 and 4.1.2.2)

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific_Product_Header structure	
02-20	***Main_Info***	structure				Main Product Info structure's fields as defined in fields 01 to 18 in Table 4-3	
21	***Quality_Information***	Starting Tag				Init of XML Structure containing variables described below	
22	***Overall_Quality***	integer	N/A	1	%01d	Good, medium or bad: 0 = good, 1 = medium, 2 = bad The overall quality is set according to the following formula: ▪ If percentage of the nodes with successful retrieval > Quality_Threshold_High then Overall_Quality = 0 (good) ▪ else if percentage of the nodes with successful retrieval > Quality_Threshold_Low then Overall_Quality = 1 (medium) ▪ else Overall_Quality = 2 (bad) Percentage of the nodes with successful retrievals is computed as: 100 * (sum of Total_Successful_Nodes in SPH) / (Total_Processed_L1c_Nodes in SPH)	INT
23	***Overall_Quality_Threshold_Low***	integer	(10^{-2} %)	5 bytes	%05d	Low Threshold to set the SPH Overal_Quality field	AUX_CNFSMD/ AUX_CNFSMF
24	***Overall_Quality_Threshold_High***	integer	(10^{-2} %)	5 bytes	%05d	High Threshold to set the SPH Overal_Quality field	AUX_CNFSMD/ AUX_CNFSMF

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
25	***Total_L1c_Nodes***	Integer	N/A		%d	Total number of nodes in the L1c product	MIR
26	***Total_Processed_L1c_Nodes***	Ineger	N/A		%d	Total number of L1c nodes falling inside the Processing_Window	INT
27	***Percentage_Rejected_TBs***	Starting Tag				XML structure containing the percentage of rejected TBs due to different criteria	
28	***Due_To_Amplitude_Range***	Integer	10^{-2}%	5 bytes	%05d	Percentage of TBs rejected due to amplitude range check	INT
29	***Due_To_TB_Range***	Integer	10^{-2}%	5 bytes	%05d	Percentage of TBs rejected due to range check	INT
30	***Due_To_4th_Stokes_Parameter***	Integer	10^{-2}%	5 bytes	%05d	Percentage of TBs rejected due to 4th Stokes Parameter check	INT
31	***Due_To_Sun_Point_Flag***	Integer	10^{-2}%	5 bytes	%05d	Percentage of TBs rejected due to Sun Point Flag check.	INT
32	***Due_To_Spatial_Resolution***	Ineger	10^{-2}%	5 bytes	%05d	Percentage of TBs rejected due to Spatial Resolution check.	INT
33	***Due_To_1st_Stokes_Anomaly***	Ineger	10^{-2}%	5 bytes	%05d	Percentage of TBs rejected due to 1st Stokes anomaly	INT
34	***Percentage_Rejected_TBs***	Ending Tag				Tag ending the XMLstructure containing the percentage of rejected TBs due to different criteria.	
35	***Total_Retrieval_Attempted_L1c_Nodes***	Integer	N/A		%d	Total number of nodes for which the retrieval is attemped.	INT
36	***List_of_Retrieval_Cases_Statistics***	Starting tag				Init of list of statistics for the different retrieval cases with a counter as attribute	
37	***Retrieval_Case_Statistics***	Starting Tag				Tag starting the statistics for each retrieval case	
38	***Retrieval_Case***	String	N/A	Variable	%s	The retrieval case. Possible values are: → All_open_water, → Heterogenous_open_water → Strong_topo_pollution → Soft_topo_pollution → All_wet_snow → All_mixed_snow	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
						→ Wet_snow_pollution → Mixed_snow_pollution → All_frost → Frost_pollution → Forest_cover → Soil_cover → All_wetlands → All_barren → All_ice → All_urban → Heterogeneous	
39	***Total_Nodes***	Integer	N/A		%d	Total number of L1c nodes assigned to this retrieval case	INT
40	***Total_Failed_Nodes***	Integer	N/A		%d	Total number of L1c nodes assigned to this retrieval case whose retrieval failed.	INT
41	***R4***	Starting tag				Tag starting the statistics for R4 (maximum) retrieval for this retrieval case with a counter as attribute.	
42	***Model_Opacity_Level***	Starting Tag				Tag starting the statistics for each combination of model and opacity level. “Model_Opacity_Level” is repeated counter number of times.	
43	***Model***	String	N/A	2	2*uc	The selected model for retrieval: MN, MW or MD.	INT
44	***Opacity_Level***	String	N/A	Variable	%s	The opacity level: Low, Med or High	INT
45	***Total_Successful_Nodes***	Integer	N/A		%d	Total number of L1c nodes with successful retrieval for this combination of model and opacity level.	INT
46	***Model_Opacity_Level***	Ending Tag				Tag ending the statistics for each combination of model and opacity level.	
47	***R4***	Ending Tag				Tag ending the statistics for R4 (maximum) retrieval for this retrieval case.	

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
48	***R3***	Starting Tag				Tag starting the statistics for R3 (full) retrieval for this retrieval case with a couner as attribute	
49	***Model_Opacity_Level***	Starting Tag				Tag starting the statistics for each combination of model and opacity level. "Model_Opacity_Level" is repeated counter number of times.	
50	***Model***	String	N/A	2	2*uc	The selected model for retrieval: MN, MW or MD.	INT
51	***Opacity_Level***	String	N/A	Variable	%s	The opacity level: Low, Med or High	INT
52	***Total_Successful_Nodes***	Integer	N/A		%d	Total number of L1c nodes with successful retrieval for this combination of model and opacity level.	INT
53	***Model_Opacity_Level***	Ending Tag				Tag ending the statistics for each combination of model and opacity level.	
54	***R3***	Starting Tag				Tag ending the statistics for R3 (full) retrieval for this retrieval case.	
55	***R2***	Starting Tag				Tag starting the statistics for R2 (minimum) retrieval for this case with a counter as attribute.	
56	***Model_Opacity_Level***	Starting Tag				Tag starting the statistics for each combination of model and opacity level. "Model_Opacity_Level" is repeated counter number of times.	
57	***Model***	String	N/A	2	2*uc	The selected model for retrieval: MN, MW or MD.	INT
58	***Opacity_Level***	String	N/A	Variable	%s	The opacity level: Low, Med or High	INT
59	***Total_Successful_Nodes***	Integer	N/A		%d	Total number of L1c nodes with successful retrieval for this combination of model and opacity level.	INT
60	***Model_Opacity_Level***	Ending Tag				Tag ending the statistics for each combination of model and opacity level.	

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
61	***R2***	Ending Tag				Tag ending the statistics for R2 (minimum) retrieval for this retrieval case.	
62	***Retrieval_Case_Statistics***	Ending Tag				End of statistics for each retrieval case.	
63	***List_of_Retrieval_Cases_Statistics***	Ending Tag				End of list of statistics for the different retrieval cases.	
64	***Quality_Information***	Ending Tag				Ending of XML Structure containing quality variables	
65	***L2_Product_Location***	Starting Tag				Init of XML structure containing variables described below	
66	***Start_Lat***	real	deg	11 bytes	%+011.6f	Latitude of first satellite nadir point at the Sensing_Start time of first snapshot used in the generation (positive North)	MIR
67	***Start_Long***	real	deg	11 bytes	%+011.6f	Longitude of first satellite nadir point at the Sensing_Start time of first snapshot used in the generation (positive East of Greenwich (-180, +180])	MIR
68	***Stop_Lat***	real	deg	11 bytes	%+011.6f	Latitude of first satellite nadir point at the Sensing_Stop time of last snapshot used in the generation (positive North)	MIR
69	***Stop_Long***	real	deg	11 bytes	%+011.6f	Longitude of first satellite nadir point at the Sensing_Stop time of last snapshot used in the generation (positive East of Greenwich (-180,+180])	MIR
70	***Mid_Lat***	real	deg	11 bytes	%+011.6f	Latitude of satellite nadir point of the snapshot in the middle (rounded down) of the list used in the generation of the product .	MIR

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
71	***Mid_Lon***	real	deg	11 bytes	%+011.6f	Longitude of satellite nadir point of the snapshot in the middle (rounded down) of the list used in the generation of the product	MIR
72	***Southernmost_Latitude***	real	deg	11	%+011.6f	Geodetic Latitude of southernmost grid point (WGS84)	INT
73	***Southernmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of southernmost grid point	INT
74	***Northernmost_Latitude***	real	deg	11	%+011.6f	Geodetic Latitude of northernmost grid point (WGS84)	INT
75	***Northernmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of northernmost grid point	INT
76	***Easternmost_Longitude***	real	deg	11	%+011.6f	Geocentric Longitude of easternmost grid point	INT
77	***Easternmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of easternmost grid point	INT
78	***Westernmost_Longitude***	real	deg	11	%+011.6f	Geocentric Longitude of Westernmost grid point	INT
79	***Westernmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of westernmost grid point	INT
80	***L2_Product_Location***	Ending Tag				End of XML structure containing variables described below	
81	***Chi_2_Scale***	real	N/A		%g	Scale factor for converting the unsigned byte Chi_2 value in the UDP to a double. double value = ((unsigned byte value * Chi_2_Scale) / 255)	AUX_CNFSMD/ AUX_CNFSMF
82-93	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
94	***Specific_Product_Header***	Ending Tag				Tag ending the Specific_Product_Header structure	

Table 4-7 SPH of the L2 SM User Data Product

The specific valid Reference Data Sets for MIR_SMUDP2 Products are:

Reference Data Set Name	Product Type
L1C_SM_FILE	MIR_SCLD1C_, MIR_SCLF1C_
ORBIT_SCENARIO_FILE	MPL_ORBSCT
ECMWF_FILE	AUX_ECMWF_
DFFG_FRACTIONS_FILE	AUX_DFFFRA
DFFG_XYZ_FILE	AUX_DFFXYZ
DFFG_LAI_FILE	AUX_DFFLAI
DFFG_LAI_MAX_FILE	AUX_DFFLMX
DFFG_SOIL_PROPERTIES_FILE	AUX_DFFSOI
DFFG_SNOW_FILE	AUX_DFFSNO
DGG_XYZ_FILE	AUX_DGGXYZ
DGG_CUR_TAU_NAD_LV_FILE	AUX_DGGTLV
DGG_CUR_TAU_NAD_FO_FILE	AUX_DGGTFO
DGG_CUR_ROUGHNESS_H_FILE	AUX_DGGROU
DGG_CUR_RFI_FILE	AUX_DGGRFI
DGG_CUR_FLOOD_FILE	AUX_DGGFLO
WEIGHTING_FUNCTION_FILE	AUX_WEF___
MEAN_WEIGHTING_FUNCTION_FILE	AUX_MN_WEF

Reference Data Set Name	Product Type
GALAXY_SM_FILE	AUX_GAL_SM
LAND_COVER_CLASSES_FILE	AUX_LANDCL
SOIL_MOISTURE_CONFIG_FILE	AUX_CNFSMD/ AUX_CNFSMF
FARA_P_FILE	AUX_FARA_P （It is used in LTA Reprocessing Centre）
FARA_C_FILE	AUX_FARA_C （It is used in LTA Reprocessing Centre）
FARA_R_FILE	AUX_FARA_R （It is used in LTA Reprocessing Centre）
BULLETIN_B_FILE	AUX_BULL_B

Table 4-8 List of References Data Set Names

4.2.1.1.1 Data Block

The SMOS Level 2 Soil Moisture User Data Product consists of one Measurement Data Set and several Reference Data Sets.

The Reference DSD Names are used to fill the tag <Data_Set_Name> in the SPH but their content does not appear in the Data Block.

The SM_SWATH Measurement Data Set contains a complete DSR for every DGG point in the input L1 land product. A SM_SWATH DSR has a fixed size since it must contain all the fields. It is important to note that the number of DGG points in each product (swath based) will vary from one to another according to the number of grid points in the Level 1C Product. According to SMOS Level 1 and Auxiliary Data Products Specifications [AD.5] the number of DGG points included in a swath is 80.000.

The SM_SWATH DSR arranges the relevant data for the L2 SM UDP in a list of parameters having 4 specific parts. These are:

- **Product Confidence Descriptor** (PCD): includes indications about the global quality of the product
- **Product Science Flags** (PSF): includes information about geophysical features of the product
- **Product Process Descriptor** (PPD): includes indications about interpretation and process status of the product

- **Retrieval Results and Data Quality Index** (DQX) are included in the product for each parameter.

  For those parameters that have been obtained through retrieval, their DQX is the theoretical retrieval a posteriori standard deviation, denoted as RSTD (retrieved standard deviation). For those parameters that have been obtained other than through retrieval, their DQX is set to the default value zero.

- **DGG_Current_Data_Structure:** contains the DQX for HR_Cur and Tau Cur computed using a special sigma corresponding to the case whre HR_Cur and Tau_Cur are completely free. The number of delected TB removed due to suspect RFI is also included in this structure.

The following table describes the format of a complete **SM_SWATH** Data Set Record. There is a complete DSR for each DGG point. All fields (including those belonging to the PCD, PSF, PPD and DQX) are repeated for each grid point.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	SM_SWATH					Init of binary Data Set containing the ***SWATH Data set*** records.	
01	***N_Grid_Points***	Counter	N/A	Unsigned integer (4 bytes)	1 element	Number of ***Grid_Points*** data set record structures.	INT
	List_of_Grid_Points_Datas					Init of list of ***Grid_Points*** data set record structures repeated ***N_Grid_Point*** times. There are as many DSR as integration periods in the product.	
	Grid_Point_Data					Init of ***Grid_Point*** data set record structure.	
02	***Grid_Point_ID***	identifier	N/A	Unsigned integer (4 bytes)	1 element	Unique identifier of Earth fixed grid point	MIR
03	***Latitude***	real value	deg	float (4 bytes)	1 element	Latitude of DGG point	MIR
04	***Longitude***	real value	deg	float (4 bytes)	1 element	Longitude of DGG point	MIR
05	***Altitude***	real value	m	float (4 bytes)	1 element	Altitude of DGG point	MIR

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
06	***Mean_Acq_Time***	Date	N/A	signed/unsigned integer (4 bytes)	Vector array of 3 elements. First element(days) is signed integer, remaining two (seconds and microseconds) are unsigned	Mean acquisition time of the set of snapshots participating in the current successful or the latest failed retrieval attempt. If no retrieval has been attempted, then the mean is taken over the remaining valid snapshots after initial filtering. Expressed in EE CFI transport time format (Array of 3 integer elements)	INT
	Retrieval_Results_Data					Init of ***Retrieval_Results*** structure	
07	***Soil_Moisture***	real value	m^3m^{-3}	Float (4 bytes)	1 element	An estimate of surface soil moisture obtained through a successful retrieval of this parameter A value of -999 for soil moisture indicates no estimates are available. See the possible values in the note included after this table.	INT
08	***Soil_Moisture_DQX***	Real value	m^3m^{-3}	Float (4 bytes)	1 element	The RSTD of Soil_Moisture corresponding to its successful retrieval. Otherwise -999. See the possible values in the note included after this table.	INT
09	***Optical_Thickness_Nad***	Real value	neper	Float (4 bytes)	1 element	An estimate of optical thickness at nadir point (i.e. independent of incidence angle) produced by a successful retrieval of this parameter A value of -999 for optical thickness indicates no estimates are available. It represents the global Tau if the Use_TAU_L_In_Inv flag from the AUX_CNFSMD/F is OFF, otherwise it is the vegetation Tau. See the possible values in the note included after this table.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
10	***Optical_Thickness_Nad_DQX***	Real value	neper	Float (4 bytes)	1 element	The RSTD of Optical_Thickness_Nad corresponding to its successful retrieval. Otherwise -999. See the possible values in the note included after this table.	INT
11	***Surface_Temperature***	Real value	K	Float (4 bytes)	1 element	An estimate of surface temperature produced by a successful retrieval of this parameter. A value of -999 for surface temperature indicates no estimates are available. See the possible values in the note included after this table.	INT
12	***Surface_Temperature_DQX***	Real value	K	Float (4 bytes)	1 element	The RSTD of Surface_Temperature Corresponding to its successful retrieval. Otherwise -999. See the possible values in the note included after this table.	INT
13	***TTH***	Real value	N/A	Float (4 bytes)	1 element	An estimate of the angular correction parameter for optical thickness at H polarization produced by a successful retrieval of this parameter. A value of -999 for TTH indicates no estimates are available. See the possible values in the note included after this table.	INT
14	***TTH_DQX***	Real value	N/A	Float (4 bytes)	1 element	The RSTD of TTH corresponding to its successful retrieval. Otherwise -999	INT
15	***RTT***	Real value	N/A	Float (4 bytes)	1 element	An estimate of the ratio of the angular correction parameter TTH/TTV produced by a successful retrieval of this parameter. A value of -999 for RTT indicates no estimates are available. See the possible values in the note included after this table.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
16	***RTT_DQX***	Real value	N/A	Float (4 bytes)	1 element	The RSTD of RTT corresponding to its successful retrieval. Otherwise -999. See the possible values in the note included after this table.	INT
17	***Scattering_Albedo_H***	Real value	N/A	Float (4 bytes)	1 element	An estimate of the vegetation's scattering albedo at H polarization produced by a successful retrieval of this parameter. A value of -999 for Scatering_Albedo_H indicates no estimates are available. See the possible values in the note included after this table.	INT
18	***Scattering_Albedo_H _DQX***	Real value	N/A	Float (4 bytes)	1 element	The RSTD of Scattering_Albedo_H corresponding to its successful retrieval. Otherwise -999. See the possible values in the note included after this table.	INT
19	***DIFF_Albedos***	Real value	N/A	Float (4 bytes)	1 element	An estimate of the vegetation's difference of albedos (ωH –ωV) produced by a successful retrieval of this parameter. A value of -999 for DIFF_Albedos indicates no estimates are available. See the possible values in the note included after this table.	INT
20	***DIFF_Albedos _DQX***	Real value	N/A	Float (4 bytes)	1 element	The RSTD of DIFF_Albedos corresponding to its successful retrieval. Otherwise -999. See the possible values in the note included after this table.	INT
21	***Roughness_Param***	Real value	N/A	Float (4 bytes)	1 element	An estimate of the max surface roughness (HR_Max value) produced by a successful retrieval of this parameter. A value of -999 for Roughness_Param indicates no estimates are available.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						See the possible values in the note included after this table.	
22	***Roughness_Param_DQX***	Real value	N/A	Float (4 bytes)	1 element	The RSTD of Roughness_Param corresponding to its successful retrieval. Otherwise -999. See the possible values in the note included after this table.	INT
23	***Dielect_Const_MD_RE***	Real value	Fm^{-1}	Float (4 bytes)	1 element	An estimate of the surface's dielectric constant (real part) produced by a successful retrieval using the Cardioid model. Otherwise -999. See the possible values in the note included after this table.	INT
24	***Dielect_Const_MD_RE_DQX***	Real value	Fm^{-1}	Float (4 bytes)	1 element	The RSTD propagated to Dielect_Const_MD_RE from the RTSD of the retrieved A_Card when retrieval is successful. Otherwise -999. See the possible values in the note included after this table.	INT
25	***Dielect_Const_MD_ IM***	Real value	Fm^{-1}	Float (4 bytes)	1 element	An estimate of the surface's dielectric constant (imaginary part) produced by a successful retrieval using the Cardioid model. Otherwise -999. See the possible values in the note included after this table.	INT
26	***Dielect_Const_MD_IM_DQX***	Real value	Fm^{-1}	Float (4 bytes)	1 element	The RSTD propagated to Dielect_Const_MD_IM from the RTSD of the retrieved A_Card when retrieval is successful. Otherwise -999. See the possible values in the note included after this table.	INT
27	***Dielect_Const_Non_MD_RE***	Real value	Fm^{-1}	Float (4 bytes)	1 element	An estimate of the surface's dielectric constant (real part) produced by a successful retrieval using a non Cardioid model. Otherwise -999.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						See the possible values in the note included after this table.	
28	***Dielect_Const_Non_MD_RE_DQ X***	Real value	Fm^{-1}	Float (4 bytes)	1 element	The RSTD propagated to Dielect_Const_Non_MD_RE from the RSTDs of the retrieved physical parameters when retrieval is successful. Otherwise -999. See the possible values in the note included after this table.	INT
29	***Dielect_Const_Non_MD_IM***	Real value	Fm^{-1}	Float (4 bytes)	1 element	An estimate of the surface's dielectric constant (imaginary part) produced by a successful retrieval using a non Cardioid model. Otherwise -999. See the possible values in the note included after this table.	INT
30	***Dielect_Const_Non_MD_IM_DQX***	Real value	Fm^{-1}	Float (4 bytes)	1 element	The RSTD propagated to Dielect_Const_Non_MD_IM from the RSTDs of the retrieved physical parameters when retrieval is successful. Otherwise -999. See the possible values in the note included after this table.	INT
31	***TB_ASL_Theta_B_H***	Real value	K	Float (4 bytes)	1 element	The Above Surface Level (ASL) TB at H polarization for a user specified incidence angle, Theta_B. This is generated by forward models using successfully retrieved geophysical data as input. This value is provided at the Earth reference frame and is expected to be comparable to those obtained by tower radiometers. Since geophysical parameters used are obtained by interpolation, a valid value is reported only when retrieval is successful and	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						there are two valid consecutive measurements of SMOS whose incidence angles contain Theta_B. Otherwise "-999" is reported. See the possible values in the note included after this table.	
32	***TB_ASL_Theta_B_H_ DQX***	Real value	K	Float (4 bytes)	1 element	The Data Quality olar of TB_ASL_Theta_B_H. This value expresses the impact of radiometric uncertainties, the uncertainties of fixed parameters, and the model errors among other things. See the possible values in the note included after this table.	INT
33	***TB_ASL_Theta_B_V***	Real value	K	Float (4 bytes)	1 element	The Above Surface Level (ASL) TB at V polarization for a user specified incidence angle, Theta_B. This is generated by forward models using successfully retrieved geophysical data as input. This value is provided at the Earth reference frame and is expected to be comparable to those obtained by tower radiometers. Since geophysical parameters used are obtained by interpolation, a valid value is reported only when retrieval is successful and there are two valid consecutive measurements of SMOS whose incidence angles contain Theta_B. Otherwise "-999" is reported. See the possible values in the note included after this table.	INT
34	***TB_ASL_Theta_B_V_ DQX***	Real value	K	Float (4 bytes)	1 element	The Data Quality olar of TB_ASL_Theta_B_V. This value expresses the impact of radiometric uncertainties, the uncertainties of fixed	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						arameters, and the model errors among other things. See the possible values in the note included after this table.	
35	***TB_TOA_Theta_B_H***	Real value	K	Float (4 bytes)	1 element	Top Of the Atmosphere (TOA) TB computed from forward models at a user supplied incidence angle Theta_B (normally 42.5º), for X olarization. This TB is generated by forward models using successfully retrieved geophysical data as input and is then transferred to the antenna level. This value is provided at the antenna reference frame and is expected to be comparable to the L1c browse TB. Since geophysical parameters used are obtained by interpolation, a valid value is reported only when retrieval is successful and there are two valid consecutive measurements of SMOS whose incidence angles contain Theta_B. Otherwise "-999" is reported. See the possible values in the note included after this table.	INT
36	***TB_TOA_Theta_B_H_DQX***	Real value	K	Float (4 bytes)	1 element	The Data Quality olar of TB_TOA_Theta_B_H. This value expresses the impact of radiometric uncertainties, the uncertainties of fixed parameters, and the model errors among other things. See the possible values in the note included after this table.	INT
37	***TB_TOA_Theta_B_V***	Real value	K	Float (4 bytes)	1 element	Top Of the Atmosphere (TOA) TB computed from forward models at a user supplied incidence	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						angle Theta_B (normally 42.5º), for Y olarization. This TB is generated by forward models using successfully retrieved geophysical data as input and is then transferred to the antenna level. This value is provided at the antenna reference frame and is expected to be comparable to the L1c browse TB. Since geophysical parameters used are obtained by interpolation, a valid value is reported only when retrieval is successful and there are two valid consecutive measurements of SMOS whose incidence angles contain Theta_B. Otherwise "-999" is reported. See the possible values in the note included after this table.	
38	***TB_TOA_Theta_B_V_DQX***	Real value	K	Float (4 bytes)	1 element	The Data Quality olar of TB_TOA_Theta_B_V. This value expresses the impact of radiometric uncertainties, the uncertainties of fixed parameters, and the model errors among other things. See the possible values in the note included after this table.	INT
	Retrieval_Results_Data					End of ***Retrieval_results*** structure.	
	Confidence_Descriptors_Data					Init of ***Confidence_Descriptors*** structure.	
39	***Confidence_Flags***	flags	N/A	unsigned integer (2 bytes)	1 element	See Table 4-10	INT
40	***GQX***	Integer value	N/A	Unsigned byte	1 element	Global Quality Index providing an estimate on the retrieved SM uncertainty. The value is expected	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						to be within [1, 20] with 1 being excellent and 20 indicating the retrieved parameter is worthless.	
41	***Chi_2***	Integer value	N/A	Unsigned byte	1 element	This is the retrieval fit quality index. It is the cost function at the end of retrieval normalized by the degrees of freedom. This value is expected to be within (0, Chi_2_Scale]. A lower value indicates a better fit between SMOS measurements and modeled TBs. To convert from the integer value to the actual Chi_2 value: Chi_2 = (integer value) * Chi_2_Scale / (2^8-1) where Chi_2_Scale is stored in MIR_SMUDP2 SPH.	INT
42	***Chi_2_P***	Integer value	N/A	Unsigned byte	1 element	Goodness of fit indicator. It is the Chi_2 high-end acceptability probability which is the probability that no anomaly occurred about the fit. Coded in 2's complement. The actual Chi_2_P value is: Chi_2_P= (integer value)*1/(2^8-1)" Beware of loss of precision when Chi_2_P is converted from double to unsigned byte. E.g. a value of 0.0493085 or 0.0511449 will both be converted to 13 (using scale factor of 5). If TH_Chi_2_P_Max is 0.5, then FL_Chi2_P can be OFF or ON for the same value of 13.	INT
43	***N_Wild***	Integer value	N/A	unsigned integer (2 bytes)	1 element	The number of outliers present in a successful retrieval. Therefore, N_Wild cannot be greater than M_AVA.	INT
44	***M_AVA0***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Initial number of TB measurements available in L1c	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
45	***M_AVA***	Integer value	N/A	unsigned integer (2 bytes)	1 element	The number of valid TB measurements participating in the retrieval.	INT
46	***AFP***	Real value	Km	Float (4 bytes)	1 element	The equivalent disk radius (in km) of the mean antenna foot print surface. It is computed for the M_AVA views used in the successful retrieval. Otherwise, it is set to -999.	INT
47	***N_AF_FOV***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Counts the number of valid TBs in which the L1c AF FOV flag is OFF. If no retrieval has been attempted, then the remaining valid TBs after the initial filtering are used.	INT
48	***N_Sun_Tails***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Counts the number of valid TBs in which the L1c SUN TAILS flag is ON. If no retrieval has been attempted, then the remaining valid TBs after the initial filtering are used.	INT
49	***N_Sun_Glint_Area***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Counts the number of valid TBs in which the L1c SUN GLINT AREA flag is ON. If no retrieval has been attempted, then the remaining valid TBs after the initial filtering are used.	INT
50	***N_Sun_FOV***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Counts the number of valid TBs in which the L1c SUN FOV flag is ON. If no retrieval has been attempted, then the remaining valid TBs after the initial filtering are used.	INT
51	***N_RFI_Mitigations***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Counts the number of valid TBs in which the L1c RFI Mitigation flag is ON. If no retrieval has been attempted, then the remaining valid TBs after the initial filtering are used.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
52	***N_Strong_RFI***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Counts the number of valid TBs in which the L1c Strong RFI flag is ON. If no retrieval has been attempted, then the remaining valid TBs after the initial filtering are used.	INT
53	***N_Point_Source_RFI***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Counts the number of valid TBs in which the L1c Point Source RFI flag is ON. If no retrieval has been attempted, then the remaining valid TBs after the initial filtering are used.	INT
54	***N_Tails_Point_Source_RFI***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Counts the number of valid TBs in which the L1c Tails Point Source RFI flag is ON. If no retrieval has been attempted, then the remaining valid TBs after the initial filtering are used.	INT
55	***N_Software_Error***	Integer value	N/A	unsigned integer (2 bytes)	1 element	This counts the number of TBs that pass the initial TB filtering and have the L1c Software_Error_flag ON	INT
56	***N_Instrument_Error***	Integer value	N/A	unsigned integer (2 bytes)	1 element	This counts the number of TBs that pass the initial TB filtering and have the L1c Instrument_Error_Flag ON	INT
57	***N_ADF_Error***	Integer value	N/A	unsigned integer (2 bytes)	1 element	This counts the number of TBs that pass the initial TB filtering and have the L1c ADF_Error_flag on.	INT
58	***N_Calibration_Error***	Integer value	N/A	unsigned integer (2 bytes)	1 element	This counts the number of TBs that pass the initial TB filtering and have the L1c Calibration_Error_flag ON	INT
59	***N_X_Band***	Integer value	N/A	unsigned integer (2 bytes)	1 element	This counts the number of TBs that pass the initial TB fitering and have L1c X-Band ON.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Confidence_Descriptors_Data					End of ***Confidence_Descriptors_Data*** structure.	
	Science_Descriptors_Data					Init of ***Science_Descriptors_Data*** structure	
60	***Science_Flags***	Flags		Unsigned integer 32 (4 bytes)	1 element	See Table 4-11 Note that the Science flags will be set to OFF in case in the event of no retrieval.	INT
61	***N_Sky***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Counts the number of TBs (from the last retrieval) for which at least one of the corresponding sky contribution TBH and TBV values exceeds user defined threshold (TH_Sky in AUX_CNFSMx). If no retrieval has been attempted, then the remaining valid TBs after the initial filtering are used.	INT
	Science_Descriptors_Data					End of ***Science_Descriptors*** structure	
	Processing_Descriptors_Data					Init of ***Processing_Descriptors*** structure.	
62	***Processing_Flags***	Flags	N/A	unsigned integer(2 bytes)	1 element	See Table 4-12	INT
63	***S_Tree_1***	Integer value	N/A	Unsigned byte	1 element	This represents one of the 17 Retrieval Cases from Stage 1 of Decision Tree. Among other things it indicates which forward models (Nominal, Water, Cardioid) to use for the retrieval process.	INT
64	***S_Tree_2***	Integer value	N/A	Unsigned byte	1 element	Encodes retrieval conditions including forward model used, vegetation opacity, and richness level. For interpretation of this field see related note below.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Processing_Descriptors_Data					End of ***Processing_Descriptors*** structure.	
	DGG_Current_Data					Init of **DGG_Current_Data** structure	
65	***DGG_Current_Flags***	Flag	N/A	Unsigned byte	1 element	See table 4-13	INT
66	***Tau_Cur_DQX***	Real Value	Neper	Float (4 bytes)	1 element	This is a special tau DQX value computed using a special sigma corresponding to the case where tau nad is completely free. This sigma is the parameter Current_TAU_NADIR_ASTD in the L2SM Configuration Parameters Products	INT
67	***HR_Cur_DQX***	Real Value	N/A	Float (4 bytes)	1 element	This is a special HR DQX value computed using a special sigma corresponding to the case where HR is completely free. This sigma is the parameter Current_HR_ASTD in the L2SM Configuration Parameters Products	INT
68	***N_RFI_X***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Counts the number of TBX (and companion TBXY for full polarization) among all the available TBs that are suspected of being contaminated by RFI	INT
69	***N_RFI_Y***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Counts the number of TBY (and companion TBXY for full polarization) among all the available TBs that are suspected of being contaminated by RFI	INT
70	***RFI_Prob***	Integer value	N/A	unsigned byte	1 element	The probability of RFI contamination computed based on AUX_DGGRFI product. Valid range is [0.0, 1.0]. Values > 1.0 could indicate possible data corruption in AUX_DGGRFI. Final value = (raw integer value / 200.0)	INT
	DGG_Current_Data					End of ***DGG_Current_Data*** structure	
71	***X_Swath***	real value (code as	km	signed integer (2 bytes)	1 element	Abscissa of dwell line (km) The sign of the value is relative to the direction of the satellite. It will be positive if it is to the right and negative if it is to the left.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
		integer)				X_Swath value in km=integer value * 1050 /(2^{15}-1)	
	Grid_Point_Data					End of ***Grid_Point_Data*** data set record structure.	
	List_of_Grid_Points_Datas					End of list of ***Grid_Points_Data*** data set record structures.	
	SM_SWATH					End of binary Data Set containing the ***SWATH Data set*** records.	
	Data_Block					End of binary Data Block in the product.	

Table 4-9 SM_SWATH Data Set Record

Here are detailed the rules to fill the fields included in table 4-9:

- Fields from #07 to #22
  - If no retrieval is attempted, then set the parameter value and its DQX both to -999.
  - If the parameter is fixed, then the parameter and its DQX are set to -999.If the parameter is free and retrieval is successful, then set the parameter value to the retrieved value and the DQX to the RSTD of the retrieved value.
  - If the parameter is free but the retrieval failed, then the parameter and its DQX are set to-999
- Fields from #23 to #30
  - If no main retrieval (main retrieval means not the Mda retrieval) is attempted or the main retrieval failed, then set Fields #26 to Fields #33 to -999.

- If the main retrieval is MD and it is successful, then set Field #26 Dielect_Const_MD_RE and Field #28 Dielect_Const_MD_IM to the respective real and imaginary parts of the dielectric constant from the successful main retrieval. Set Field #27 Dielect_Const_MD_RE_DQX and Field #29 Dielect_Const_MD_IM_DQX to the respective real and imaginary parts of the DQX for the dielectric constant stored in Fields #26 and #28. Set Fields #30 to #33 to -999.
- If the main retrieval is not MD and it is successful, then set Field #30 Dielect_Const_Non_MD_RE and Field #32 Dielect_Const_Non_MD_IM to the respective real and imaginary parts of the dielectric constant from the successful main retrieval. Set Field #31 Dielect_Const_Non_MD_RE_DQX and Field #33 Dielect_Const_Non_MD_IM_DQX to the respective real and imaginary parts of the DQX for the dielectric constant stored in Fields #30 and #32. If the Mda retrieval is successful, then set Field #26 Dielect_Const_MD_RE and Field #28 Dielect_Const_MD_IM to the respective real and imaginary parts of the dielectric constant from the successful Mda retrieval. Otherwise set Fields #26 and #28 to the dielectric constant computed using the free parameter value from the last iteration in the retrieval loop (as opposed to using the retrieved value in the case of a successful Mda retrieval). Set Field #27 Dielect_Const_MD_RE_DQX and Field #29 Dielect_Const_MD_IM_DQX to the DQX for the dielectric constant stored in Fields #26 and #28.

- From Filed #31 to Field #38, if there are no consecutive snapshots containing Theta B, then -999 will be output
- Field #60, S_Tree_2, the integer value is encoded according to the following table:

Encoding	**Reserved**		**Model (MN, MW, MD)**		**TAU (min,med,high)**		**Retrieval Case: Rx**	
Bits	7(MSB)	6	5	4	3	2	1	0 (LSB)
Retrieval Case: Rx								
No Retrieval	xx		xx		xx		00	
R2	xx		xx		xx		01	
R3	xx		xx		xx		10	
R4	xx		xx		xx		11	

TAU (min,med,high)				
[0 TH_23]	xx	xx	00	xx
[TH_23 TH_34]	xx	xx	01	xx
> TH_34	xx	xx	10	xx
Reserved	xx	xx	11	xx
Model (MN, MW, MD)				
MN	xx	00	xx	xx
MW	xx	01	xx	xx
MD	xx	10	xx	xx
Reserved	xx	11	xx	xx

- For Fields from #62 to Field #63, the values are output only when the parameter is free and the retrieval is successful. If the parameter is fixed, or no retrieval is attempted, or the retrieval failed, -999 is output.

4.2.1.1.1.1 Confidence Flags

The **Retrieval Flags** indicate either the quality or a characteristic of the retrieval data. This set of flags is henceforth called UDP Retrieval Flags. The UDP Retrieval Flags include:

- **FL_Range**: raised as soon as any retrieval parameter exceeds its allowed range set in AUX_CNFSMX
- **FL_DQX**: raised as soon as any retrieval parameter exceeds its allowed range set in AUX_CNFSMF

The following table lists the structure of all the Confidence Flags in the DSR, along with the FL_Views_T flag. Note that Bit #01 is the Least Significant Bit (LSB).

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
39.01	***Spare bit***		1
39.02	***FL_RFI_Prone_H***	Set when probability of RFI is high (beyond a user defined threshold TH_Current_RFI_H in AUX_CNFSMx) for H polarization. The probability is computed based on data from AUX_DGGRFI.	1
39.03	***FL_RFI_Prone_V***	Set when probability of RFI is high (beyond a user defined threshold TH_Current_RFI_V in AUX_CNFSMx) for V polarization. The probability is computed based on data from AUX_DGGRFI.	1
39.04	***Spare bit***		1
39.05	***FL_NO_PROD***	When raised, it indicates the retrieval has failed either due to retrieved geophysical data not being of an acceptable quality or other factors.	1
39.06	***FL_RANGE***	Set if any of the retrieved geophysical data are outside the extended range.	1
39.07	***FL_DQX***	Set if any DQX of the retrieved parameters exceeds a user supplied threshold.	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
39.08	***FL_ChI2_P***	Poor fit quality. This flag is raised if Chi_2_P is outside [TH_Chi2_P_Min, TH_Chi2_P_Max] These threshold values are defined in AUX_CNFSMD/F file. See warning in Chi_2_P (Table 4-9 Field# 42)	1
39.09	***FL_FARADAY_ROTATION_ANGLE***	To indicate the source of the faraday rotation angles. 0 means the faraday rotation angles in the L1c product are used. 1 means the faraday rotation angles in the AUX_FARA_x product are used	1
39.10-39.16	***Spare Bits***	7 spare bits for future use.	7

Table 4-10 Structure of the Confidence Flags in the DSR

4.2.1.1.1.2 Science Flags

The **Science Flags** indicate the presence of features within the DGG that may have impact on the processing steps for the DGG cell. This set of flags is henceforth called UDP Scene Flags..
The following table lists the structure of all the Scene Flags in the DSR (Bit #01 is the Least Significant Bit (LSB)).

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
60.01	***FL_Non_Nom***	This flag is raised (set to 1) if any one of the flags in Bits 60.03 to 60.10, 60.12 to 60.20 in this table is raised.	1
60.02	***FL_Scene_T***	This flag is set when either FL_Non_Nom or FL_Nominal is raised.	1
60.03	***FL_Barren***	This flag is raised (set to 1) when fraction of Barren surface type (Mean_FM0_FEB in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FEB in AUX_CNFSMx).	1
60.04	***FL_Topo_S***	This flag is raised (set to 1) when fraction of Strong Topography surface type (Mean_FM0_FTS in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FTS in AUX_CNFSMx).	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
60.05	***FL_Topo_M***	This flag is raised (set to 1) when fraction of Moderate Topography surface type Mean_FM0_FTM in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FTM in AUX_CNFSMx).	1
60.06	***FL_OW***	This flag is raised (set to 1) when fraction of Open Water surface type (Mean_FM0_FWO in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FOW in AUX_CNFSMx).	1
60.07	***FL_Snow_Mix***	This flag is raised (set to 1) when fraction of Mixed Snow surface type (Mean_FM0_FSM in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FSN in AUX_CNFSMx).	1
60.08	***FL_Snow_Wet***	This flag is raised (set to 1) when fraction of Wet Snow surface type (Mean_FM0_FSW in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FSW in AUX_CNFSMx).	1
60.09	***FL_Snow_Dry***	This flag is raised (set to 1) when fraction of Dry Snow surface type, which is determined by ECMWF parameter TSN (Temperature_Snow_Layer in AUX_ECMWF_), is above user defined threshold (TH_SCENE_FSD in AUX_CNFSMx).	1
60.10	***FL_Forest***	This flag is raised (set to 1) when fraction of Forest surface type (Mean_FM0_FFO in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FFO in AUX_CNFSMx).	1
60.11	***FL_Nominal***	This flag is raised (set to 1) when fraction of Nominal (Vegetated soil +sand) surface type (Mean_FM0_FNO in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FNO in AUX_CNFSMx).	1
60.12	***FL_Frost***	This flag is raised (set to 1) when fraction of Frost surface type (Mean_FM0_FRZ in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FRZ in AUX_CNFSMx).	1
60.13	***FL_Ice***	This flag is raised (set to 1) when fraction of Total Ice surface type (Mean_FM0_FTI in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FTI in AUX_CNFSMx).	1
60.14	***FL_Wetlands***	This flag is raised (set to 1) when fraction of Wetlands surface type (Mean_FM0_FWL in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FWL in AUX_CNFSMx).	1
60.15	***FL_Flood_Prob***	This flag is raised (set to 1) when the sum of the ECMWF parameters LSP and CP (Large_Scale_Precipitation and Convective_Precipitation in AUX_ECMWF_) is above user defined threshold (TH_FLOOD in AUX_CNFSMx)	1
60.16	***FL_Urban_Low***	This flag is raised (set to 1) when fraction of Urban surface type (Mean_FM0_FEU in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FUL in AUX_CNFSMx).	1
60.17	***FL_Urban_High***	This flag is raised (set to 1) when fraction of Urban surface type (Mean_FM0_FEU in MIR_SMDAP2) is above user defined threshold (TH_SCENE_FUH in AUX_CNFSMx).	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
60.18	***FL_Sand***	This flag is raised (set to 1) when the mean sand fraction is above user defined threshold (TH_Sand in AUX_CNFSMx). The mean sand fraction is computed as the non-weighted average of the sand olarizati from the Soil Properties product (PC_Sand in AUX_DFFSOI) over every DFFG cell in the working area (including land and sea DFFG cells).	1
60.19	***FL_Sea_Ice***	This flag is raised (set to 1) when fraction of Sea Ice surface type, which is determined by ECMWF parameter CI (Sea_Ice_Cover in AUX_ECMWF_) is above user defined threshold (TH_Sea_Ice in AUX_CNFSMx).	1
60.20	***FL_Coast***	This flag is raised (set to 1) when the Wetlands fraction (FWL in AUX_DFFFRA) in at least one DFFG cell in the working area is above zero and the corresponding Land Cover Class reference code (FWL_Class_Code in AUX_DFFFRA) is 242.	1
60.21	***FL_Occur_T***	This flag is raised (set to 1) if any one of FL_Litter, FL_PR, or FL_Intercep is raised indicating occurrence of a special event during retrieval.	1
60.22	***FL_Litter***	This flag is raised (set to 1) when mean litter opacity is above user defined threshold (TH_TAU_Litter in AUX_CNFSMx).	1
60.23	***FL_PR***	This flag is raised (set to 1) when interception index (PR_Index in MIR_SMDAP2) is below certain threshold computed using the user defined parameter (TH_PR in AUX_CNFSMx).	1
60.24	***FL_Intercep***	This flag is raised (set to 1) when ECMWF parameter SRC (Skin_Reservoir_Content in AUX_ECMWF_) is above user defined threshold (TH_Intercep in AUX_CNFSMx).	1
60.25	***FL_External***	This flag is raised (set to 1) when one of FL_Rain, FL_TEC is raised or N_Sky > 0.	1
60.26	***FL_Rain***	This flag is raised (set to 1) when the sum of the ECMWF parameters LSP and CP (Large_Scale_Precipitation and Convective_Precipitation in AUX_ECMWF_) is above user defined threshold (TH_RAIN in AUX_CNFSMx).	1
60.27	***FL_TEC***	This flag is raised (set to 1) if the TEC content of the first snapshot contributing TB measurements to the last retrieval is above the user defined threshold (TH_TEC in AUX_CNFSMx). If no retrieval has been attempted, then the TBs are those used to compute MVAL0.	1
60.28	***FL_TAU_FO***	This flag is raised (set to 1) when mean forest opacity is above user defined threshold (TH_SCENE_TAU_FO in AUX_CNFSMx).	1
60.29	***FL_WINTER_FOREST***	Flag indicating that the winter forest case has been selected by the decision tree.	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
60.30	*FL_DUAL_RETR_FNO_FFO*	Flag indicating dual retrieval is performed on the FNO and FFO fractions.	1
60.31-60.32	*Spare_SFL*	Two spare bits	2

Table 4-11 Structure of the Science Flags in the DSR

4.2.1.1.1.3 Processing Flags

Processing flags specify main retrieval options and conditions imposed on parameters used for processing.

The following table lists the structure of all the Retrieval Flags in the DSR (Bit #01 is the Least Significant Bit (LSB)). Note that 12 spare fields exit for future use.

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
62.01	*FL_R4*	It will be set to True if attempted regardless of success.	1
62.02	*FL_R3*	It will be set to True if attempted regardless of success.	1
62.03	*FL_R2*	It will be set to True if attempted regardless of success.	1
62.04	*FL_MD_A*	True if Mda failed	1
62.05-62.16	*Spare_bits*	12 spare fields for future use	12

Table 4-12 Structure of the Processing Flags in the DSR

4.2.1.1.1.4 DGG Current Flags

The content of the DGG_Current_Flags is specified below:

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
65.01	***FL_Current_Tau_Nadir_LV***	Flag driving request for updating the DGG_Current_Tau_Nadir_LV map after processing. 1 means update to the map.	1
65.02	***FL_Current_Tau_Nadir_FO***	Flag driving request for updating the DGG_Current_Tau_Nadir_FO map after processing. 1 means update to the map.	1
65.03	***FL_Current_HR***	Flag driving request for updating the DGG_Current_HR map after processing. 1 means update to the map.	1
65.04	***FL_Current_RFI***	Flag driving request for updating the DGG_Current_RFI map after processing. 1 means update to the map.	1
65.05	***FL_Current_Flood***	Flag driving request for updating the DGG_Current_Flood map after processing. It is a place holder. No Algorithm has been defined yet. 1 means update to the map.	1
65.06-65.08	***Spare_bits***	3 spare bits	3

Table 4-13 Structure of the DGG Current Flags in the DSR

4.2.1.2 Level 2 Soil Moisture Data Analysis Product (MIR_SMDAP2)

4.2.1.2.1 Main Product Header

Same as the UDP’s MPH. See section 4.2.1.1.1

4.2.1.2.2 Specific Product Header

The following table lists the data elements in the SPH of the L2SM DAP that are in addition to those in the common SPH (see section 4.1.2.1 and 4.1.2.2)

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific_Product_Header structure	
02-20	***Main_Info***	structure				Main Product Info structure's fields as defined in fields 01 to 18 in Table 4-3	
21	***Quality_Information***	Starting Tag				Init of XML Structure containing variables described below	
22	***Overall_Quality***	integer	N/A	1	%01d	Good, medium or bad: 0 = good, 1 = medium, 2 = bad The overall quality is set according to the following formula: ▪ If percentage of the nodes with successful retrieval > Quality_Threshold_High then Overall_Quality = 0 (good) ▪ else if percentage of the nodes with successful retrieval > Quality_Threshold_Low then Overall_Quality = 1 (medium) ▪ else Overall_Quality = 2 (bad) Percentage of the nodes with successful retrievals is computed as: 100 * (sum of Total_Successful_Nodes in SPH) / (Total_Processed_L1c_Nodes in SPH)	INT
23	***Overall_Quality_Threshold_Low***	integer	(10^{-2}%)	5 bytes	%05d	Low Threshold to set the SPH Overal_Quality field	AUX_CNFSMD/ AUX_CNFSMF

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
24	***Overall_Quality_Threshold_High***	integer	(10^{-2}%)	5 bytes	%05d	High Threshold to set the SPH Overal_Quality field	AUX_CNFSMD/ AUX_CNFSMF
25	***Total_L1c_Nodes***	Integer	N/A		%d	Total number of nodes in the L1c product	MIR
26	***Total_Processed_L1c_Nodes***	Ineger	N/A		%d	Total number of L1c nodes falling inside the Processing_Window	INT
27	***Percentage_Rejected_TBs***	Starting Tag				XML structure containing the percentage of rejected TBs due to different criteria	
28	***Due_To_Amplitude_Range***	Integer	10^{-2}%	5 bytes	%05d	Percentage of TBs rejected due to amplitude range check	INT
29	***Due_To_TB_Range***	Integer	10^{-2}%	5 bytes	%05d	Percentage of TBs rejected due to range check	INT
30	***Due_To_4th_Stokes_Parameter***	Integer	10^{-2}%	5 bytes	%05d	Percentage of TBs rejected due to 4th Stokes Parameter check	INT
31	***Due_To_Sun_Point_Flag***	Integer	10^{-2}%	5 bytes	%05d	Percentage of TBs rejected due to Sun Point Flag check.	INT
32	***Due_To_Spatial_Resolution***	Ineger	10^{-2}%	5 bytes	%05d	Percentage of TBs rejected due to Spatial Resolution check.	INT
33	***Due_To_1st_Stokes_Anomaly***	Ineger	10^{-2}%	5 bytes	%05d	Percentage of TBs rejected due to 1st Stokes anomaly	INT
34	***Percentage_Rejected_TBs***	Ending Tag				Tag ending the XMLstructure containing the percentage of rejected TBs due to different criteria.	
35	***Total_Retrieval_Attempted_L1c_Nodes***	Integer	N/A		%d	Total number of nodes for which the retrieval is attemped.	INT
36	***List_of_Retrieval_Cases_Statistics***	Starting tag				Init of list of statistics for the different retrieval cases with a counter as attribute	
37	***Retrieval_Case_Statistics***	Starting Tag				Tag starting the statistics for each retrieval case	
38	***Retrieval_Case***	String	N/A	Variable	%s	The retrieval case. Possible values are: → All_open_water, → Heterogenous_open_water → Strong_topo_pollution → Soft_topo_pollution	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
						→ All_wet_snow → All_mixed_snow → Wet_snow_pollution → Mixed_snow_pollution → All_frost → Frost_pollution → Forest_cover → Soil_cover → All_wetlands → All_barren → All_ice → All_urban → Heterogeneous	
39	***Total_Nodes***	Integer	N/A		%d	Total number of L1c nodes assigned to this retrieval case	INT
40	***Total_Failed_Nodes***	Integer	N/A		%d	Total number of L1c nodes assigned to this retrieval case whose retrieval failed.	INT
41	***R4***	Starting tag				Tag starting the statistics for R4 (maximum) retrieval for this retrieval case with a counter as attribute.	
42	***Model_Opacity_Level***	Starting Tag				Tag starting the statistics for each combination of model and opacity level. "Model_Opacity_Level" is repeated counter number of times.	
43	***Model***	String	N/A	2	2*uc	The selected model for retrieval: MN, MW or MD.	INT
44	***Opacity_Level***	String	N/A	Variable	%s	The opacity level: Low, Med or High	INT
45	***Total_Successful_Nodes***	Integer	N/A		%d	Total number of L1c nodes with successful retrieval for this combination of model and opacity level.	INT
46	***Model_Opacity_Level***	Ending Tag				Tag ending the statistics for each combination of model and opacity level.	

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
47	***R4***	Ending Tag				Tag ending the statistics for R4 (maximum) retrieval for this retrieval case.	
48	***R3***	Starting Tag				Tag starting the statistics for R3 (full) retrieval for this retrieval case with a couner as attribute	
49	***Model_Opacity_Level***	Starting Tag				Tag starting the statistics for each combination of model and opacity level. “Model_Opacity_Level” is repeated counter number of times.	
50	***Model***	String	N/A	2	2*uc	The selected model for retrieval: MN, MW or MD.	INT
51	***Opacity_Level***	String	N/A	Variable	%s	The opacity level: Low, Med or High	INT
52	***Total_Successful_Nodes***	Integer	N/A		%d	Total number of L1c nodes with successful retrieval for this combination of model and opacity level.	INT
53	***Model_Opacity_Level***	Ending Tag				Tag ending the statistics for each combination of model and opacity level.	
54	***R3***	Starting Tag				Tag ending the statistics for R3 (full) retrieval for this retrieval case.	
55	***R2***	Starting Tag				Tag starting the statistics for R2 (minimum) retrieval for this case with a counter as attribute.	
56	***Model_Opacity_Level***	Starting Tag				Tag starting the statistics for each combination of model and opacity level. “Model_Opacity_Level” is repeated counter number of times.	
57	***Model***	String	N/A	2	2*uc	The selected model for retrieval: MN, MW or MD.	INT
58	***Opacity_Level***	String	N/A	Variable	%s	The opacity level: Low, Med or High	INT
59	***Total_Successful_Nodes***	Integer	N/A		%d	Total number of L1c nodes with successful retrieval for this combination of model and opacity level.	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
60	***Model_Opacity_Level***	Ending Tag				Tag ending the statistics for each combination of model and opacity level.	
61	***R2***	Ending Tag				Tag ending the statistics for R2 (minimum) retrieval for this retrieval case.	
62	***Retrieval_Case_Statistics***	Ending Tag				End of statistics for each retrieval case.	
63	***List_of_Retrieval_Cases_Statistics***	Ending Tag				End of list of statistics for the different retrieval cases.	
64	***Quality_Information***	Ending Tag				Ending of XML Structure containing quality variables	
65	***L2_Product_Location***	Starting Tag				Init of XML structure containing variables described below	
66	***Start_Lat***	real	deg	11 bytes	%+011.6f	Latitude of first satellite nadir point at the Sensing_Start time of first snapshot used in the generation (positive North)	MIR
67	***Start_Long***	real	deg	11 bytes	%+011.6f	Longitude of first satellite nadir point at the Sensing_Start time of first snapshot used in the generation (positive East of Greenwich (-180,+180])	MIR
68	***Stop_Lat***	real	deg	11 bytes	%+011.6f	Latitude of first satellite nadir point at the Sensing_Stop time of last snapshot used in the generation (positive North)	MIR
69	***Stop_Long***	real	deg	11 bytes	%+011.6f	Longitude of first satellite nadir point at the Sensing_Stop time of last snapshot used in the generation (positive East of Greenwich (-180,+180])	MIR
70	***Mid_Lat***	real	deg	11 bytes	%+011.6f	Latitude of satellite nadir point of the snapshot in the middle (rounded	MIR

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
						down) of the list used in the generation of the product .	
71	***Mid_Lon***	real	deg	11 bytes	%+011.6f	Longitude of satellite nadir point of the snapshot in the middle (rounded down) of the list used in the generation of the product	MIR
72	***Southernmost_Latitude***	real	deg	11	%+011.6f	Geodetic Latitude of southernmost grid point (WGS84)	INT
73	***Southernmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of southernmost grid point	INT
74	***Northernmost_Latitude***	real	deg	11	%+011.6f	Geodetic Latitude of northernmost grid point (WGS84)	INT
75	***Northernmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of northernmost grid point	INT
76	***Easternmost_Longitude***	real	deg	11	%+011.6f	Geocentric Longitude of easternmost grid point	INT
77	***Easternmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of easternmost grid point	INT
78	***Westernmost_Longitude***	real	deg	11	%+011.6f	Geocentric Longitude of Westernmost grid point	INT
79	***Westernmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of westernmost grid point	INT
80	***L2_Product_Location***	Ending Tag				End of XML structure containing variables described below	
81-92	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
93	***Specific_Product_Header***	Ending Tag				Tag ending the Specific_Product_Header structure	

Table 4-14 SPH of the L2 SM Data Analysis Product

See the Reference Data Set names in Table 4-8.

4.2.1.2.3 Data Block

For each SM_SWATH DSR in the UDP, there is one corresponding SM_SWATH_ANALYSIS DSR in the DAP. Therefore, the number of DSRs in a DAP is equal to the number of DGG cells in the input L1c product.

A SM_SWATH_ANALYSIS DSR is variable in size since it captures only the data for good views, the number of which varies from cell to cell and time to time.

The size of DSRs in this product varies depending on the number of Measurements Availables (M_AVA) in one DGG point.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	SM_SWATH_ANALYSIS					Init of binary Data Set containing the ***SM_SWATH_ANALYSIS*** Data Set records.	
01	***N_Grid_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of ***Grid_Points*** data set record structures.	INT
	List_of_Grid_Point_Datas					Init of list of ***Grid_Point_Data*** data set record structures.	
	Grid_Point_Data					Init of ***Grid_Point_Data*** data set record structure.	
02	***Grid_Point_ID***	Identifier	N/A	unsigned integer (4 bytes)	1 element	Unique identifier of Earth fixed grid point	MIR
03	***Latitude***	real value	deg	Float (4 bytes)	1 element	Latitude of DGG point	MIR
04	***Longitude***	real value	deg	Float (4 bytes)	1 element	Longitude of DGG point	MIR
05	***Altitude***	real value	m	Float (4 bytes)	1 element	Altitude of DGG point	MIR

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Mean_Cover_Fractions_Data					Init of ***Mean_Cover_Fractions_Data*** structure.	
06	***Mean_FM0_FNO***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FNO (nominal soil cover) used to decide the retrieval case. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
07	***Mean_FM0_FFO***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FFO (forest cover) used to decide the retrieval case. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
08	***Mean_FM0_FWL***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FWL (wetlands) used to decide the retrieval case. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
09	***Mean_FM0_FWO***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FWO (open water) used to decide the retrieval case. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
10	***Mean_FM0_FEB***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FEB (barren land cover) used to decide the retrieval case. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
11	***Mean_FM0_FTI***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FTI (total ice) used to decide the retrieval case. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
12	***Mean_FM0_FEU***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FEU (urban land cover) used to decide the retrieval case. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
13	***Mean_FM0_FTS***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FTS (strong topography) used to decide the retrieval case. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
14	***Mean_FM0_FTM***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FTM (moderate topography) used to decide the retrieval case The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
15	***Mean_FM0_FRZ***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FRZ (non-permanent frost) used to decide the retrieval case. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
16	***Mean_FM0_FSM***	integer value	%	unsigned integer (2	1 element	Mean cover fraction for surface type FSM (mixed snow) used to decide the retrieval case.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
				bytes)		The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	
17	***Mean_FM0_FSW***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FSW (wet snow) used to decide the retrieval case. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
18	***Mean_FM_FNO***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FNO (nominal soil cover) used in selecting forward models. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1)	INT
19	***Mean_FM_FFO***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FFO (forest cover) used in selecting forward models. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1)	INT
20	***Mean_FM_FWL***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FWL (wetlands) used in selecting forward models. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1)	INT
21	***Mean_FM_FWP***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FWP (pure water) used in selecting forward models. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1)	INT
22	***Mean_FM_FWS***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FWS (saline water) used in selecting forward models. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1)	INT
23	***Mean_FM_FEB***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FEB (barren land cover) used in selecting forward models. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
24	***Mean_FM_FTI***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FTI (total ice) used in selecting forward models. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1)	INT
25	***Mean_FM_FRZ***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FRZ (non-permanent frost) used in selecting forward models The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1)	INT
26	***Mean_FM_FSN***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FSN (olariza snow) used in selecting forward models. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1)	INT
27	***Mean_FM_FEU***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for surface type FEU (urban land cover) used in selecting forward models. The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1)	INT
	Mean_Cover_Fractions					End of ***Mean_Cover_Fractions_Data*** structure.	
	Other_Data					Init of ***Other_Data*** structure.	
28	***X_Swath***	real value (code as integer)	km	signed integer (2 bytes)	1 element	Abscissa of dwell line (km). The sign of the value is relative to the direction of the satellite. It will be positive if it is to the right and negative if it is to the left. X_Swath value in km = integer value * 1050 / (2^{15}-1).	INT
29	***N_TB_Range***	Integer value	N/A	unsigned integer (2 bytes)	1 element	L2 testing TB against range – count of deleted TB measurements.	INT
30	***RATIO_AVA***	Integer value	N/A	unsigned byte	1 element	Ratio of useful views Coded in 2's complement. LSB =1/(2^8-1).	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						This means value = (unsigned char) *1/(2^8-1)	
31	***N_Retries***	Integer value	N/A	unsigned byte	1 element	Number of retries	INT
32	***N_Cleaned***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Wild data removed (count)	INT
33	***N_Iterations***	Integer value	N/A	unsigned byte	1 element	Number of iterations to convergence	INT
34	***PR_Index***	Integer value	N/A	unsigned byte	1 element	Polarisation ratio Index The range is [-1, 1] or -999. The final value is: -999 if raw integer value is (2^8-1) (raw integer value – 127)/127 otherwise	INT
35	***Tsurf_Init_Val***	real value	K	float (4 bytes)	1 element	Initial value for free parameters. See the possible values in the note included after this table.	INT
36	***A_Card_Init_Val***	real value	F/M	float (4 bytes)	1 element	Initial value for free parameters	INT
37	***SM_Init_Val***	real value	%	float (4 bytes)	1 element	Initial value for free parameters	INT
38	***Tau_Init_Val***	real value	neper	float (4 bytes)	1 element	Initial value for free parameters	INT
39	***TTH_Init_Val***	real value	N/A	float (4 bytes)	1 element	Initial value for free parameters	INT
40	***RTT_Init_Val***	real value	N/A	float (4 bytes)	1 element	Initial value for free parameters	INT
41	***OMH_Init_Val***	real value	N/A	float (4 bytes)	1 element	Initial value for free parameters. See the possible values in the note included after this table.	INT
42	***Diff_Init_Val***	real value	N/A	float (4 bytes)	1 element	Initial value for free parameters.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						See the possible values in the note included after this table.	
43	***HR_Init_Val***	real value	N/A	float (4 bytes)	1 element	Initial value for free parameters. See the possible values in the note included after this table.	INT
44	***Tsurf_Init_Std***	real value	N/A	float (4 bytes)	1 element	Initial std for free parameters. See the possible values in the note included after this table.	INT
45	***A_Card _Init_Std***	real value	N/A	float (4 bytes)	1 element	Initial std for free parameters. See the possible values in the note included after this table.	INT
46	***SM_Init_Std***	real value	N/A	float (4 bytes)	1 element	Initial std for free parameters. See the possible values in the note included after this table.	INT
47	***Tau_Init_Std***	real value	N/A	float (4 bytes)	1 element	Initial std for free parameters. See the possible values in the note included after this table.	INT
48	***TTH_Init_Std***	real value	N/A	float (4 bytes)	1 element	Initial std for free parameters. See the possible values in the note included after this table.	INT
49	***RTT_Init_Std***	real value	N/A	float (4 bytes)	1 element	Initial std for free parameters. See the possible values in the note included after this table.	INT
50	***OMH_Init_Std***	real value	N/A	float (4 bytes)	1 element	Initial std for free parameters. See the possible values in the note included after this table.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
51	***Diff_Init_Std***	real value	N/A	float (4 bytes)	1 element	Initial std for free parameters. See the possible values in the note included after this table.	INT
52	***HR_Init_Std***	real value	N/A	float (4 bytes)	1 element	Initial std for free parameters. See the possible values in the note included after this table.	INT
53	***TAU_LV_IN***	real value	neper	float (4 bytes)	1 element	Read in from its Current Table. See the possible values in the note included after this table.	INT
54	***TAU_LV_IN_DQX***	real value	neper	float (4 bytes)	1 element	Read in from its Current Table. See the possible values in the note included after this table.	INT
55	***TAU_FO_IN***	real value	neper	float (4 bytes)	1 element	Read in from its Current Table. See the possible values in the note included after this table.	INT
56	***TAU_FO_IN_DQX***	real value	neper	float (4 bytes)	1 element	Read in from its Current Table. See the possible values in the note included after this table.	INT
57	***HR_IN***	real value	N/A	float (4 bytes)	1 element	Read in from its Current Table. See the possible values in the note included after this table.	INT
58	***HR_IN_DQX***	real value	N/A	float (4 bytes)	1 element	Read in from its Current Table. See the possible values in the note included after this table.	INT
59	***Tau_Litter***	real value	neper	Float (4 bytes)	1 element	The canopy opacity for litter averaged using Mean WEF for the retrieval fraction. It is reported regardless of thevalue of the flag Use_TAU_L_In_Inv in the AUX_CNFSMD/F	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
60	***T_Phys***	real value	K	Float (4 bytes)	1 element	Physical temperature computed using the WEF of the median measured TB for the retrieval fraction.	INT
	Other_Data					End of ***Other_Data*** structure.	
61	***DAP_Flags***	Flags	N/A	Unsigned integer (4 bytes)	1 element	See Table 4-15	INT
62	***M_AVA0***	Counter	N/A	unsigned integer (2 bytes)	1 element	Initial number of TBs before filtering	INT
	List_of_Residual_Datas					Init of list of ***Residual_Data*** structure.	
	Residual_Data					Init of ***Residual_Data*** structure, repeated M_AVA0 times	
63	***Residual***	real value	K	Float (4 bytes)	1 element.	Residuals of TBMm-TBFm	INT
	Residual_Data					End of ***Residual_Data*** structure.	
	List_of_Residual_Datas					End of list of ***Residual_Data*** structure.	
64	***Num_Incidence_Angles***	Counter	N/A	unsigned integer (2 bytes)	1 element	The number of valid incidence angles used in the retrieval.	INT
	List_of_Cover_Fractions_Datas					Init of list of Cover_Fractions_Data structure.	
	Cover_Fractions_Data					Init of Cover_Fractions_Data structure, repeated Num_Incidence_Angles times	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
65	***Cover_Frac_FM_ FNO***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Vegetated Soil+ Sand The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
66	***Cover_Frac_FM_ FFO***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Forest The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
67	***Cover_Frac_FM_ FWL***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Wetlands The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
68	***Cover_Frac_FM_ FWP***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Open Fresh Water The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
69	***Cover_Frac_FM_ FWS***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Open Saline Water The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
70	***Cover_Frac_FM_ FEB***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Barren The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
71	***Cover_Frac_FM_ FTI***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for permanent ice/ snow The range is [0, 100].	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						The final value is (raw integer value)*100/(2^16-1).	
72	***Cover_Frac_FM_FRZ***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Frozen The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
73	***Cover_Frac_FM_FSN***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Snow The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
74	***Cover_Frac_FM_FEU***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Urban The range is [0, 100]. The final value is (raw integer value)*100/(2^16-1).	INT
	Cover_Fractions_Data					End of ***Cover_Fractions_Data*** structure.	
	List_of_Cover_Fractions_Datas					End of list of Cover_Fractions_Datas.	
	Grid_Point_Data					End of ***Grid_Point_Data*** data set record structure.	
	List_of_Grid_Point_Datas					End of list of ***Grid_Point_Data*** data set record structures.	
	SM_SWATH_ANALYSIS					End of binary Data Set containing the ***SM_SWATH_ANALYSIS Data Set*** records.	
	Data_Block					End of binary Data Block in the product.	

Table 4-15 Binary Content of a DSR in the SM_SWATH_ANALYSIS Product

Here are detailed the rules to fill the fields included in table 4-12:

- Fields from #36 to #52
  - If no retrieval is attempted, then set the initial value and its standard deviation both to -999.
  - If the parameter is fixed, then set the initial value to the reference value computed using the WEF of the median measured TB for the retrieval fraction. Set the standard deviation to -999 in this case.
  - If the parameter is free (regardless of whether the retrieval is successful or not), then report the initial value and the associated ASTD of the free parameter

- Fields from #53 to #58
  - If the corresponding DGG current table is not available, -999 is the output.

4.2.1.2.3.1 DAP Flags

The following table lists the structure of all the flags in the DSR (Bit #01 is the Least Significant Bit (LSB)):

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
61.01	***FL_Data_Miss***	Check fall back options	1
61.02	***FL_MVAL0***	Flag to indicate no more retrieval to be done. True if MVAL0< TH_Mmin0	1
61.03	***FL_MVAL***	Flag to indicate no more retrieval to be done. True if MVAL < TH_Mmin1	1
61.04	***FL_R4_NITM***	Flag indicating that R4 was attempted, but failed with NITM (R4:Retrieval status for retrieval option 4 – Full retrieval scheme)	1
61.05	***FL_R4_KDIA***	Flag indicating R4 wasattempted, but failed with KDIA (R4:Retrieval status for retrieval option 4 – Full retrieval scheme)	1
61.06	***FL_R4_COND***	Flag to indicate R4 attempted, but failed COND (R4:Retrieval status for retrieval option 4 – Full retrieval scheme)	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
61.07	***FL_R3_NITM***	Flag to indicate R37 attempted, failed NITM (R3: Retrieval status for retrieval option 3 –rich retrieval scheme)	1
61.08	***FL_R3_KDIA***	Flag to indicate Failed KDIA (R3: Retrieval status for retrieval option 3 –rich retrieval scheme)	1
61.09	***FL_R3_COND***	Flag to indicate R3 attempted, but failed COND (R3: Retrieval status for retrieval option 3 –rich retrieval scheme)	1
61.10	***FL_R2_NITM***	Flag to indicate R2 attempted, but failed NITM (R2: Retrieval status for retrieval option 2 –poor retrieval scheme)	1
61.11	***FL_R2_KDIA***	Flag to indicate Failed KDIA	1
61.12	***FL_R2_COND***	Flag to indicate R2 attempted, but failed COND (R2: Retrieval status for retrieval option 2 –poor retrieval scheme)	1
61.13	***FL_MD_NITM***	Flag to indicate aditonal MD retrieval failed NITM	1
61.14	***FL_MD_KDIA***	Flag to indicate Failed KDIA	1
61.15	***FL_MD_COND***	Flag to indicate Mda failed COND	1
61.16	***FL_CE***	Computational exceptions	1
61.17	***FL_Sun_Point_C***	Used to exclude view	1
61.18	***FL_Sun_Glint_FOV_C***	Indicator of possible sun glint effects. Not relevant for SM computations	1
61.19	***FL_R4_RANGE***	Set to ON if a retrieved value is outside the extended valid range in R4 retrieval.	1
61.20	***FL_R4_DQX***	Set to ON if a retrieved value DQX is greater than the threshold in R4 retrieval	1
61.21	***FL_R3_RANGE***	Set to ON if a retrieved value is outside the extended valid range in R3 retrieval.	1
61.22	***FL_R3_DQX***	Set to ON if a retrieved value DQX is greater than the threshold in R3 retrieval	1
61.23	***FL_R2_RANGE***	Set to ON if a retrieved value is outside the extended valid range in R2 retrieval.	1
61.24	***FL_R2_DQX***	Set to ON if a retrieved value DQX is greater than the threshold in R2 retrieval	1
61.25	***FL_MDA_RANGE***	Set to ON if a retrieved value is outside the extended valid range	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
61.26	***FL_MDA_DQX***	Set to ON if a retrieved value DQX is greater than the threshold in Mda retrieval.	1
61.27-61.32	***Spare***	Spare bits	6

Table 4-16 Structure of the Flags in the DAP

4.2.2 Level 2 Ocean Salinity data types

As is written in [RD.9], the SMOS L2 SSS processor shall derived one geophysical parameter, the Sea Surface Salinity.

The SMOS L2 SSS processor generates two types of product:

- The User Data Product (UDP) is designed for olarization and high level processing centers. It includes geophysical parameters, a theorical estimate of their accuracy and flags and descriptors for the product quality.
- Data Analysis Product: more information, for quality control and advanced users, are available in the Data Analysis Report (DAP)

All L2 SSS products are in XML hybrid format with headers in ASCII and binary data blocks

4.2.2.1 Level 2 Ocean Salinity User Data Product (MIR_OSUDP2)

The SMOS L2 SSS processor shall derived one geophysical parameter, the Sea Surface Salinity. The iterative retrieval method that is implemented in the processor is able to derive some information on other geophysical parameters depending on the forward model used in the iterative scheme. The forward model accounts for main contributions to the measurements. For one of these contributions, the one due to the roughness of sea surface, three sub-models are implemented in parallel in the processor. For this reason, most geophysical parameters in the output products are repeated three times.

The User Data Product (UDP) is designed for oceanographers and high level processing centers. It includes geophysical parameters, a theoretical estimate of their accuracy and flags and descriptors for the product quality.

The User Data Product is in XML hybrid format with headers in ASCII and binary data blocks.

4.2.2.1.1 Main Product Header

See section 4.1.1

4.2.2.1.2 Specific Product Header

The following table lists the data elements in the SPH of the L2SOS UDP that are in addition to those in the common SPH (see section 4.1.2.1 and 4.1.2.2):

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	
02-20	***Main_Info***	structure				Main Product Info structure's fields as defined in fields 01 to 18 in Table 4-3	
21	***Quality_Information***	Starting Tag				Init of XML Structure containing variables described below	
22	***Total_Selected_L1c_Grid_Points***	integer	N/A	4 byte	%04d	Total number of grid points in L1c selected for processing by the land sea mask. Good_Quality_Grid_Points=Sea_Ice_Quality.Good_Quality + Near_Coast_Quality.Good_Quality + Sea_Ice_Quality.Good_Quality Poor_Quality_Grid_Points =Sea_Ice_Quality.Poor_Quality + Near_Coast_Quality.Poor_Quality + Sea_Ice_Quality.Poor_Quality Rejected_Grid_Points (where no retrieval was attempted) = Total_Selected_L1c_Grid_Points -	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
						(Good_Quality_Grid_Points + Poor_Quality_Grid_Points)	
23	***List_of_Retrieval_Schemes***	Starting tag				Init of XML structure for list of quality information for each Retrieval Scheme, repeated "count" = 4 times.	
24	***Quality_Description***	Starting tag				Init of quality information for a retrieval schema.	
25	***Retrieval_Schema***	String	dl	Variable	%s	Retrieval scheme index (1 to 4)	INT
26	***Land_Rejected***	Integer	dl	4 bytes	%04d	Total number of grid points rejected because they are classified as land (Fg_sc_land_sea_coast1.false & Fg_sc_land_sea_coast2.false)	INT
27	***Too_Close_To_Land_Rejected***	Integer	dl	4 bytes	%04d	Total number of grid points rejected because they are classified as to close to land (Fg_sc_land_sea_coast1.false & Fg_sc_land_sea_coast2.true)	INT
28	***Ice_Rejected***	Integer	dl	4 bytes	%04d	Total number of grid points relected because they are classified as ice (Fg_sc_ice.true)	INT
29	***Missing_ECMWF_Rejected***	Integer	dl	4 bytes	%04d	Total number of grid points that would have been processed but were rejected because of missing ECMWF Data needed for this configuration	INT
30	***Too_Few_Measurements_Rejected***	Integer	dl	4 bytes	%04d	Total number of grid points rejected because there are too few measurements (Fg_ctrl_num_meas_min.true)	INT
31	***Good_Quality_Grid_Points***	Integer	dl	4 bytes	%04d	Total number of good quality grid points used for retrieval Good_Quality_Grid_Points = Sea_Ice_Quality.Good_Quality + Near_Coast_Quality.Good_Quality + Sea_Ice_Quality.Good_Quality	INT
32	***Poor_Quality_Grid_Points***	Integer	dl	4 bytes	%04d	Total number of poor quality grid points used for retrieval. Poor_Quality_Grid_Points=	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
						Sea_Ice_Quality.Poor_Quality + Near_Coast_Quality.Poor_Quality+ Sea_Ice_Quality.Poor_Quality	
33	***Sea_Quality***					Tag starting the XML Sea_Quality structure Retrieval quality record for gridpoints flagged as sea	
34	***Grid_Point_Type***	String	dl	%10s	<=10	Grid point type for this quality record. One of: “Sea” (Fg_sc_land_sea_coast1 = = true and Fg_sc_land_sea_coast2 == false), “Near_Coast” (Fg_sc_land_sea_coast1 = = true and Fg_sc_land_sea_coast2 == true), “Sea_Ice” (Fg_sc_suspect_ice = = true)	INT
35	***SSS_Class***	String	dl	%6s	<=6	SSS class for this quality record. One of: “All”, “High”, “Normal”, “Low”. Thresholds set by Tm_Qual_Low_SSS/Tm_Qual_High_SSS in AUX_CNFOSD/F.	INT
36	***SST_Class***	String	dl	%6s	<=6	SST class for this quality record. One of: “All”, “High”, “Normal”, “Low”. Thresholds set by Tm_Qual_Low_SST/Tm_Qual_High_SST in AUX_CNFOSD/F.	INT
37	***WS_Class***	String	dl	%6s	<=6	WS class for this quality record. One of: “All”, “High”, “Normal”, “Low”. Thresholds set by Tm_Qual_Low_WS/Tm_Qual_High_WS in AUX_CNFOSD/F.	INT
38	***Good_Quality***	Integer	dl	4 bytes	%04d	total number of grid points in this class flagged as good quality	INT
39	***Good_Quality_Retrieved***	Integer	dl	4 bytes	%04d	total number of successful retrievals for good quality grid points in this class	INT
40	***Good_Quality_Retrieved _Average_Sigma***	Integer	dl	4 bytes	%04d	average sigma for good quality grid points in this class with successful retrievals	INT
41	***Good_Quality_Failed_Ou tside_Valid_Range***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to poor SSS quality: outside valid range (Fg_ctrl_range = = true)	INT
42	***Good_Quality_Failed_Sig***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to poor SSS quality: sigma too high	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
	ma_Too_High					(Fg_ctrl_sigma = = true)	
43	***Good_Quality_Failed_Poor_Fit***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to poor fit quality: Fg_ctrl_chi2 = = true or Fg_ctrl_chi2_P = = true	INT
44	***Good_Quality_Failed_Marquardt***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed because lambda grew too large during iterations (Fg_ctrl_marq = = true)	INT
45	***Good_Quality_Failed_Maxiter***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed because the maximum number of iterations was reached (Fg_ctrl_reach_Maxiter = = true)	INT
46	***Good_Quality_Failed_OOLUT***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to one or more out-of-LUT range critical flag raised	INT
47	***Poor_Quality***	Integer	dl	4 bytes	%04d	number of grid points in this class flagged as poor quality	INT
48	***Poor_Quality_Retrieved***	Integer	dl	4 bytes	%04d	total number of successful retrievals for poor quality grid points in this class	INT
49	***Poor_Quality_Retrieved_Average_Sigma***	Integer	dl	4 bytes	%04d	average sigma for poor quality grid points in this class with successful retrievals	INT
50	***Sea_Quality***					Tag ending the XML Sea_Quality structure	INT
51	***Near_Coast_Quality***					Tag starting the XML Near_Coat_Quality structure Retrieval quality record for gridpoints flagged as near to coast	INT
52	***Grid_Point_Type***	String	dl	%10s	<=10	Grid point type for this quality record. One of: “Sea” (Fg_sc_land_sea_coast1 = = true and Fg_sc_land_sea_coast2 == false), “Near_Coast” (Fg_sc_land_sea_coast1 = = true and Fg_sc_land_sea_coast2 == true), “Sea_Ice” (Fg_sc_suspect_ice = = true)	INT
53	***SSS_Class***	String	dl	%6s	<=6	SSS class for this quality record. One of: “All”, “High”, “Normal”, “Low”. Thresholds set by Tm_Qual_Low_SSS/Tm_Qual_High_SSS in AUX_CNFOSD/F.	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
54	***SST_Class***	String	dl	%6s	<=6	SST class for this quality record. One of: "All", "High", "Normal", "Low". Thresholds set by Tm_Qual_Low_SST/Tm_Qual_High_SST in AUX_CNFOSD/F.	INT
55	***WS_Class***	String	dl	%6s	<=6	WS class for this quality record. One of: "All", "High", "Normal", "Low". Thresholds set by Tm_Qual_Low_WS/Tm_Qual_High_WS in AUX_CNFOSD/F.	INT
56	***Good_Quality***	Integer	dl	4 bytes	%04d	total number of grid points in this class flagged as good quality	INT
57	***Good_Quality_Retrieved***	Integer	dl	4 bytes	%04d	total number of successful retrievals for good quality grid points in this class	INT
58	***Good_Quality_Retrieved _Average_Sigma***	Integer	dl	4 bytes	%04d	average sigma for good quality grid points in this class with successful retrievals	INT
59	***Good_Quality_Failed_Ou tside_Valid_Range***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to poor SSS quality: outside valid range (Fg_ctrl_range = = true)	INT
60	***Good_Quality_Failed_Sig ma_Too_High***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to poor SSS quality: sigma too high (Fg_ctrl_sigma = = true)	INT
61	***Good_Quality_Failed_Po or_Fit***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to poor fit quality: Fg_ctrl_chi2 = = true or Fg_ctrl_chi2_P = = true	INT
62	***Good_Quality_Failed_Ma rquardt***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed because lambda grew too large during iterations (Fg_ctrl_marq = = true)	INT
63	***Good_Quality_Failed_Ma xiter***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed because the maximum number of iterations was reached (Fg_ctrl_reach_Maxiter = = true)	INT
64	***Good_Quality_Failed_OO LUT***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to one or more out-of-LUT range critical flag raised	INT
65	***Poor_Quality***	Integer	dl	4 bytes	%04d	number of grid points in this class flagged as poor quality	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
66	***Poor_Quality_Retrieved***	Integer	dl	4 bytes	%04d	total number of successful retrievals for poor quality grid points in this class	INT
67	***Poor_Quality_Retrieved_ Average_Sigma***	Integer	dl	4 bytes	%04d	average sigma for poor quality grid points in this class with successful retrievals	INT
68	***Near_Coast_Quality***					Tag ending the XML Near_Coast_Quality structure	INT
69	***Sea_Ice_Quality***					Tag starting the XML Sea_Ice_Quality structure Retrieval quality record for gridpoints flagged as near to coast	INT
70	***Grid_Point_Type***	String	dl	%10s	<=10	Grid point type for this quality record. One of: “Sea” (Fg_sc_land_sea_coast1 = = true and Fg_sc_land_sea_coast2 == false), “Near_Coast” (Fg_sc_land_sea_coast1 = = true and Fg_sc_land_sea_coast2 == true), “Sea_Ice” (Fg_sc_suspect_ice = = true)	INT
71	***SSS_Class***	String	dl	%6s	<=6	SSS class for this quality record. One of: “All”, “High”, “Normal”, “Low”. Thresholds set by Tm_Qual_Low_SSS/Tm_Qual_High_SSS in AUX_CNFOSD/F.	INT
72	***SST_Class***	String	dl	%6s	<=6	SST class for this quality record. One of: “All”, “High”, “Normal”, “Low”. Thresholds set by Tm_Qual_Low_SST/Tm_Qual_High_SST in AUX_CNFOSD/F.	INT
73	***WS_Class***	String	dl	%6s	<=6	WS class for this quality record. One of: “All”, “High”, “Normal”, “Low”. Thresholds set by Tm_Qual_Low_WS/Tm_Qual_High_WS in AUX_CNFOSD/F.	INT
74	***Good_Quality***	Integer	dl	4 bytes	%04d	total number of grid points in this class flagged as good quality	INT
75	***Good_Quality_Retrieved***	Integer	dl	4 bytes	%04d	total number of successful retrievals for good quality grid points in this class	INT
76	***Good_Quality_Retrieved _Average_Sigma***	Integer	dl	4 bytes	%04d	average sigma for good quality grid points in this class with successful retrievals	INT
77	***Good_Quality_Failed_Ou***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to poor SSS quality: outside valid range	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
	tside_Valid_Range					(Fg_ctrl_range = = true)	
78	*Good_Quality_Failed_Sigma_Too_High*	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to poor SSS quality: sigma too high (Fg_ctrl_sigma = = true)	INT
79	*Good_Quality_Failed_Poor_Fit*	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to poor fit quality: Fg_ctrl_chi2 = = true or Fg_ctrl_chi2_P = = true	INT
80	*Good_Quality_Failed_Marquardt*	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed because lambda grew too large during iterations (Fg_ctrl_marq = = true)	INT
81	*Good_Quality_Failed_Maxiter*	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed because the maximum number of iterations was reached (Fg_ctrl_reach_Maxiter = = true)	INT
82	*Good_Quality_Failed_OOLUT*	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to one or more out-of-LUT range critical flag raised	INT
83	*Poor_Quality*	Integer	dl	4 bytes	%04d	number of grid points in this class flagged as poor quality	INT
84	*Poor_Quality_Retrieved*	Integer	dl	4 bytes	%04d	total number of successful retrievals for poor quality grid points in this class	INT
85	*Poor_Quality_Retrieved_Average_Sigma*	Integer	dl	4 bytes	%04d	average sigma for poor quality grid points in this class with successful retrievals	INT
86	*Sea_Ice_Quality*					Tag ending the XML Sea_Ice_Quality structure	INT
87	*List_of_Quality_Classes*	Starting Tag				Tag starting the list of quality records for low, normal & high SSS, SST & WS. Repeat tags below "count" = 27 (3 * 3 * 3) times.	
88	*Quality_Record*					Tag starting Retrieval quality record structure (Grid_Point_Type = "All")	INT
89	*Grid_Point_Type*	String	dl	%10s	<=10	Grid point type for this quality record. One of: "Sea" (Fg_sc_land_sea_coast1 = = true and Fg_sc_land_sea_coast2 == false), "Near_Coast" (Fg_sc_land_sea_coast1 = = true and Fg_sc_land_sea_coast2 == true), "Sea_Ice" (Fg_sc_suspect_ice = = true) or All for all types (ie Sea, Near_Coast and Sea_Ice).	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
90	***SSS_Class***	String	dl	%6s	<=6	SSS class for this quality record. One of: “All”, “High”, “Normal”, “Low”. Thresholds set by Tm_Qual_Low_SSS/Tm_Qual_High_SSS in AUX_CNFOSD/F.	INT
91	***SST_Class***	String	dl	%6s	<=6	SST class for this quality record. One of: “All”, “High”, “Normal”, “Low”. Thresholds set by Tm_Qual_Low_SST/Tm_Qual_High_SST in AUX_CNFOSD/F.	INT
92	***WS_Class***	String	dl	%6s	<=6	WS class for this quality record. One of: “All”, “High”, “Normal”, “Low”. Thresholds set by Tm_Qual_Low_WS/Tm_Qual_High_WS in AUX_CNFOSD/F.	INT
93	***Good_Quality***	Integer	dl	4 bytes	%04d	total number of grid points in this class flagged as good quality	INT
94	***Good_Quality_Retrieved***	Integer	dl	4 bytes	%04d	total number of successful retrievals for good quality grid points in this class	INT
95	***Good_Quality_Retrieved_Average_Sigma***	Integer	dl	4 bytes	%04d	average sigma for good quality grid points in this class with successful retrievals	INT
96	***Good_Quality_Failed_Outside_Valid_Range***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to poor SSS quality: outside valid range (Fg_ctrl_range = = true)	INT
97	***Good_Quality_Failed_Sigma_Too_High***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to poor SSS quality: sigma too high (Fg_ctrl_sigma = = true)	INT
98	***Good_Quality_Failed_Poor_Fit***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to poor fit quality: Fg_ctrl_chi2 = = true or Fg_ctrl_chi2_P = = true	INT
99	***Good_Quality_Failed_Marquardt***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed because lambda grew too large during iterations (Fg_ctrl_marq = = true)	INT
100	***Good_Quality_Failed_Maxiter***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed because the maximum number of iterations was reached (Fg_ctrl_reach_Maxiter = = true)	INT
101	***Good_Quality_Failed_OO***	Integer	dl	4 bytes	%04d	count of good quality grid points in this class where retrieval failed due to one or more out-of-LUT range critical flag	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
	LUT					raised	
102	***Poor_Quality***	Integer	dl	4 bytes	%04d	number of grid points in this class flagged as poor quality	INT
103	***Poor_Quality_Retrieved***	Integer	dl	4 bytes	%04d	total number of successful retrievals for poor quality grid points in this class	INT
104	***Poor_Quality_Retrieved_ Average_Sigma***	Integer	dl	4 bytes	%04d	average sigma for poor quality grid points in this class with successful retrievals	INT
105	***Quality_Record***	Ending Tag				Tag ending the Quality_Record structure.	
106	***List_of_Quality_Classes***	Ending Tag				Tag ending the list of quality records for low, normal & high SSS, SST & WS.	
107	***Quality_Description***	Ending Tag				Tag ending the XML Quality_Description structure.	
108	***List_of_Retrieval_Schem es***	Ending Tag				Tag ending the List_of_Retrieval_Schemes	
109	***Quality_Information***	Ending Tag				Tag ending the Quality_Information structure.	
110	***L2_Product_Description***	Starting Tag				Tag starting the XML L2_Product_Description structure	
111	***List_of_models***	Starting Tag				Tag starting the List of models with a counter (=4) as attribute.	
112	***List_of_Retrieved_Param eters***	Starting Tag				Tag starting the List_of_Retrieved_Parameters with a counter (=10) as attribute.	
113	***Retrieved_Parameter***	Starting Tag				Tag starting the XML Retrieved_Parameter structure.	
114	***name***	String	dl	40 bytes	%40s	Name of retrieved parameter	INT
115	***unit***	String	dl	40 bytes	%40s	Unit of retrieved parameter	INT
116	***description***	String	dl	40 bytes	%40s	Short definition / description of retrieved parameter	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
117	***Retrieved_Parameter***	Ending tag				Tag ending the XML Retrieved_Parameter structure	
118	***L2_Product_Desciption***	Ending tag				Tag ending the XML L2_Product_Description structure	
119	***L2_Product_Location***	Starting Tag				Init of XML structure containing variables described below	
120	***Start_Lat***	real	deg	11 bytes	%+011.6f	Latitude of first satellite nadir point at the Sensing_Start time of first snapshot used in the generation (positive North)	MIR
121	***Start_Long***	real	deg	11 bytes	%+011.6f	Longitude of first satellite nadir point at the Sensing_Start time of first snapshot used in the generation (positive East of Greenwich (-180,+180])	MIR
122	***Stop_Lat***	real	deg	11 bytes	%+011.6f	Latitude of first satellite nadir point at the Sensing_Stop time of last snapshot used in the generation (positive North)	MIR
123	***Stop_Long***	real	deg	11 bytes	%+011.6f	Longitude of first satellite nadir point at the Sensing_Stop time of last snapshot used in the generation (positive East of Greenwich (-180,+180])	MIR
124	***Mid_Lat***	real	deg	11 bytes	%+011.6f	Latitude of satellite nadir point of the snapshot in the middle (rounded down) o the list used in the generation of the product .	MIR
125	***Mid_Lon***	real	deg	11 bytes	%+011.6f	Longitude of satellite nadir point of the snapshot in the middle (rounded down) of the list used in the generation of the product	MIR
126	***Southernmost_Latitude***	real	deg	11 bytes	%+011.6f	Geodetic Latitude of southernmost grid point (WGS84) where retrieval is attempted.	INT
127	***Southernmost _Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of southernmost grid point where retrieval is attempted.	INT
128	***Northernmost_Latitude***	real	deg	11 bytes	%+011.6f	Geodetic Latitude of northernmost grid point (WGS84) where retrieval is attempted.	INT
129	***Northernmost_Gridpoint***	Unsigne	N/A	7	%07d	Unique identifier of northernmost grid point	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
	_ID	d Integer					
130	***Easternmost_Longitude***	real	deg	11 bytes	%+011.6f	Geocentric Longitude of easternmost grid point where retrieval is attempted.	INT
131	***Easternmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of easternmost grid point where retrieval is attempted.	INT
132	***Westernmost_Longitude***	real	deg	11 bytes	%+011.6f	Geocentric Longitude of Westernmost grid point where retrieval is attempted.	INT
133	***Westernmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of westernmost grid point where retrieval is attempted.	INT
134	***L2_Product_Location***	Ending Tag				End of XML structure containing variables described above	
134-146	***Data_Sets***	structure				Data Sets structure's fields as defined in fields 14 to 26 in Table 4-4	
147	***Specific_Product_Header***	Ending Tag				Tag ending the Specific_Product_Header	

Table 4-17 Additional fields in the OS SPH

The specific valid Reference Data Sets for MIR_OSUDP2 Products are:

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
L1C_OS_FILE	MIR_SCSD1C_, MIR_SCSF1C_
DGG_FILE	AUX_DGG___
ORBIT_SCENARIO_FILE	MPL_ORBSCT
ECMWF_FILE	AUX_ECMWF_

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
FLAT_SEA_FILE	AUX_FLTSEA
ROUGHNESS_IPSL_FILE	AUX_RGHNS1
ROUGHNESS_IFREMER_FILE	AUX_RGHNS2
ROUGHNESS_ICM_CSIC_FILE	AUX_RGHNS3
GALAXY_OS_FILE	AUX_GAL_OS
GALAXY_2OS_FILE	AUX_GAL2OS
FOAM_FILE	AUX_FOAM__
SUNGLINT_FILE	AUX_SGLINT
SUN_BT_FILE	AUX_SUN_BT
ATMOS_FILE	AUX_ATMOS_
DISTAN_FILE	AUX_DISTAN
CLIMATOLOGY_SSS_FILE	AUX_SSS___
OCEAN_SALINITY_CONFIG_FILE	AUX_CNFOSD/ AUX_CNFOSF
OTT1D_FILE	AUX_OTT1D_
OTT1F_FILE	AUX_OTT1F_
OTT2D_FILE	AUX_OTT2D_
OTT2F_FILE	AUX_OTT2F_
OTT3D_FILE	AUX_OTT3D_
OTT3F_FILE	AUX_OTT3F_
MSOTT_FILE	AUX_MSOTT_
BEST_FIT_PLANE_FILE	AUX_BFP___
MISPOINTING_ANGLES_FILE	AUX_MISP__

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
OS_GEOPHYSICAL_PARAMETERS_FILE	AUX_AGDPT_ (Currently this file is not used by the L2OS operational processor)
FARA_P_FILE	AUX_FARA_P (It is used in LTA Reprocessing Centre)
FARA_C_FILE	AUX_FARA_C (It is used in LTA Reprocessing Centre)
FARA_R_FILE	AUX_FARA_R (It is used in LTA Reprocessing Centre)
DGG_CUR_RFI_FILE	AUX_DGGRFI
BULLETIN_B_FILE	AUX_BULL_B

Table 4-18 L2 OS Data Set Reference List

4.2.2.1.3 Data Block

The SMOS Level 2 Ocean Salinity User Data Product consists of one Measurement Data Set and several Reference Data Sets.

The Reference DSD Names are used to fill the tag <Data_Set_Name> in the SPH but their content does not appear in the Data Block.

The SSS_SWATH Measurement Data Set contains a complete DSR for every DGG point in the input L1 sea product. A SSS_SWATH DSR has a fixed size since it must contain all the fields. It is important to note that the number of DGG points in each product (swath based) will vary from one to another according to the number of grid points in the Level 1C Product.

The UDP contains information about:

- Grid point geographic coordinates
- Geophysical parameters in the product
- Product control flags
- Product control descriptors
- Science flags

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	SSS_SWATH					Init of binary Data Set containing the ***SSS_SWATH Data Set*** records.	
01	***N_Grid_Points***	Counter	N/A	Unsigned integer (4 bytes)	1 element	Number of ***Grid_Points*** data set record structures.	INT
	List_of_Grid_Point_Datas					Init of list of ***Grid_Points*** data set record structures, repeated N_Grid_Points times.	
	Grid_Point_Data					Init of ***Grid_Point*** data set record structure.	
02	***Grid_Point_ID***	identifier	dl	Unsigned integer (4 bytes)	1 element	Unique identifier of Earth fixed grid point	MIR
03	***Latitude***	real value	deg	float (4 bytes)	1 element	Geodetic latitude of grid point (WGS84)	MIR
04	***Longitude***	real value	deg	float (4 bytes)	1 element	Geocentric longitude of grid point.	MIR
	Geophysical_Parameters_Data					Init of ***Geophysical Parameters_Data*** structure. Default values are used if a grid point is not processed	
05	***Equiv_ftprt_diam***	real value	Km	float (4 bytes)	1 element	Equivalent Footprint diameter. (default value -999 if no olarization for this grid point)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
06	***Mean_acq_time***	real value	dd	float (4 bytes)	1 element	Mean time of acquisition for all valid TB measurements of DGG point. Expressed in UTC decimal days (in MJD2000 reference). Default value -999 if grid point not processed.	INT
07	***SSS_corr***	real value	psu	float (4 bytes)	1 element	Sea surface salinity corrected for land-sea contamination (default value -999 if not processed)	INT
08	***Sigma_SSS_corr***	real value	psu	float (4 bytes)	1 element	Theoretical uncertainty computed for SSS_corr (default value -999 if not processed)	INT
09	***SSS_uncorr***	real value	psu	float (4 bytes)	1 element	Sea surface salinity without land-sea correction (default value -999 if not processed)	INT
10	***Sigma_SSS_uncorr***	real value	psu	float (4 bytes)	1 element	Theoretical uncertainty computed for SSS_uncorr (default value -999 if not processed)	INT
11	***SSS_anom***	real value	psu	float (4 bytes)	1 element	Sea surface salinity anomaly = SSS_corr minus climatology (nominally WOA2009 climatology, default value -999 if not processed)	INT
12	***Sigma_SSS_anom***	real value	psu	float (4 bytes)	1 element	Theoretical uncertainty computed for SSS_anom (default value -999 if not processed, nominally copied from Sigma_SSS_corr)	INT
13	***A_card***	Real value	dl	float (4 bytes)	1 element	Effective_Acard retrieved with minimalist model (default value -999 if not processed)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
14	***Sigma_Acard***	real value	dl	float (4 bytes)	1 element	Theoretical uncertainty computed for Acard. (default value -999 if not processed)	INT
15	***WS***	real value	$m.s^{-1}$	float (4 bytes)	1 element	10m neutral wind module derived from ECMWF UN10 & VN10 (default value -999 if not processed)	INT
16	***SST***	real value	C	float (4 bytes)	1 element	Sea surface temperature from ECMWF (default -999 if grid point not processed)	INT
17	***Tb_42.5H***	real value	K	float (4 bytes)	1 element	Brightness Temperature at surface level derived with default forward model and retrieved geophysical parameters, H olarization direction. (default value -999 if grid point not processed)	INT
18	***Sigma_Tb_42.5H***	real value	K	float (4 bytes)	1 element	Theoretical uncertainty computed for Tb42.5H (default value -999 if grid point not processed)	INT
19	***Tb_42.5V***	real value	K	float (4 bytes)	1 element	Brightness Temperature at surface level derived with default forward model and Retrieved geophysical parameters, V olarization direction. (default value -999 if grid point not processed)	INT
20	***Sigma_Tb_42.5V***	real value	K	float (4 bytes)	1 element	Theoretical uncertainty computed for Tb42.5V (default value -999 if grid point not processed)	INT
21	***Tb_42.5X***	Real value	K	float (4 bytes)	1 element	Brightness Temperature at antenna level derived with default forward model and retrieved geophysical parameters, X olarization direction. (default value -999 if grid point not processed)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
22	***Sigma_Tb_42.5X***	Real value	K	float (4 bytes)	1 element	Theoretical uncertainty computed for Tb42.5X (default value -999 if grid point not processed)	INT
23	***Tb_42.5Y***	Real value	K	float (4 bytes)	1 element	Brightness Temperature at antenna level derived with default forward model and retrieved geophysical parameters, Y olarization direction. (default value -999 if grid point not processed)	INT
24	***Sigma_Tb_42.5Y***	Real value	K	float (4 bytes)	1 element	Theoretical uncertainty computed for Tb42.5Y (default value -999 if grid point not processed)	INT
	Geophysical_Parameters_ Data					End of ***Geophysical_Parameters_Data*** structure	
25	***Control_Flags_corr***	Flags		unsigned integer (4 bytes)	1 element	Control flags for SSS_corr retrieval. See Table 4-20 for details. Least significant bit is field #01. Most significant bit is field #32	INT
26	***Control_Flags_uncorr***	Flags		unsigned integer (4 bytes)	1 element	Control flags for SSS_uncorr retrieval. See Table 4-20 for details. Least significant bit is field #01. Most significant bit is field #32	INT
27	***Control_Flags_anom***	Flags		unsigned integer (4 bytes)	1 element	Control flags for SSS_anom retrieval, nominally copied from Control_Flags_corr. See Table 4-20 for details. Least significant bit is field #01. Most significant bit is field #32	INT
28	***Control_Flags_Acard***	Flags		unsigned integer (4 bytes)	1 element	Control flags for Acard retrieval. See Table 4-20 for details. Least significant bit is field #01. Most significant bit is field #32	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Product_Confidence_Descriptor					Init of Product_Confidence_Descriptor structure	
29	***Dg_chi2_corr***	Integer value	dl	unsigned integer (2 bytes)	1 element	Normalized retrieval fit quality index for SSS_corr, scaled by multiplying by 100 (default value 0 if grid point not processed)	INT
30	***Dg_chi2_uncorr***	Integer value	dl	unsigned integer (2 bytes)	1 element	Normalized retrieval fit quality index for SSS_uncorr, scaled by multiplying by 100 (default value 0 if grid point not processed)	INT
31	***WS_corr***	Integer value	m/s	unsigned integer (2 bytes)	1 element	Wind speed module retrieved with SSS_corr, scaled by multiplying by 1000 (default value -999 if not processed)	INT
32	***Dg_chi2_Acard***	Integer value	dl	unsigned integer (2 bytes)	1 element	Normalized retrieval fit quality index from olarizat model, scaled by multiplying by 100 (default value 0 if grid point not processed)	INT
33	***Dg_chi2_P_corr***	Integer value	dl	unsigned integer (2 bytes)	1 element	Normalised chi2 high value acceptability probability for SSS_corr, scaled by multiplying by 1000 (default value 0 if grid point not processed).	INT
34	***Dg_chi2_P_uncorr***	Integer value	dl	unsigned integer (2 bytes)	1 element	Normalised chi2 high value acceptability probability for SSS_uncorr, scaled by multiplying by 1000 (default value 0 if grid point not processed).	INT
35	***Sigma_WS_corr***	Integer value	m/s	unsigned integer (2 bytes)	1 element	Error on wind speed module retrieved with SSS_corr, scaled by multiplying by 1000 (default value -999 if not processed)	INT
36	***Dg_chi2_P_Acard***	Integer value	dl	unsigned integer (2 bytes)	1 element	Normalised chi2 high value acceptability probability with from cardioids model, scaled by multiplying by 1000. (default value 0 if grid point not processed)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
37	***Dg_quality_SSS_corr***	Integer value	dl	unsigned integer (2 bytes)	1 element	Quality index for SSS_corr: lower = better (default 999 if grid point not processed)	INT
38	***Dg_quality_SSS_uncorr***	Integer value	dl	unsigned integer (2 bytes)	1 element	Quality index for SSS_uncorr: lower = better (default 999 if grid point not processed)	INT
39	***Dg_quality_SSS_anom***	Integer value	dl	unsigned integer (2 bytes)	1 element	Quality index for SSS_anom: lower = better (default 999 if grid point not processed, nominally copied from Dg_quality_SSS_anom)	INT
40	***SSS_climatology***	Integer value	psu	unsigned integer (2 bytes)	1 element	Salinity from interpolated climatology, scaled by multiplying by 100.	INT
41	***Dg_num_iter_corr***	Integer value	dl	Unsigned Byte	1 element	Number of iterations for the retrieval of SSS_corr (0 if not processed).	INT
42	***Dg_num_iter_uncorr***	Integer value	dl	Unsigned Byte	1 element	Number of iterations for the retrieval of SSS_uncorr (0 if not processed).	INT
43	***Coast_distance***	Integer value	Km	Unsigned Byte	1 element	Distance to nearest coast, scaled by multiplying by 0.05	INT
44	***Dg_num_iter_Acard***	Integer value	dl	Unsigned Byte	1 element	Number of iterations for the retrieval of Acard (0 if not processed).	INT
45	***Dg_num_meas_l1c***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of measurements available in L1c product	INT
46	***Dg_num_meas_valid***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of valid measurement available for SSS retrieval	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
47	***Dg_border_fov***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of valid measurements with BORDER_FOV flag raised.	INT
48	***Dg_af_fov***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of valid measurements with AF_FOV flag raised.	INT
49	***Dg_sun_tails***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of measurements with SUN_TAILS flag raised.	INT
50	***Dg_sun_glint_area***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of measurements withSUN_GLINT_AREA flag raised.	INT
51	***Dg_sun_glint_fov***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of measurements with SUN_GLINT_FOV flag raised.	INT
52	***Dg_sun_fov***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of measurements with SUN_FOV flag raised.	INT
53	***Dg_sun_glint_L2***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of measurements with L2 sunglint flag raised	INT
54	***Dg_Suspect_ice***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of suspected ice contaminated measurements	INT
55	***Dg_galactic_Noise_Error***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of measurements discarded due to errors in galactic noise.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
56	***Dg_sky***	Integer value	dl	unsigned integer(2 bytes)	1 element	Count measurements with specular direction toward a strong galactic source.	INT
57	***Dg_moonglint***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of measurements with L2 moonglint raised.	INT
58	***Dg_RFI_L1***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of measurements suspected by L1 as being contaminated by RFI.	INT
59	***Dg_RFI_X***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of measurements suspected of being contaminated by RFI in X olarization.	INT
60	***Dg_RFI_Y***	Integer value	dl	unsigned integer(2 bytes)	1 element	Number of measurements suspected of being contaminated by RFI in Y olarization.	INT
61	***Dg_RFI_probability***	Integer value	%	unsigned integer(2 bytes)	1 element	Probability of grid point being contaminated by RFI, estimated from AUX_DGGRFI	INT
62	***X_swath***	Real value	Km	float (4 bytes)	1 element	Grid point distance from the satellite track (default value -999 if grid point not processed)	
	Product_Confidence_Descriptor					End of ***Product_Confidence_Descriptor*** structure	
63	***Science_Flags_corr***	Flags		Unsigned integer (4 bytes)	1 element	Science flags for SSS_corr retrieval. See Table 4-21 for details. Least significant bit is field #01. Most significant bit is field #32.	INT
64	***Science_Flags_uncorr***	Flags		Unsigned integer (4 bytes)	1 element	Science flags for SSS_uncorr retrieval. See Table 4-21 for details. Least significant bit is field #01. Most significant bit is field #32.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
65	***Science_Flags_anom***	Flags		Unsigned integer (4 bytes)	1 element	Science flags for SSS_anom retrieval, nominally copied from Science_Flags_corr. See Table 4-21 for details. Least significant bit is field #01. Most significant bit is field #32.	INT
66	***Science_Flags_Acard***	Flags		Unsigned integer (4 bytes)	1 element	Science flags for Acard retrieval. See Table 4-21 for details. Least significant bit is field #01. Most significant bit is field #32.	INT
	Grid_Point_Data					End of **Grid_Point_Data** data set record	
	List_of_ Grid_ Point_Datas					End of list of **grid_point** data set record structures.	
	SSS_SWATH					***End of binary Data Set containing the SSS_SWATH Data Set records.***	
	Data_Block					End of binary Data Block in the product.	

Table 4-19. Description of L2 SSS product Data Block (UDP)

4.2.2.1.3.1 Control Flags

The Control flags mentioned in table 4-16 are specified below. This list of flags is repeated for each grid point contained in the swath.

Bit # (01 → LSB)	Tag Name	Description	Size (bits)
25.01	***Fg_ctrl_ignore***	Set if grid point is not processed (ie ignored). Least Significant bit	1
25.02	***Fg_ctrl_range***	Retrieved values outside range using Forward model1. Least significant Bit.	1
25.03	***Fg_ctrl_sigma***	High retrieval sigma using forward model 1	1
25.04	***Fg_ctrl_chi2***	Poor fit quality, set if (Dg_chi2/Nt) >= Tg_chi2. Nt is the number of valid measurements plus the number of adjusted parameters.	1
25.05	***Fg_ctrl_chi2_P***	Poor fit quality, set if (Dg_chi_2_P / 1000) > Tg_Chi2_P_max or (Dg_chi_2_P / 1000) < Tg_Chi2_P_min	1

Bit # (01 → LSB)	Tag Name	Description	Size (bits)
25.06	***Fg_ctrl_contaminated***	Set if SSS_corr is significantly different from SSS_uncorr (abs(SSS_corr – SSS_uncorr) > SC57)	1
25.07	***Fg_ctrl_sunglint***	Grid point with number of measurements flagged for sunglint above threshold.	1
25.08	***Fg_ctrl_moonglint***	Grid point with number of measurements flagged for moonglint above threshold.	1
25.09	***Fg_ctrl_gal_noise***	Grid point with number of measurements flagged for galactic noise above threshold.	1
25.10	***Fg_ctrl_mixed_scene***	Flag set if any (or all) grid point measurements have been corrected by mixed scene (land-sea) AUX_MSOTT_ LUT before convergence	1
25.11	***Fg_ctrl_reach_maxiter***	Maximum number of iteration reached before convergence using forward model1	1
25.12	***Fg_ctrl_num_meas_min***	Not processed due to too few valid measurements. Flag set if number of valid measurements < Tg_num_meas_min	1
25.13	***Fg_ctrl_num_meas_low***	Processed, but with a low number of measurements. Flag set if number of valid measurement < Tg_num_meas_valid	1
25.14	***Fg_ctrl_many_outliers***	Flag set if number of outliers Dg_num_outliers >Tg_num_outliers_max	1
25.15	***Fg_ctrl_marq***	Iterative loop ends because Marquardt increment is greather than lambdaMax.	1
25.16	***Fg_ctrl_roughness***	Roughness correction applied	1
25.17	***Fg_ctrl_foam***	Wind speed is less than Tg_WS_foam and foam contribution and foam fraction are set to zero.	1
25.18	***Fg_ctrl_ecmwf***	Flag set to false if one or more ECMWF data is missing for the different models. Most significant Bit.	1
25.19	***Fg_ctrl_valid***	Flags raised if grid points pass grid point measurement discrimination tests at described in section 3.1 of [RD.12]	1
25.20	***Fg_ctrl_no_surface***	Flags raised if the 42.5º angle is not included in the dwell line for grid points.	1
25.21	***Fg_ctrl_range_Acard***	Flags raised if retrieved Acard is outside range (only used for Acard retrievals).	1
25.22	***Fg_ctrl_sigma_Acard***	Flags raised if retrieved Acard sigma is too high (only used for Acard retrievals).	1
25.23	***spare***	Not used	1
25.24	***Fg_ctrl_used_faraTEC***	Flags raised if TEC for this grid point was obtained from AUX_FARA_x	1

Bit # (01 → LSB)	Tag Name	Description	Size (bits)
25.25	***Fg_ctrl_poor_geophysical***	Flags set if this grid point probably has poor quality SSS due to geophysical problems (outliers, glint, etc), or Fg_ctrl_valid = = FALSE	1
25.26	***Fg_ctrl_poor_retrieval***	Flags set if this grid point poor SSS due to retrieval failure, poor quality convergence, or Fg_ctrl_valid = = FALSE. Poor SSS quality retrieval may be caused by retrieval problems	1
25.27	***Fg_ctrl_suspect_rfi***	Grid point is suspected of being contaminated by RFI. Flag set if (Dg_RFI_X + Dg_RFI_Y) / Dg_num_meas_L1 > Tg_num_RFI_max.	1
25.28	***Fg_ctrl_rfi_prone_X***	Grid point is likely to be contaminated by X olarization RFI as indicated by AUX_DGGRFI (set if Dg_RFI_X / Dg_num_meas_L1c > Tg_current_RFI_max_X).	1
25.29	***Fg_ctrl_rfi_prone_Y***	Grid point is likely to be contaminated by Y olarization RFI as indicated by AUX_DGGRFI (set if Dg_RFI_Y / Dg_num_meas_L1c > Tg_current_RFI_max_Y).	1
25.30	***Fg_ctrl_adjusted_ra***	Set if radiometric accuracy of measurements on this grid point have been adjusted using AUX_DGGRFI.	1
25.31	***Fg_ctrl_retriev_fail***	Flags raised if iterative scheme returns an error	1
25.32	***Spare***	Not used. Most significant bit	1

Table 4-20 Structure of the Control Flags1

4.2.2.1.3.2 Science Flags

The Science flags mentioned in table 4-16 are repeated N_grid_Points times. The type description and the size for each flag considered are listed below:

Bit # (01 → LSB)	Tag Name	Description	Size (bits)
63.01	***Fg_sc_land_sea_coast1***	Fg_sc_land_sea_coast:Fg_sc_land_sea_coast2 take the following values Land: 0:0 Too close to land (distance to coast ≤ 40 km): 0:1 Near land (distance to coast > 40 km and ≤ 200 km): 1:1 Ocean (distance to coast > 200 km): 1:0	1
63.02	***Fg_sc_land_sea_coast2***		1
63.03	***Fg_sc_TEC_gradient***	High TEC gradient along dwell for a grid point	1
63.04	***Fg_sc_in_clim_ice***	Gridpoint with maximum extend of sea ice olari to monthly climatology.	1
63.05	***Fg_sc_ice***	Ice concentration at gridpoint is above threshold Tg_ice_concentration	1
63.06	***Fg_sc_suspect_ice***	Suspect ice on gridpoint	1
63.07	***Fg_sc_rain***	Heavy rain suspected on gridpoint. Rain rate is above threshold Tg_max_rainfall.	1
63.08	***Fg_sc_high_wind***	Fg_high_wind : Fg_low_wind take the following values: 0:0 if wind speed ≤ Tg_low_wind 0:1 if Tg_low_wind < wind speed ≤ Tg_medium_wind 1:1 if Tg_medium_wind < wind speed ≤ Tg_high_wind 1:0 if Tg_high_wind <wind_speed	1
63.09	***Fg_sc_low_wind***		1
63.10	***Fg_sc_high_SST***	Fg_high_sst : Fg_low_sst take the following values 0:0 if sst ≤ Tg_low_sst 0:1 if Tg_low_sst < sst ≤ Tg_medium_sst 1:1 if Tg_medium_sst < sst ≤ Tg_high_sst 1:0 if Tg_high_sst < sst	1
63.11	***Fg_sc_low_SST***		1

Bit # (01 → LSB)	Tag Name	Description	Size (bits)
63.12	***Fg_sc_high_SSS***	Fg_high_sss : Fg_low_sss take the following values 0:0 if sss ≤ Tg_low_sss 0:1 if Tg_low_sss < sss ≤ Tg_medium_sss 1:1 if Tg_medium_sss < sss ≤ Tg_high_sss 1:0 if Tg_high_sss < sss	1
63.13	***Fg_sc_low_SSS***		1
63.14	***Fg_sc_sea_state_1***	Sea state class 2: waves swell dominated, old sea. Flag set if swell fraction >= Tg_swell and omega < Tg_old_sea	1
63.15	***Fg_sc_sea_state_2***	Sea state class 3: waves wind dominated, medium sea. Flag set if swell fraction < Tg_swell and omega >= Tg_old_sea and omega <= Tg_young_sea	1
63.16	***Fg_sc_sea_state_3***	Sea state class 4: waves swell dominated, medium sea. Flag set if swell fraction >= Tg_swell and omega >= Tg_old_sea and omega <= Tg_young_sea	1
63.17	***Fg_sc_sea_state_4***	Sea state class 5: waves wind dominated, young sea. Flag set if swell fraction < Tg_swell and omega > Tg_old_sea	1
63.18	***Fg_sc_sea_state_5***	Sea state class 6: waves swell dominated, young sea. Flag set if swell fraction >= Tg_swell and omega > Tg_young_sea	1
63.19	***Fg_sc_sea_state_6***	Sea state class 2: waves swell dominated, old sea. Flag set if swell fraction >= Tg_swell and omega < Tg_young_sea	1
63.20	***Fg_sc_sst_front***	Not implemented yet	1
63.21	***Fg_sc_sss_front***	Not implemented yet	1
63.22	***Fg_sc_ice_Acard***	Ice flag from cardioid (if Effective temperature <273K and Acard <40 raise flag and abs(latitude) >45°).	1
63.23	***Fg_sc_ecmwf_land***	Grid point contains some land. Flag set if ECMWF Land_Sea_Mask > 0	1

Table 4-21 Structure of the Science Flags

4.2.2.2 Level 2 Ocean Salinity Data Analysis Product (MIR_OSDAP2)

4.2.2.2.1 Main Product Header

See section 4.1.1

4.2.2.2.2 Specific Product Header

See section 4.2.2.1.2

See the Reference Data Set Names List in Table 4-17

4.2.2.2.3 Data Block

For each SSS_SWATH DSR in the UDP, there is one corresponding SSS_SWATH_ANALYSIS DSR in the DAP. Therefore, the number of DSRs in a DAP is equal to the number of DGG cells in the input L1c product.

A SSS_SWATH_ANALYSIS DSR is variable in size since it captures only the data for good views, the number of which varies from cell to cell and time to time.

The size of DSRs in this product varies depending on the number of Measurements Availables (Dg_num_meas_l1c) in one DGG point.

DAP contains information about:

- Grid point identification on the DGG:
- Grid point flags;
- Grid point descriptors;
- Measurement data (flags and differences between measurements and results of forward models);

- Initial conditions for geophysical parameters**;**
- Output of retrieval schemes (retrieved geophysical parameters and associated theoretical uncertainties);

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	SSS_SWATH_ANALYSIS					Init of binary Data Set containing the ***SSS_SWATH_ANALYSIS*** Data Set records	
01	***N_Grid_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of ***Grid_Points*** data set record structures.	INT
	List_of_Grid_Point_Datas					Init of list of ***Grid_Point*** data set record structures repeated N_Grid_Points times.	
	Grid_Point_Data					Init of ***Grid_Point*** data set record structure.	
02	***Grid_Point_ID***	identifier	dl	unsigned integer (4 bytes)	1 element	Unique identifier of Earth fixed grid point	MIR
03	***Latitude***	Real value	deg	Float (4 bytes)	1 element	Geodetic latitude of grid point (WGS84)	MIR
04	***Longitude***	Real value	deg	Float (4 bytes)	1 element	Geocentric longitude of grid point.	MIR
	Grid_Point_Descriptors					Init of ***Grid_Point_Descriptors*** structure. Default values are used if a grid point is not processed: ie use defaults if Fg_sc_land_sea_coast1[Ngp] = = false or Fg_ctrl_valid[Ngp] = = false	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
05	***Out_of_LUT_flags_R1***	Flag		Unsigned integer (4 bytes)	1 element	Flags for for 1st mapped retrieval See table 4-23 below	INT
06	***Out_of_LUT_flags_R2***	Flag		Unsigned integer (4 bytes)	1 element	Flags for for 2nd mapped retrieval See table 4-23 below	INT
07	***Out_of_LUT_flags_R3***	Flag		Unsigned integer (4 bytes)	1 element	Flags for for 3rd mapped retrieval See table 4-23 below	INT
08	***Out_of_LUT_flags_R4***	Flag		Unsigned integer (4 bytes)	1 element	Flags for for 4th mapped retrieval See table 4-23 below	INT
09	***X_swath***	Integer value	Km	signed integer (2 bytes)	1 element	Grid point distance from the satellite track (default value -999 if grid point not processed)	INT
10	***Dg_af_fov***	Integer value	dl	unsigned integer (2 bytes)	1 element	Number of valid measurements with AF_FOV flag raised.	INT
11	***Dg_num_outliers***	Integer value	Dl	unsigned integer (2 bytes)	1 element	Number of measurements with Fm_outlier flag raised.	INT
12	***Dg_num_high_resol***	Integer value	dl	unsigned integer (2 bytes)	1 element	Number of measurements with Fm_Resol flag raised.	INT
13	***Dg_user***	Integer value	dl	unsigned integer (2 bytes)	1 element	Number of measurements matching user filter in AUX_CNFOSF/D	INT
14	***Dg_sunglint_L1***	Integer value	dl	unsigned integer (2 bytes)	1 element	Number of measurements with Fm_L1c_sun flag raised.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
15	***Tau***	Real value (code as integer)	dl	float (4 bytes)	1 element	Atmospheric optical depth at nadir (all Stokes) Default value -999 if grid point not processed.	INT
16	***Tbatm_emission***	Real value (code as integer)	K	float (4 bytes)	1 element	Atmospheric emission toward sensor (nadir emission). Only first polarization. Default value -999 if grid point not processed.	INT
	Grid_Point_Descriptors					End of list of ***Grid_Point_Descriptors*** structures.	
	Geophysical_Parameters_Prior					Init of ***Geophysical Parameters_Prior*** structure	
17	***Param1_prior_R1***	real value	psu	float (4 bytes)	1 element	Prior, sigma descriptors & flags for parameters for 1st mapped retrieval configuration (nominally SSS_corr, default -999 if grid point not processed).	INT
18	***Param1_sigma_prior_R1***	real value	psu	float (4 bytes)	1 element		INT
19	***Param2_prior_R1***	real value	K	float (4 bytes)	1 element		INT
20	***Param2_sigma_prior_R1***	real value	K	float (4 bytes)	1 element		INT
21	***Param3_prior_R1***	real value	m.s-1	float (4 bytes)	1 element		INT
22	***Param3_sigma_prior_R1***	real value	m.s-1	float (4 bytes)	1 element		INT
23	***Param4_prior_R1***	real value	m.s-1	float (4 bytes)	1 element		INT
24	***Param4_sigma_prior_R1***	real value	m.s-1	float (4 bytes)	1 element		INT
25	***Param5_prior_R1***	real value	tecu	float (4 bytes)	1 element		INT
26	***Param5_sigma_prior_R1***	real value	tecu	float (4 bytes)	1 element		INT
27	***Param6_prior_R1***	real value	dl	float (4 bytes)	1 element		INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
28	***Dg_LSC_R1***	Real value	K	float (4 bytes)	1 element	Dwell-line mean of absolute value of land-sea correction for 1st mapped retrieval (nominally SSS_corr).	INT
29	***Science_Flags_R1***	Integer value	dl	Unsigned integer (4 bytes)	1 element	Science flags for 1st mapped retrieval configuration (nominally SSS_corr). See table 4-21 for details.	INT
30	***Control_Flags_R1***	Integer value	dl	Unsigned integer (4 bytes)	1 element	Control flags for 1st mapped retrieval configuration (nominally SSS_corr). See table 4-20 for details.	INT
31	***Param1_prior_R2***	real value	psu	float (4 bytes)	1 element	Prior, sigma, descriptors & flags for parameters for 2nd mapped retrieval configuration (nominally SSS with roughness model 2, default -999 if grid point not processed).	INT
32	***Param1_sigma_prior_R2***	real value	psu	float (4 bytes)	1 element		INT
33	***Param2_prior_R2***	real value	K	float (4 bytes)	1 element		INT
34	***Param2_sigma_prior_R2***	real value	K	float (4 bytes)	1 element		INT
35	***Param3_prior_R2***	real value	m.s-1	float (4 bytes)	1 element		INT
36	***Param3_sigma_prior_R2***	real value	m.s-1	float (4 bytes)	1 element		INT
37	***Param4_prior_R2***	real value	tecu	float (4 bytes)	1 element		INT
38	***Param4_sigma_prior_R2***	real value	tecu	float (4 bytes)	1 element		INT
39	***Param5_prior_R2***	real value	dl	float (4 bytes)	1 element		INT
40	***Param5_sigma_prior_R2***	real value	dl	float (4 bytes)	1 element		INT
41	***Param6_prior_R2***	real value	dl	float (4 bytes)	1 element		INT
42	***Dg_LSC_R2***	real value	K	float (4 bytes)	1 element	Dwell-line mean of absolute value of land-sea correction for 2nd mapped retrieval (nominally SSS model 2).	INT
43	***Science_Flags_R2***	Integer value	dl	Unsigned Integer (4 bytes)	1 element	Science flags for 2nd mapped retrieval configuration (nominally SSS model 2). See table 4-21 for details.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
44	***Control_Flags_R2***	Integer value	dl	Unsigned Integer (4 bytes)	1 element	Control flags for 2nd mapped retrieval configuration (nominally SSS model 2). See table 4-20 for details.	INT
45	***Param1_prior_R3***	real value	psu	float (4 bytes)	1 element	Prior, sigma, descriptors & flags for parameters for 3rd mapped retrieval configuration (nominally SSS with roughness model 3, default -999 if grid point not processed).	INT
46	***Param1_sigma_prior_R3***	real value	psu	float (4 bytes)	1 element		INT
47	***Param2_prior_R3***	real value	m.s-1	float (4 bytes)	1 element		INT
48	***Param2_sigma_prior_R3***	real value	m.s-1	float (4 bytes)	1 element		INT
49	***Param3_prior_R3***	real value	tecu	float (4 bytes)	1 element		INT
50	***Param3_sigma_prior_R3***	real value	tecu	float (4 bytes)	1 element		INT
51	***Param4_prior_R3***	real value	dl	float (4 bytes)	1 element		INT
52	***Param4_sigma_prior_R3***	real value	dl	float (4 bytes)	1 element		INT
53	***Param5_prior_R3***	real value	dl	float (4 bytes)	1 element		INT
54	***Param5_sigma_prior_R3***	real value	dl	float (4 bytes)	1 element		INT
55	***Param6_prior_R3***	real value	dl	float (4 bytes)	1 element		INT
56	***Dg_LSC_R3***	real value	K	float (4 bytes)	1 element	Dwell-line mean of absolute value of land-sea correction for 3rd mapped retrieval (nominally SSS model 3).	INT
57	***Science_Flags_R3***	Integer value	dl	Unsigned integer (4 bytes)	1 element	Science flags for 3rd mapped retrieval configuration (nominally SSS model 3). See table 4-21 for details.	INT
58	***Control_Flags_R3***	Integer value	dl	Unsigned integer (4 bytes)	1 element	Control flags for 3rd mapped retrieval configuration (nominally SSS model 3). See table 4-20 for details.	INT
59	***Param1_prior_R4***	real value	dl	float (4 bytes)	1 element	Prior, sigma, descriptors & flags for parameters for 4th	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
60	***Param1_sigma_prior_R4***	real value	dl	float (4 bytes)	1 element	mapped retrieval configuration (nominally Acard , default -999 if grid point not processed).	INT
61	***Param2_prior_R4***	real value	K	float (4 bytes)	1 element		INT
62	***Param2_sigma_prior_R4***	real value	K	float (4 bytes)	1 element		INT
63	***Param3_prior_R4***	real value	dl	float (4 bytes)	1 element		INT
64	***Param3_sigma_prior_R4***	real value	dl	float (4 bytes)	1 element		INT
65	***Param4_prior_R4***	real value	dl	float (4 bytes)	1 element		INT
66	***Param4_sigma_prior_R4***	real value	dl	float (4 bytes)	1 element		INT
67	***Param5_prior_R4***	real value	dl	float (4 bytes)	1 element		INT
68	***Param5_sigma_prior_R4***	real value	dl	float (4 bytes)	1 element		INT
69	***Param6_prior_R4***	real value	dl	float (4 bytes)	1 element		INT
70	***Dg_LSC_R4***	real value	dl	float (4 bytes)	1 element	Dwell-line mean of absolute value of land-sea correction for 4th mapped retrieval (nominally Acard).	INT
71	***Science_Flags_R4***	Flags	dl	Unsigned integer (4 bytes)	1 element	Science flags for 4th mapped retrieval configuration (nominally Acard). See table 4-21 for details.	INT
72	***Control_Flags_R4***	Flags	dl	Unsigned integer (4 bytes)	1 element	Control flags for 4th mapped retrieval configuration (nominally Acard). See table 4-20 for details.	INT
	Geophysical_Parameters_Prior					End of Geophysical Parameters_Prior structure	
	Geophysical_Parameters_Post					Init of Geophysical Parameters_Post structure	
73	***Param1_R1***	Real value	psu	float (4 bytes)	1 element	Value, theoretical uncertainty & counters for	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
74	***Param1_sigma_R1***	Real value	psu	float (4 bytes)	1 element	parameters retrieved with 1st mapped configuration (nominally SSS_corr, default -999 if parameters have not been retrieved).	INT
75	***Param2_R1***	Real value	K	float (4 bytes)	1 element		INT
76	***Param2_sigma_R1***	Real value	K	float (4 bytes)	1 element		INT
77	***Param3_R1***	Real value	m.s-1	float (4 bytes)	1 element		INT
78	***Param3_sigma_R1***	Real value	m.s-1	float (4 bytes)	1 element		INT
79	***Param4_R1***	Real value	m.s-1	float (4 bytes)	1 element		INT
80	***Param4_sigma_R1***	Real value	m.s-1	float (4 bytes)	1 element		INT
81	***Param5_R1***	Real value	tecu	float (4 bytes)	1 element		INT
82	***Param5_sigma_R1***	Real value	tecu	float (4 bytes)	1 element		INT
83	***Dg_num_iter_R1***	Integer value	dl	Unsigned integer (4 bytes)	1 element	Number of iterations for 1st mapped configuration (nominally SSS_corr, 0 if not processed).	INT
84	***Dg_quality_R1***	Integer value	dl	Unsigned integer (4 bytes)	1 element	Quality index for 1st mapped configuration (nominally SSS_corr): lower = better (default 999 if grid point not processed).	INT
85	***Dg_chi2_R1***	Integer value	dl	Unsigned integer (4 bytes)	1 element	Normalized retrieval fit quality index for 1st mapped configuration (nominally SSS_corr), scaled by multiplying by 100 (default value 0 if grid point not processed).	INT
86	***Dg_chi2_P_R1***	Integer value	dl	Unsigned integer (4 bytes)	1 element	Normalised chi2 high value acceptability probability for 1st mapped configuration (nominally SSS_corr), scaled by multiplying by 1000 (default value 0 if grid point not processed).	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
87	***Param1_R2***	Real value	psu	float (4 bytes)	1 element	Value, theoretical uncertainty & counters for parameters retrieved with 2nd mapped configuration (nominally SSS with roughness model 2, default -999 if parameters have not been retrieved).	INT
88	***Param1_sigma_R2***	Real value	psu	float (4 bytes)	1 element		INT
89	***Param2_R2***	Real value	K	float (4 bytes)	1 element		INT
90	***Param2_sigma_R2***	Real value	K	float (4 bytes)	1 element		INT
91	***Param3_R2***	Real value	m.s-1	float (4 bytes)	1 element		INT
92	***Param3_sigma_R2***	Real value	m.s-1	float (4 bytes)	1 element		INT
93	***Param4_R2***	Real value	tecu	float (4 bytes)	1 element		INT
94	***Param4_sigma_R2***	Real value	tecu	float (4 bytes)	1 element		INT
95	***Param5_R2***	Real value	dl	float (4 bytes)	1 element		INT
96	***Param5_sigma_R2***	Real value	dl	float (4 bytes)	1 element		INT
97	***Dg_num_iter_R2***	Integer value	dl	Unsigned Integer (4 bytes)	1 element	Number of iterations for 2nd mapped configuration (nominally SSS with roughness model 2, 0 if not processed).	INT
98	***Dg_quality_R2***	Integer value	dl	Unsigned Integer (4 bytes)	1 element	Quality index for 2nd mapped configuration (nominally SSS with roughness model 2): lower = better (default 999 if grid point not processed).	INT
99	***Dg_chi2_R2***	Integer value	dl	Unsigned Integer (4 bytes)	1 element	Normalized retrieval fit quality index for 2nd mapped configuration (nominally SSS with roughness model 2), scaled by multiplying by 100 (default value 0 if grid point not processed).	INT
100	***Dg_chi2_P_R2***	Integer value	dl	Unsigned Integer (4 bytes)	1 element	Normalised chi2 high value acceptability probability for 2nd mapped configuration (nominally SSS with roughness model 2), scaled by multiplying by 1000 (default value 0 if grid point not processed).	INT
101	***Param1_R3***	Real value	psu	float (4 bytes)	1 element	Value, theoretical uncertainty & counters for parameters retrieved with 3rd mapped configuration (nominally SSS with roughness model 3, default -999 if	INT
102	***Param1_sigma_R3***	Real value	psu	float (4 bytes)	1 element		INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
103	***Param2_R3***	Real value	m.s-1	float (4 bytes)	1 element	parameters have not been retrieved).	INT
104	***Param2_sigma_R3***	Real value	m.s-1	float (4 bytes)	1 element		INT
105	***Param3_R3***	Real value	tecu	float (4 bytes)	1 element		INT
106	***Param3_sigma_R3***	Real value	tecu	float (4 bytes)	1 element		INT
107	***Param4_R3***	Real value	dl	float (4 bytes)	1 element		INT
108	***Param4_sigma_R3***	Real value	dl	float (4 bytes)	1 element		INT
109	***Param5_R3***	Real value	dl	float (4 bytes)	1 element		INT
110	***Param5_sigma_R3***	Real value	dl	float (4 bytes)	1 element		INT
111	***Dg_num_iter_R3***	Integer value	dl	Unsigned Integer (4 bytes)	1 element	Number of iterations for 3rd mapped configuration (nominally SSS with roughness model 3, 0 if not processed).	INT
112	***Dg_quality_R3***	Integer value	dl	Unsigned Integer (4 bytes)	1 element	Quality index for 3rd mapped configuration (nominally SSS with roughness model 3): lower = better (default 999 if grid point not processed).	INT
113	***Dg_chi2_R3***	Integer value	dl	Unsigned Integer (4 bytes)	1 element	Normalized retrieval fit quality index for 3rd mapped configuration (nominally SSS with roughness model 3), scaled by multiplying by 100 (default value 0 if grid point not processed).	INT
114	***Dg_chi2_P_R3***	Integer value	dl	Unsigned Integer (4 bytes)	1 element	Normalised chi2 high value acceptability probability for 3rd mapped configuration (nominally SSS with roughness model 3), scaled by multiplying by 1000 (default value 0 if grid point not processed).	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
115	***Param1_R4***	Real value	dl	float (4 bytes)	1 element	Value, theoretical uncertainty & counters for parameters retrieved with 4th mapped configuration (nominally Acard, default -999 if parameters have not been retrieved).	INT
116	***Param1_sigma_R4***	Real value	dl	float (4 bytes)	1 element		INT
117	***Param2_R4***	Real value	K	float (4 bytes)	1 element		INT
118	***Param2_sigma_R4***	Real value	K	float (4 bytes)	1 element		INT
119	***Param3_R4***	Real value	dl	float (4 bytes)	1 element		INT
120	***Param3_sigma_R4***	Real value	dl	float (4 bytes)	1 element		INT
121	***Param4_R4***	Real value	dl	float (4 bytes)	1 element		INT
122	***Param4_sigma_R4***	Real value	dl	float (4 bytes)	1 element		INT
123	***Param5_R4***	Real value	dl	float (4 bytes)	1 element		INT
124	***Param5_sigma_R4***	Real value	dl	float (4 bytes)	1 element		INT
125	***Dg_num_iter_R4***	Integer value	dl	Unsigned integer (4 bytes)	1 element	Number of iterations for 4th mapped configuration (nominally Acard, 0 if not processed).	INT
126	***Dg_quality_R4***	Integer value	dl	Unsigned integer (4 bytes)	1 element	Quality index for 4th mapped configuration (nominally Acard): lower = better (default 999 if grid point not processed).	INT
127	***Dg_chi2_R4***	Integer value	dl	Unsigned integer (4 bytes)	1 element	Normalized retrieval fit quality index for 4th mapped configuration (nominally Acard), scaled by multiplying by 100 (default value 0 if grid point not processed).	INT
128	***Dg_chi2_P_R4***	Integer value	dl	Unsigned integer (4 bytes)	1 element	Normalised chi2 high value acceptability probability for 4th mapped configuration (nominally Acard), scaled by multiplying by 1000 (default value 0 if grid point not	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						processed).	
	Geophysical_Parameters_Post					End of ***Geophysical Parameters_Post*** structure	
	SSS_SWATH_ANALYSIS					End of binary Data Set containing the ***SSS_SWATH_ANALYSIS*** Data Set records	
	SSS_MEASUREMENT_ANALYSIS					Init of **SSS_MEASUREMENT_ANALYSIS** structure	
129	***N_Grid_Points_Measurements***	Integer value	dl	integer signed (4 bytes)	1 element	Number of grid points with measurement data	INT
	Grid_Point_Measurement_Data					Init of **Grid_Point_Measurement_Data** structure	
130	***Grid_Point_ID***	Integer value	dl	unsigned integer (4 bytes)	1 element	Unique identifier of Earth fixed grid point.	INT
	Available_Data					Init of ***Available_Data*** structure.	
131	***Dg_num_meas_l1c***	Integer value	dl	unsigned integer (2 bytes)	1 element	Number of measurements available in L1c product	INT
	Measuremet_Data					Init of ***Measurements_Data*** structure	
132	***Snapshot_ID***	Integer value	dl	unsigned integer (4 bytes)	1 element	Unique ID of L1c snapshot containing each measurement	INT
133	***xi***	Integer value	dl	signed integer (2 bytes)	1 element	Antenna level xi coordinate of measurement (scaled by multiplying by 1000). -999 if grid point not retrieved.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
134	***eta***	Integer value	dl	signed integer (2 bytes)	1 element	Antenna level eta coordinate of measurement (scaled by multiplying by 1000). -999 if grid point not retrieved.	INT
135	***Meas_Flags***	Flags		unsigned integer (4 bytes)	1 element	See Table 4-23	INT
	Measuremet_Data					End of ***Measurements_Data*** structure	
	Diff_TBs					Init of ***Diff_TBs*** structure	
136	***Diff_TB***	real value (code as integer)	K	integer signed (2 bytes)	1 element	Difference between L1c measurement TB (after applying OTT) and forward model 1 TB (scaled by multiplying by 100). -999 if grid point not retrieved.	INT
137	***Tb_gal_H***	real value (code as integer)	K	integer signed (2 bytes)	1 element	Galactic noise in H olarization obtained from auxiliary data (scaled by multiplying by 100). Default value -999 if grid point not retrieved	INT
138	***Tb_gal_V***	real value (code as integer)	K	integer signed (2 bytes)	1 element	Galactic noise in V olarization obtained from auxiliary data (scaled by multiplying by 100). Default value -999 if grid point not retrieved	INT
	Diff_TBs					End of ***Diff_TBs*** structure.	
	Available_Data					End of ***Available_Data*** structure	
	Grid_Point_Measurement_Data					Init of **Grid_Point_Measurement_Data** structure	
	Data_Block					End of binary Data Block in the product.	

Table 4-22 Data Blocks of the L2 SSS Data Analysis Report

4.2.2.2.3.1 Out of range flags

The list of **Out_of_LUT flags** included in table 4-22 is specified below:

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
05.01.	***Fg_Oor_LUT_rough_dim1***	Out of range flag raised if SST value falls outside the acceptable interval limits.	1
05.02.	***Fg_Oor_LUT_rough_dim2***	Out of range flag raised if 2nd LUT parameter (model 1: sss, model 2: omega, model 3: wsn) falls outside the acceptable LUT range.	
05.03.	***Fg_Oor_LUT_rough_dim3***	Out of range flag raised if 3rd LUT parameter (model 1: wsn, model 2: theta, model 3: phi_wsn) value falls outside the acceptable LUT range.	
05.04.	***Fg_Oor_LUT_rough_dim4***	Out of range flag raised if 4th LUT parameter (model 1: theta, model 2: sss, model 3: HS) value falls outside the acceptable LUT range.	
05.05.	***Fg_Oor_LUT_rough_dim5***	Out of range flag raised if 5th LUT parameter (model 2: sst) value falls outside the acceptable LUT range.	
05.06.	***spare***	Not used	1
05.07.	***spare***	Not used	1
05.08.	***spare***	Not used	1
05.09.	***spare***	Not used	1
05.10.	***Fg_oor_LUT_gam1_ra***	Out of range flag raised if at least one of the measurements of a dwell has a right ascension value which falls outside the acceptable interval limits.	1
05.11.	***Fg_oor_LUT_gam1_dec***	Out of range flag raised if at least one of the measurements of a dwell has a declination value which falls outside the acceptable interval limits.	1
05.12.	***Fg_oor_LUTsunglint_thetasun***	Out of range flag raised if at least one of the measurements of a dwell has a theta value which falls outside the acceptable interval limits.	1
05.13.	***Fg_oor_LUTsunglint_phismos***	Out of range flag raised if at least one of the measurements of a dwell has a phi smos value which falls outside the acceptable interval limits.	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
05.14.	***Fg_oor_LUTsunglint_theta***	Out of range flag raised if at least one of the measurements of a dwell has a theta value which falls outside the acceptable interval limits.	1
05.15.	***Fg_oor_LUTsunglint_WS***	Out of range flag raised if WSn value falls outside the acceptable interval limits.	1
05.16.	***Fg_oor_LUTfoam_WS***	Out of range flag raised if WS value falls outside the acceptable interval limits.	1
05.17.	***Fg_oor_LUTfoam_Tseaair***	Out of range flag raised if Tsea_air value falls outside the acceptable interval limits.	1
05.18.	***Fg_oor_LUTfoam_SSS***	Out of range flag raised if SSS value falls outside the acceptable interval limits.	1
05.19.	***Fg_oor_LUTfoam_SST***	Out of range flag raised if SST value fall outside the acceptable interval limits.	1
05.20.	***Fg_oor_LUTfoam_theta***	Out of range flag raised if at least one of the measurements of a dwell has a theta value which falls outside the acceptable interval limits.	1
05.21.	***Fg_oor_gam2_dec***	Dec went out of LUT range during retrieval	1
05.22.	***Fg_oor_gam2_ra***	Ra went out of LUT range during retrieval	1
05.23.	***Fg_oor_gam2_WSn***	WSn went out of LUT range during retrieval	1
05.24.	***Fg_oor_gam2_theta***	Theta went out of LUT range during retrieval	1
05.25.	***Fg_oor_gam2_psi***	Psi went out of LUT range during retrieval	1
05.26-05-32	***Spare***		7

Table 4-23 Out of LUT Flags

4.2.2.2.3.2 Measurement Flags

The **Measurement flags** mentioned in table 4-21 are listed below:

Bit # (01 → LSB)	Tag Name	Description	Size (bits)
130.01	***Fm_suspect_ice***	True if difference between measured brightness temperature and flat sea model > Tm_DT_ice	1
130.02	***Fm_scene_contamination***	Set if measurement suspected of being contaminated eg by RFI (ie snapshot with fs_scene_contamination set)	1
130.03	***Fm_out_of_range***	True if difference between measured brightness temperature and that derived with default forward model > Tm_out_of_range	1
130.04	***Fm_fara_interp***	True if interpolation used to calculate TEC from AUX_FARA_x	1
130.05	***Fm_l1c_sun***	True if any of the L1c flags sun point, sun tails, or sun glint fov are true.	1
130.06	***Fm_high_sun_glint***	Fm_high_sun_glint:Fm_low_sun_glint take the following values:	1
130.07	***Fm_low_sun_glint***	0:0 if sun glint ≤ Tm_low_sun_glint 0:1 if Tm_low_sun_glint < sun glint ≤ Tm_medium_sun_glint 1:1 if Tm_medium_sun_glint < sun glint ≤ Tm_high_sun_glint 1:0 if Tm_high_sun_glint < sun glint	1
130.08	***Fm_ott***	True if Ocean Target Transformation has been applied to this measurement	1
130.09	***Fm_moon_spec_dir***	True if difference between specular direction and target to moon direction < Tm_angle_moon	1
130.10	***Fm_gal_noise_error***	True if uncertainty on galactic noise source > Tm_max_gal_noise_error	1
130.11	***Fm_high_gal_noise***	True if galactic noise > Tm_high_gal_noise	1
130.12	***Fm_mixed_scene***	True if mixed scene (land-sea) correction applied to this measurement	1

Bit # (01 → LSB)	Tag Name	Description	Size (bits)
130.13	***Fm_outlier***	True if outlier measurement; if false, not outlier measurement	1
130.14	***Fm_resol***	True if major axis of the footprint ellipse is greater than threshold Tg_resol_max_ocean	1
130.15	***Fm_valid***	Flag set if measurement is valid according to decision tree criteria PRP_12-1	1
130.16	***Fm_lost_data***	Flag set if measurement not used due to lack of companion olarization.	1
130.17	***Fm_l1c_rfi***	True if measurement is flagged as contaminated by RFI in L1c	1
130.18	***Fm_l1c_software_error***	Flag set if L1c Software_Error_flag is set or L1c BT value is invalid (NaN)	1
130.19	***Fm_l1c_instrument_error***	Flag set if L1c Instrument_Error_flag is set.	1
130.20	***Fm_l1c_adf_error***	Flag set if L1c ADF_Error_flag is set.	1
130.21	***Fm_l1c_calibration_error***	Flag set if L1c Calibration_Error_flag is set.	1
130.22	***Fm_l2_rfi***	Flag set if measurement is suspected of being contaminated by RFI	1
130.23	***Fm_l2_rfi_outlier***	Flag set if measurement is suspected of being contaminated by RFI by measurement discrimination outlier tests	1
130.24	***Fm_l2_rfi_snapshot_out_of_range***	Flag set if measurement is suspected of being contaminated by RFI because snapshot contains out-of-range TBs	1
130.25	***Fm_l2_rfi_high_snapshot_std***	Flag set if measurement is suspected of being contaminated by RFI because snapshot std/ra for XX/YY measurements is too high (>Ts_std).	1
130.26	***Fm_l2_rfi_high_snapshot_std_stokes3***	Flag set if measurement is suspected of being contaminated by RFI because snapshot std/ra for Stokes3 measurements is too high (>Ts_std_stokes3).	1
130.27	***Fm_l2_rfi_high_snapshot_std_stokes4***	Flag set if measurement is suspected of being contaminated by RFI because snapshot std/ra for Stokes4 measurements is too high (>Ts_std_stokes4).	1
130.28	***Fm_LO_calibration***	Flag set if measurement is made in a snapshot immediately following a LO calibration (as detected by a gap in snapshot times)	1

Bit # (01 → LSB)	Tag Name	Description	Size (bits)
130.29	***Fm_keepXpol***	keep brightness temperature in X olarization direction	1
130.30	***Fm_keepYpol***	keep brightness temperature in Y olarization direction	1
130.31	***Fm_keepST34***	Keep Stokes 3 (real part) & Stoke 4 (imaginary part). Most significant bit.	1
130.32	***spare***	not used	1

Table 4-24 Measurement Flags

5. LEVEL 2 AUXILIARY DATA PRODUCT TYPES SPECIFICATIONS

5.1 AUXILIARY DATA PRODUCTS COMMON HEADER

5.1.1 Main Product Header

ADF only have Fixed Header and Specific Product Header, including the needed fields to specify which belongs to the product`s MPH in the ADF's SPH

5.1.2 Specific Product Header

The Specific Product Header for ADF with binary data blocks has the following structure:

- Main_SPH as defined in Table 5-2
- ADF particular SPH (optionally defined for each product, see the corresponding section for each ADF)
- Data_Sets as defined in Table 4-4

The Reference Data Sets contain the reference to any file containing relevant information for the Product. The Measurement Data Sets contain relevant information about the information linked directly to the product (Binary or XML).

Amongst the fields in the Specific Product Header Main Info section, its second Field, the *SPH_Descriptor* will be different for every type of Level 2 Auxiliary Products.

The Specific Product Header for ADF with XML ASCII data blocks has the following structure:

- Main_SPH_for_XML as defined in Table 5-3
- ADF particular SPH (optionally defined for each product, see the corresponding section for each ADF)

All the accepted types and names are presented in the following table:

Accepted Name	Description
AUX_DGG____SPH	SPH For ADP containing the DGG Geodetic Product
AUX_ECMWF__SPH	SPH For ADP containing the ECMWF Product
AUX_DFFFRA_SPH	SPH For ADP containing the DFFG Fractions Product
AUX_DFFXYZ_SPH	SPH For ADP containing the DFFG XYZ Product
AUX_DFFLAI_SPH	SPH For ADP containing the DFFG LAI Product
AUX_DFFLMX_SPH	SPH For ADP containing the DFFG LAI Max Product
AUX_DFFSOI_SPH	SPH for ADP containing the DFFG Soil Properties Product
AUX_DFFSNO_SPH	SPH for ADP containing the DFFG Snow Product
AUX_DGGXYZ_SPH	SPH For ADP containing the DGG XYZ Product
AUX_DGGTLV_SPH	SPH For ADP containing the DGG Current Tau Nadir LV Product
AUX_DGGTFO_SPH	SPH For ADP containing the DGG Current Tau Nadir FO Product
AUX_DGGROU_SPH	SPH For ADP containing the DGG Current Roughness H Product
AUX_DGGRFI_SPH	SPH for ADP containing the DGG RFI Product
AUX_DGGFLO_SPH	SPH For ADP containing the DGG Current Flood Product
AUX_WEF____SPH	SPH For ADP containing the WEF Product

Accepted Name	Description
AUX_MN_WEF_SPH	SPH For ADP containing the Mean WEF Product
AUX_GAL_SM_SPH	SPH For ADP containing the Galaxy Map Product convolved with the AUX_MN_WEF
AUX_BIGBWF_SPH	SPH For ADP containing the Big water body flag Product
AUX_LANDCL_SPH	SPH For ADP containing the Land Cover Class Product
AUX_CNFSMD_SPH	SPH For ADP containing the Configuration Parameters Product for L1c dual polarization input
AUX_CNFSMF_SPH	SPH For ADP containing the Configuration Parameters Product for L1c full polarization input
AUX_FLTSEA_SPH	SPH For ADP containing Flat Sea Coefficients
AUX_RGHNS1_SPH	SPH For ADP containing the Look Up Tables used by Roughness Model 1
AUX_RGHNS2_SPH	SPH For ADP containing the Look Up Tables used by Roughness Model 2
AUX_RGHNS3_SPH	SPH For ADP containing the Look Up Tables used by Roughness Model 3
AUX_FOAM___SPH	SPH For ADP containing the Look Up Tables used by Foam Model
AUX_GAL_OS_SPH	SPH For ADP containing the Galactic Map Product convolved with the AUX_WEF___
AUX_GAL2OS_SPH	SPH for ADP containing the Galaxy Map product 2
AUX_SGLINT_SPH	SPH for ADP containing the Look Up Tables of the Bistatic Coefficients used in Sun Glint Computation
AUX_SUN_BT_SPH	SPH for ADP containing the estimated L-Band sun brightness temperature
AUX_ATMOS__SPH	SPH for ADP containing Constants to Estimate Atmospheric Contamination

Accepted Name	Description
AUX_DISTAN_SPH	SPH for the ADP containing the Land Sea Mask
AUX_SSS____SPH	SPH for the ADP containing the SSS Climatological LUT
AUX_CNFOSD_SPH	SPH for ADP containing the Configuration Parameters Product for L1c dual polarization input
AUX_CNFOSF_SPH	SPH for ADP containing the Configuration Parameters Product for L1c full polarization input
AUX_AGDPT__SPH	SPH For ADP containing the Look Up Tables used by processor to Initialise Geophysical Parameters (Currently this file is not used by the L2OS operational processor)
AUX_OTT1D__SPH	SPH for ADP containing the Ocean Target Transformation 1 for dual pol
AUX_OTT1F__SPH	SPH for ADP containing the Ocean Target Transformation 1 for full pol
AUX_OTT2D__SPH	SPH for ADP containing the Ocean Target Transformation 2 for dual pol
AUX_OTT2F__SPH	SPH for ADP containing the Ocean Target Transformation 2 for full pol
AUX_OTT3D__SPH	SPH for ADP containing the Ocean Target Transformation 3 for dual pol
AUX_OTT3F__SPH	SPH for ADP containing the Ocean Target Transformation 3 for full pol
AUX_MSOTT__SPH	SPH for ADP containing the mixed scene land-sea correction OTT Look Up Table
AUX_DTBXY__SPH	SPH for ADP containing the delta brightness temperature data
AUX_DTBCUR_SPH	SPH for ADP containing the current delta brightness temperature data
AUX_BFP____SPH	SPH for Auxiliary product containing receivers' derived Best Fit Plane
AUX_MISP___SPH	SPH for Auxiliary product containing the mispointing angles between the Body Frame referenced in the Proteus quaternions and the Antenna Plane defined by the MIRAS instrument

Accepted Name	Description
AUX_ECOLAI_SPH	SPF for ADP containing the ECOLAI Product
AUX_BNDLST_SPH	SPH for ADP containing the Binding Lists to propagate ECMWF parameters.
AUX_ECMCDF_SPH	SPH for ADP containing CDF coefficients.
AUX_FARA_P_SPH	SPH for predicted Faraday Rotation ADF used by L2P in correction of ionospheric effects (created from AUX_VTEC_P data). It is used in LTA Reprocessing Centre.
AUX_FARA_C_SPH	SPF for analysis Rapid Faraday Rotation ADF used by L2P in correction of ionospheric effects (created from AUX_VTEC_R data). It is used in LTA Reprocessing Centre.
AUX_FARA_R_SPH	SPF for Analysis Consolidated Faraday Rotation ADF used by L2P in correction of ionospheric effects (created from AUX_VTEC_C data). It is used in LTA Reprocessing Centre.
AUX_BULL_B_SPH	SPH for Auxiliary product containing IERS Bulletin B file used by the EE CFI to get very precise computations of geolocation

Table 5-1 Level 2 SPH Auxiliary Data Accepted Names

5.1.2.1 XML Specific Product Header Main Info

The following tables present the parameters for the Specific Product Header Main Info for the Auxiliary Data. The first shows the SPH if the Data Block of the product is specified in binary format and the second if the product is specified in XML ASCII format.

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Main_SPH***	Tag				Init of Main_SPH structure	
02	***SPH_Descriptor***	String	N/A	14 bytes	%14uc	Name describing SPH, as per Table 5-1	Hard-coded

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
03	***Ref_Doc***	string	N/A	17 bytes	%17s	Name of the document containing the specifications for the current product (this document).	ICNF
04	***Precise_Validity_Start***	String	UTC	30 bytes	%30s	This is the UTC Validity Start Time, coherent with the Validity Start Time in the File Name, but in CCSDS ASCII format with time reference and microseconds. It is a repetition of the time of the first DSR. "UTC=yyyy-mm-ddThh:mm:ss.uuuuuu"	INT
05	***Precise_Validity_Stop***	String	UTC	30 bytes	%30s	This is the UTC Validity Stop Time, coherent with the Validity Stop Time in the File Name, but in CCSDS ASCII format with time reference and microseconds. It is a repetition of the time of the last DSR. "UTC=yyyy-mm-ddThh:mm:ss.uuuuuu"	INT
06	***Checksum***	integer	N/A	10 bytes	10*uc	Checksum of the datablock, obtained from the algorithm in the IEE Std 1003.1.2004, using function cksum in POSIX.	INT
07	***Header_Schema***	string	N/A	31 bytes	%31s	Name of the XSD to be use for the validation of the ADF Header. The format is as specified in [RD.16]. In the operational processor, the value will be provided by an XML R/W API method.	INT
08	***Datablock_Schema***	string	N/A	42	%42s	Name of the binX schema for the validation of the product datablock. The format is as specified in [RD.16]. In the operational processor, the value will be provided by an XML R/W API method.	CNF
09	***Header_Size***	integer	N/A	6	%06d	Number of bytes in the header.	INT
10	***Datablock_Size***	integer		11	%011d	Number of bytes in the datablock.	INT
11	***HW_Identifier***	String	N/A	4 bytes	%4s	Identifier of the machine that has generated this ADF.	ICNF
12	***Main_SPH***	Tag				End of Specific Product Header structure	

Table 5-2 Level 2 Auxiliary Data Main_SPH for products with Binary Datablock

For the pure XML ASCII ADFs, the following Main_SPH_for_XML structure will be used (note that these files do not contain the list of data sets):

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Main_SPH_for_XML***	Tag				Init of ***Main_SPH_for_XML*** structure	
02	***SPH_Descriptor***	String	N/A	14 bytes	%14uc	Name describing SPH.	ICNF
03	***Ref_Doc***	string	N/A	17 bytes	%17s	Name of the document containing the specifications for the current product (this document).	ICNF
04	***Precise_Validity_Start***	String	UTC	30 bytes	%30s	This is the UTC Validity Start Time, coherent with the Validity Start Time in the File Name, but in CCSDS ASCII format with time reference and microseconds. Note that this can have the special value indicating “beginning of mission” (without an absolute time specified) as defined in Tailoring of EEFF Standard for SMOS GS [AD.4]. “UTC=yyyy-mm-ddThh:mm:ss.uuuuuu” The Precise_Validity_Start Time shall be the start time of the period in which the product is valid –i.e. can be used as supporting input to the processing- in case the product is an auxiliary file.	INT
01	***Precise_Validity_Stop***	String	UTC	30 bytes	%30s	This is the UTC Validity Stop Time, coherent with the Validity Stop Time in the File Name, but in CCSDS ASCII format with time reference and microseconds. Note that this can have the special value indicating “end of mission” (without an absolute time specified) as defined in Tailoring of EEFF Standard for SMOS GS [AD.4]. “UTC=yyyy-mm-ddThh:mm:ss.uuuuuu” The Precise_Validity_Stop Time shall be the stop time of the period in which the product is valid –i.e. can be used as supporting input to the processing- in case the product is an auxiliary file.	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
05	***Header_Schema***	string	N/A	31 bytes	%31s	Name of the XSD to be use for the validation of the ADF Header. The format is as specified in [RD.16]. In the operational processor, the value will be provided by an XML R/W API method.	INT
06	***Datablock_Schema***	string	N/A	31 bytes	%31s	Name of the validation xml schema for the product's datablock Name of the binX schema for the validation of the product datablock. The format is as specified in [RD.3]. In the operational processor, the value will be provided by an XML R/W API method.	CNF
07	***Header_Size***	Integer	bytes	6 bytes	%06d	Size of the Header of the product	INT
08	***Datablock_Size***	Integer	Bytes	11 bytes	%011d	Size of the product Datablock	INT
09	***HW_Identifier***	String	N/A	4 bytes	%4s	Identifier of the machine that has generated this ADF.	ICNF
10	***Main_SPH_for_XML***	Tag				End of ***Main_SPH_for_XML*** structure	

Table 5-3 Level 2 Auxiliary Data Main_SPH for products with XML Datablock

5.2 AUXILIARY LEVEL 2 COMMON PRODUCTS FOR SOIL MOISTURE AND OCEAN SALINITY AUXILIARY DATA

The common auxiliary products are listed below:

5.2.1 Orbit Scenario File (MPL_ORBSCT)

This file contains the TAI time, UTC time and UT1 time required for Earth Explorer CFI library initialization.
The format of the MPL_ORBSCT is defined in [AD.6].

5.2.2 ECMWF Product (AUX_ECMWF_)

The OS and SM Processors use the AUX_ECMWF_ Auxiliary Data Product to store the geophysical parameters coming from the ECMWF forecasts. The aim of the ECMWF Auxiliary File generation is to interpolate the ECMWF model parameters on the ISEA grid and to select the grid cells corresponding to a half-orbit swath. For each L1c half-orbit there will be then one ECMWF Auxiliary file.

5.2.2.1.1 Specific Product Header

The SPH follows the format described in section 5.1.2 and it includes, in addition, the fields listed below:

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Tag				Init of ***Specific Product Header*** structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2	
14	***Quality_Information***	Starting Tag				Starting of XML Structure containing quality variables	
15	***Overall_Quality***	integer	N/A	1	%01d	Flag to asses the quality of the ADF based on the flag defined in the binary part. • If at least for one DGG point all the "Mandatory OS+SM Parameter Flags" =0 => Overall_Quality=0 (good for OS and SM) • If at least for one DGG point all the "Mandatory SM Parameter Flags" =0 => Overall_Quality=1 (good for SM) • If at least for one DGG point all the "Mandatory OS Parameter Flags" =0 => Overall_Quality=2 (good for OS) • Else (= none of the DGG point have all the Mandatory parameters-> Overall_Quality=3 (not good for both OS and SM)	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
16	***Quality_Information***	Ending Tag				Ending of XML Structure containing quality variables	
17	***L2_Product_Location***	Starting Tag				Init of XML structure containing variables described below	
18	***Start_Lat***	real	deg	11 bytes	%+011.6f	Latitude of northernmost DGG grid point used in the generation (positive North)	INT
19	***Start_Long***	real	deg	11 bytes	%+011.6f	Longitude of westernmost DGG grid point used in the generation (positive East of Greenwich (-180,+180])	INT
20	***Stop_Lat***	real	deg	11 bytes	%+011.6f	Latitude of southernmost DGG grid point used in the generation (positive North)	INT
21	***Stop_Long***	real	deg	11 bytes	%+011.6f	Longitude of easternmost DGG grid point used in the generation (positive East of Greenwich (-180,+180])	INT
22	***Mid_Lat***	real	deg	11 bytes	%+011.6f	Latitude of DGG grid point in the middle (rounded down) of the list used in the generation of the product	INT
23	***Mid_Lon***	real	deg	11 bytes	%+011.6f	Longitude of DGG grid point in the middle (rounded down) of the list used in the generation of the product	INT
24	***L2_Product_Location***	Ending Tag				End of XML structure containing variables described below	
25-36	***Data_Sets***	structure	N/A	N/A	N/A	Data Sets structure's fields as defined in Table 4-4	
37	***Specific_Product_Header***	Ending Tag	N/A	N/A	N/A	End of ***Specific Product Header*** structure	

Table 5-4 ECMWF Specific Product Header

Concernig the List_of_Data_Sets, these are following Data Set Names that should be included in each Data_Set structure for the AUX_ECMWF products:

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
DGG_FILE	AUX_DGG___
ORBIT_SCENARIO_FILE	MPL_ORBSCT
BNDLST_FILE	AUX_BNDLST
GRIB_WAV_FILE	S2Dmmddhh00mmddHHMM1
GRIB_ATM_FILE	S2Pmmddhh00mmddHHMM1
GRIB_LSM_FILE	S2Dmmddhh00mmddHHMM1

Table 5-5 ECMWF Reference Data Set Names

5.2.2.1.2 Data Block

The Data Block File is composed the ECMWF_PARAMETERS Data Set, resampled at the ISEA grid spatial resolution for half orbit. The data set contains a number of identical data set records. The data set records in the data block are ordered by node ID.

The number of grid cells per half-orbit are approximately similar to that of L1c (~80000 grid points) even if the grid points number will be slightly bigger because the file will be generated before the information of the corresponding L1c half orbit file will be available.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	ECMWF_PARAMS					Init of binary Set in the product containing the ECMWF_PARAMS records	
01	***Num_Points***	Counter	N/A	Unsigned integer (4 bytes)	1 element	Number of points in the DSR. Range: [0-100000]	INT
	List_of_ECMWF_PARAMS_Datas					Init of list of ECMWF_PARAMS data set record structures, repeated Counter times. There are as many DSR as Grid Points in the Product	
	ECMWF_PARAMS_Data					Init of binary Data Set containing the ECMWF_PARAMS records.	
02	***Grid_Point_ID***	Identifier	N/A	unsigned integer (4 bytes)	1 element	Unique identifier of Earth fixed grid	INT
03	***Latitude***	Real	deg	float (4 bytes)	1 element	Latitude of the DGG node. Range: [-90-90]	INT
04	***Longitude***	Real	deg	float (4 bytes)	1 element	Longitude of the DGG node. Range: [0-360]	INT
05	***Land_Sea_Mask***	flag	10^{-1}	unsigned byte	1 element	Fractional land cover (model uses 0.5 as threshold for mask) from ECMWF (0-1) This parameter is defined both over land and sea.	INT
06	***Sea_Ice_Cover***	Real value	-	Float (4 bytes)	1 element	Sea Ice cover. This parameter is defined both over land and sea.	INT
07	***Surface_Pressure***	Real value	Pa	Float (4 bytes)	1 element	Surface Pressure.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						This parameter is defined both over land and sea.	
08	***Air_Temperature_2m***	Real value	K	Float (4 bytes)	1 element	2 meter air temperature. This parameter is defined both over land and sea.	INT
09	***Sea_Surface_Temperature***	Real value	K	Float (4 bytes)	1 element	Temperature of the water surface. This parameter has meaningful value only over sea.	INT
10	***Total_Coulmn_Water_Vapor***	Real value	kg/m^2	Float (4 bytes)	1 element	Vertically integrated total water vapour. This parameter is defined both over land and sea.	INT
11	***Large_Scale_Precipitation***	Real value	m	Float (4 bytes)	1 element	Large scale (stratiform) precipitation (accumulated) This parameter is defined both over land and sea.	INT
12	***Convective_Precipitation***	Real value	m	Float (4 bytes)	1 element	Convective precipitation (accumulated) This parameter is defined both over land and sea.	INT
13	***Rain_Rate***	Real value	m/h	Float (4 bytes)	1 element	Rain rate This parameter is defined both over land and sea.	INT
14	***Volumetric_Soil_Water_L1***	Real value	m^3/m^3	Float (4 bytes)	1 element	Volumetric soil water level 1. This parameter has meaningful value over land.	INT
15	***Volumetric_Soil_Water_L2***	Real value	m^3/m^3	Float (4 bytes)	1 element	Volumetric soil water level 2. This parameter has meaningful value over land.	INT
16	***Scaled_Volumetric_Soil_Water_L1***	Real value	m^3/m^3	Float (4 bytes)	1 element	Re-scaled volumetric soil water level 1	INT
17	***Skin_Reservoir_Content***	Real value	m	Float (4 bytes)	1 element	Skin reservoir content (water). This parameter has meaningful value over land.	INT
18	***Soil_Temperature_L1***	Real value	K	Float (4 bytes)	1 element	Soil Temperature level 1.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						This parameter is defined both over land and sea.	
19	***Soil_Temperature_L2***	Real value	K	Float (4 bytes)	1 element	Soil Temperature level 2. This parameter is defined both over land and sea.	INT
20	***Soil_Temperature_L3***	Real value	K	Float (4 bytes)	1 element	Soil Temperature level 3. This parameter is defined both over land and sea.	INT
21	***Soil_Temperature_L4***	Real value	K	Float (4 bytes)	1 element	Soil Temperature level 4. This parameter is defined both over land and sea.	INT
22	***Skin_Temperature***	Real value	K	Float (4 bytes)	1 element	Skin Temperature. This parameter is defined both over land and sea.	INT
23	***Temperature_Snow_Layer***	Real value	K	Float (4 bytes)	1 element	Temperature of snow layer. This parameter is defined both over land and sea.	INT
24	***Ice_Surface_Temperature***	Real value	K	Float (4 bytes)	1 element	Ice surface temperature level 1. This data is defined only over land.	INT
25	***Snow_Depth***	Real value	m	Float (4 bytes)	1 element	Snow depth (meter of water equivalent) This parameter is defined both over land and sea.	INT
26	***Accumutated_Water***	Real value	m	Float (4 bytes)	1 element	Meter of water (accumulated) This parameter is defined both over land and sea.	INT
27	***Snow_Density***	Real value	kg/m^3	Float (4 bytes)	1 element	Snow density. This parameter is defined both over land and sea.	INT
28	***Wind_ Zonal_Lowest_Level***	Real value	m/s	Float (4 bytes)	1 element	wind-zonal component at lowest model level. This parameter is defined both over land and sea.	INT
29	***Wind_ Meridional_Lowest_Level***	Real value	m/s	Float (4 bytes)	1 element	wind-meridional component at lowest model level. This parameter is defined both over land and sea.	INT
30	***Temperature_Lowest_Level***	Real value	K	Float (4 bytes)	1 element	Temperature at lowest model level. This parameter is defined both over land and sea.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
31	***Specific_Humidity_Lowest_Level***	Real value	kg/kg	Float (4 bytes)	1 element	Specific humidity at lowest model level. This parameter is defined both over land and sea.	INT
32	***Charnock_Parameter***	Real value		Float (4 bytes)	1 element	Charnock parameter as returned by the wave model (non-dimensional) This parameter has meaningful value only over sea	INT
33	***Dewpoint_2m***	Real value	K	Float (4 bytes)	1 element	2 meter dewpoint temperature. This parameter is defined both over land and sea.	INT
34	***Sea_Level_Pressure***	Real value	Pa	Float (4 bytes)	1 element	Sea level pressure. This parameter is defined both over land and sea.	INT
35	***Northward_Surface_Stress_Rate***	Real value	N/m^2s	Float (4 bytes)	1 element	North-South surface stress, accumulated since start of forecast. This parameter is defined both over land and sea.	INT
36	***Eastward_Surface_Stress_Rate***	Real value	N/m^2s	Float (4 bytes)	1 element	East-West surface stress, accumulated since start of forecast. This parameter is defined both over land and sea.	INT
37	***Surface_Shortwave_Radiation_Rate***	Real value	W/m^2s	Float (4 bytes)	1 element	Net downward shortwave flux at surface (Net solar radiation at the surface), accumulated since start of forecast. This parameter is defined both over land and sea.	INT
38	***Surface_Thermal_Radiative_Flux_Rate***	Real value	W/m^2s	Float (4 bytes)	1 element	Net downward thermal radiative flux, accumulated since start of forecast. This parameter is defined both over land and sea.	INT
39	***Surface_Sensible_Heat_Flux_Rate***	Real value	W/m^2s	Float (4 bytes)	1 element	Net downward sensible heat flux, accumulated since start of forecast. This parameter is defined both over land and sea.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
40	***Surface_Latent_Heat_Flux_Rate***	Real value	W/m^{2}s	Float (4 bytes)	1 element	Net downward latent heat flux, accumulated since start of forecast. This parameter is defined both over land and sea.	INT
41	***Drag_Coefficient_With_Waves***	Real value		Float (4 bytes)	1 element	Drag coefficient with waves (non-dimensional) This parameter has meaningful value only over sea.	INT
42	***Wind_10m_Wave_Model***	Real value	m/s	Float (4 bytes)	1 element	Wave model 10 metre wind speed. This parameter has meaningful value only over sea	INT
43	***Peak_Period_1D***	Real value	s	Float (4 bytes)	1 element	Peak period of 1D spectrum. This parameter has meaningful value only over sea	INT
44	***Significant_Wave_Height***	Real value	m	Float (4 bytes)	1 element	Significant wave height. This parameter has meaningful value only over sea	INT
45	***Mean_Square_Slope***	Real value		Float (4 bytes)	1 element	Mean square slope (non-dimensional) This parameter has meaningful value only over sea	INT
46	***Mean_Period_Wind_Waves***	Real value	s	Float (4 bytes)	1 element	Mean period of wind waves. This parameter has meaningful value only over sea	INT
47	***Significant_Height_Wind_Waves***	Real value	m	Float (4 bytes)	1 element	Significant height of wind waves. This parameter has meaningful value only over sea	INT
48	***10m_Neutral_Equivalent_Wind_Zonal***	Real value	m/s	Float (4 bytes)	1 element	10 metre neutral equivalent wind –zonal component. This parameter is defined both over land and sea.	INT
49	***10m_Neutral_Equivalent_Wind_Meridional***	Real value	m/s	Float (4 bytes)	1 element	10 metre neutral equivalent wind –meridional component. This parameter is defined both over land and sea.	INT
50	***Roughness_Length***	Real value	m	Float (4 bytes)	1 element	Roughness length. This parameter is defined both over land and sea. L2OS processor does not read it.	INT
51	***Friction_Velocity_from_surface_model***	Real value	m/s	Float (4 bytes)	1 element	Friction velocity from surface layer module. This parameter is defined both over land and sea.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
52	***Friction_Velocity_from_wave_model***	Real value	m/s	float (4 bytes)	1 element	Friction velocity from wave model This parameter has meaningful value only over sea.	INT
53	***Inverse_Wave_Age***	Real value	N/A	float (4 bytes)	1 element	Inverse wave age This parameter has meaningful value only over sea.	INT
54	***Height_Lowest_Model_Level***	Real value	N/A	float (4 bytes)	1 element	Height Lowest level Atmospheric Model This parameter has meaningful value only over sea.	INT
55	***Virtual_Temperature_Lowest_Model_Level***	Real value	N/A	float (4 bytes)	1 element	Virtual Temperature Lowest Model Level This parameter has meaningful value over land and sea.	INT
56	***Flags***	Flag	N/A	unsigned long (8 bytes)	1 element	Flags to check the quality of the ECMWF product	INT
57	***Degradation_Flags***	Flag	N/A	unsigned long (8 bytes)	1 element	Flags to check if the quality of the ECMWF product is degraded (not the nominal interpolation occur). This flag identifies when a parameter has been interpolated using the nominal interpolation method or when a parameter has been interpolated using the backup interpolation method.	INT
	ECMWF_PARAMS_Data					End of ECMWF_Params_Data data set record structures.	
	List_of_ECMWF_PARAMS_Datas					End of list of ECMWF_PARAMS data set record structures, repeated Counter times. There are as many DSR as Grid Points in the Product	
	ECMWF_PARAMS					End of binary Set in the product containing the ECMWF_PARAMS records	
	Data_Block					End of binary Data Block in the product.	

Table 5-6 Binary Content of the DSRs in the ECMWF Product

Field #56 (“Flags”) includes a list of flags, each of one associated to one parameter within the Table 5-5.

The setting of the bits within “Flags” for each parameter is defined in [RD.18]

All of these flags are specified in the table attached below:

Bit # (01 → LSB)	Tag Name	Size (bits)
56.01.	***Sea_Ice_Cover_Flag***	1
56.02.	***Surface_Pressure_Flag***	1
56.03.	***Air_Temperature_2m_Flag***	1
56.04.	***Sea_Surface_Temperature_Flag***	1
56.05.	***Total_Coulmn_Water_Vapor_Flag***	1
56.06.	***Large_Scale_Precipitation_Flag***	1
56.07.	***Convective_Precipitation_Flag***	1
56.08.	***Rain_Rate_Flag***	1
56.09.	***Volumetric_Soil_Water_L1_Flag***	1
56.10.	***Volumetric_Soil_Water_L2_Flag***	1
56.11.	***Skin_Reservoir_Content_Flag***	1
56.12.	***Soil_Temperature_L1_Flag***	1
56.13.	***Soil_Temperature_L2_Flag***	1
56.14.	***Soil_Temperature_L3_Flag***	1
56.15.	***Soil_Temperature_L4_Flag***	1
56.16.	***Skin_Temperature_Flag***	1
56.17.	***Temperature_Snow_Layer_Flag***	1

Bit # (01 → LSB)	Tag Name	Size (bits)
56.18.	***Ice_Surface_Temperature_Flag***	1
56.19.	***Snow_Depth_Flag***	1
56.20.	***Accumutated_Water_Flag***	1
56.21.	***Snow_Density_Flag***	1
56.22.	***Wind_ Zonal_Lowest_Level_Flag***	1
56.23.	***Wind_ Meridional_Lowest_Level_Flag***	1
56.24.	***Temperature_Lowest_Level_Flag***	1
56.25.	***Specific_Humidity_Lowest_Level_Flag***	1
56.26.	***Charnock_Parameter_Flag***	1
56.27.	***Dewpoint_2m_Flag***	1
56.28.	***Sea_Level_Pressure_Flag***	1
56.29.	***Northward_Surface_Stress_Rate_Flag***	1
56.30.	***Eastward_Surface_Stress_Rate_Flag***	1
56.31.	***Surface_Shortwave_Radiation_Rate_Flag***	1
56.32.	***Surface_Thermal_Radiative_Flux_Rate_Flag***	1
56.33.	***Surface_Sensible_Heat_Flux_Rate_Flag***	1
56.34.	***Surface_Latent_Heat_Flux_Rate_Flag***	1
56.35.	***Drag_Coefficient_With_Waves_Flag***	1
56.36.	***Wind_10m_Wave_Model_Flag***	1
56.37.	***Peak_Period_1D_Flag***	1
56.38.	***Significant_Wave_Height_Flag***	1

Bit # (01 → LSB)	Tag Name	Size (bits)
56.39.	***Mean_Square_Slope_Flag***	1
56.40.	***Mean_Period_Wind_Waves_Flag***	1
56.41.	***Significant_Height_Wind_Waves_Flag***	1
56.42.	***10m_Neutral_Equivalent_Wind _Zonal_Flag***	1
56.43.	***10m_Neutral_Equivalent_Wind _Meridional_Flag***	1
56.44.	***Roughness_Length_Flag***	1
56.45.	***Friction_Velocity_from_surface_model_Flag***	1
56.46.	***Friction_Velocity_from_wave_model_Flag***	1
56.47.	***Inverse_Wave_Age_Flag***	1
56.48.	***Height_Lowest_Model_Level_Flag***	1
56.49.	***Virtual_Temperature_Lowest_Model_Level_Flag***	1
56.50.	***Land_Sea_Mask_Flag***	1
57.51-57.64	***Spare Bits***	14

Table 5-7 AUX_ECMWF_ Flags

Field #57 ("Degradation_Flags") includes a list of flags.The setting of the bits within "Flags" for each parameter is defined in [RD.18]

All of these flags are specified in the table attached below:

Bit # (01 → LSB)	Tag Name	Size (bits)
57.01.	Spare(this flag is never raised for Sea_Ice_Cover_Degradation_Flag)	1
57.02.	Surface_Pressure_Degradation_Flag	1

Bit # (01 → LSB)	Tag Name	Size (bits)
57.03.	Air_Temperature_2m_Degradation_Flag	1
57.04.	Sea_Surface_Temperature_Degradation_Flag	1
57.05.	Total_Column_Water_Vapor_Degradation_Flag	1
57.06.	Large_Scale_Precipitation_Degradation_Flag	1
57.07.	Convective_Precipitation_Degradation_Flag	1
57.08.	Spare(this flag is never raised for Rain_Rate_Degradation_Flag)	1
57.09.	Volumetric_Soil_Water_L1_Degradation_Flag	1
57.10.	Volumetric_Soil_Water_L2_Degradation_Flag	1
57.11.	Skin_Reservoir_Content_Degradation_Flag	1
57.12.	Soil_Temperature_L1_Degradation_Flag	1
57.13.	Soil_Temperature_L2_Degradation_Flag	1
57.14.	Soil_Temperature_L3_Degradation_Flag	1
57.15.	Soil_Temperature_L4_Degradation_Flag	1
57.16.	Skin_Temperature_Degradation_Flag	1
57.17.	Temperature_Snow_Layer_Degradation_Flag	1
57.18.	Ice_Surface_Temperature_Degradation_Flag	1
57.19.	Snow_Depth_Degradation_Flag	1
57.20.	Accumulated_Water_Degradation_Flag	1
57.21.	Snow_Density_Degradation_Flag	1
57.22.	Wind_Zonal_Lowest_Level_Degradation_Flag	1
57.23.	Wind_Meridional_Lowest_Level_Degradation_Flag	1
57.24.	Temperature_Lowest_Level_Degradation_Flag	1

Bit # (01 → LSB)	Tag Name	Size (bits)
57.25.	Specific_Humidity_Lowest_Level_Degradation_Flag	1
57.26.	Charnock_Parameter_Degradation_Flag	1
57.27.	Dewpoint_2m_Degradation_Flag	1
57.28.	Sea_Level_Pressure_Degradation_Flag	1
57.29.	Northward_Surface_Stress_Rate_Degradation_Flag	1
57.30.	Eastward_Surface_Stress_Rate_Degradation_Flag	1
57.31.	Surface_Shortwave_Radiation_Rate_Degradation_Flag	1
57.32.	Surface_Thermal_Radiative_Flux_Rate_Degradation_Flag	1
57.33.	Surface_Sensible_Heat_Flux_Rate_Degradation_Flag	1
57.34.	Surface_Latent_Heat_Flux_Rate_Degradation_Flag 1	1
57.35.	Drag_Coefficient_With_Waves_Degradation_Flag	1
57.36.	Wind_10m_Wave_Model_Degradation_Flag	1
57.37.	Peak_Period_1D_Degradation_Flag	1
57.38.	Significant_Wave_Height_Degradation_Flag	1
57.39.	Mean_Square_Slope_Degradation_Flag	1
57.40.	Mean_Period_Wind_Waves_Degradation_Flag	1
57.41.	Significant_Height_Wind_Waves_Degradation_Flag	1
57.42.	10m_Neutral_Equivalent_Wind_Zonal_Degradation_Flag	1
57.43.	10m_Neutral_Equivalent_Wind_Meridional_Degradation_Flag	1
57.44.	Roughness_Length_Degradation_Flag	1
57.45.	Friction_Velocity_from_surface_model_Degradation_Flag	1
57.46.	Friction_Velocity_from_wave_model_Degradation_Flag	1

Bit # (01 → LSB)	Tag Name	Size (bits)
57.47.	Inverse_Wave_Age_Degradation_Degradation_Flag	1
57.48.	Height_Lowest_Model_Level_Degradation_Flag	1
57.49.	Virtual_Temperature_Lowest_Model_Level_Degradation_Flag	1
57.50.	Spare (this flag is never raised for Land_Sea_Mask)	1
57.51-57.64	Spare Bits 14	14

Table 5-8 AUX_ECMWF Degraded Flags

The values specified in Table 5-5 have associated a default value in case they could not be retrieved. The list of values is detailed in the table attached below:

Missing Value	AUX_ECMWF parameter value	AUX_ECMWF parameter flag
“Expected missing value”	For Real type parameters: **-99998.0**	0 (good)
“Unexpected missing value”	For Real type parameters: **-99999.0** For Unsigned Char type parameters: **255**	1 (bad)
No missing vale	Physical value	0 (good)

Table 5-9 Missing values Handling

5.2.3 Bulletin B File (AUX_BULL_B)

As part of the evolution of the processing of SMOS data, the SMOS processors have to implement the International Earth Rotation and Reference System Service (IERS) Bulletin B file. To do that the Level-2 Soil Moisture and the Level-2 Ocean Salinity have evolved to support this implementation.

The AUX_BULL_B format specification can be found in [AD.5] section 5.2.25

5.2.4 Faraday Rotation (AUX_FARA_P, AUX_FARA_C, AUX_FARA_R)

These ADFs will be used in L2 reprocessing. Their formats are defined in [AD.5], section 5.2.22

5.2.5 DGG Current RFI Product (AUX_DGGRFI)

A passive microwave sensor detects the naturally emitted microwave energy within its field of view (FOV) and thus can detect RFI at the L-band frequency. At times, the RFI can be so strong as to make the data recorded for that FOV useless or meaningless. For SMOS mission, the measured TB detected by the passive microwave sensor may contain such a significant portion of RFI that it can have a major impact on the usefulness of the data. It is therefore useful to capture numbers impacting the influence of RFI on FOVs.

The AUX_DGGRFI Auxiliary Data Product supplies for each DGG cell the Radio Frequency Interferences counters which indicate Radio Frequency Interference (RFI) presence within the DGG cell.

This product is generated from L2 Post-processing of the Level 2 Soil Moisture User Data Product (MIR_SMUDP2) and Level 2 Ocean Salinity User Data Product (MIR_OSUDP2).

5.2.5.1 Specific Product Header

The following tabe presents the parameters that must be added to the SPH specified in section 5.1.2:

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2	
14	***Last_Grid_Point_ID_1***	integer	N/A	7	%07d	The last grid point ID of the 1st DSR	INT
15	***Last_Grid_Point_ID_2***	integer	N/A	7	%07d	The last grid point ID of the 2nd DSR	INT
16	***Last_Grid_Point_ID_3***	integer	N/A	7	%07d	The last grid point ID of the 3rd DSR	INT
17	***Last_Grid_Point_ID_4***	integer	N/A	7	%07d	The last grid point ID of the 4th DSR	INT
18	***Last_Grid_Point_ID_5***	integer	N/A	7	%07d	The last grid point ID of the 5th DSR	INT
19	***Last_Grid_Point_ID_6***	integer	N/A	7	%07d	The last grid point ID of the 6th DSR	INT
20	***Last_Grid_Point_ID_7***	integer	N/A	7	%07d	The last grid point ID of the 7th DSR	INT
21	***Last_Grid_Point_ID_8***	integer	N/A	7	%07d	The last grid point ID of the 8th DSR	INT
22-33	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
34	***Specific_Product_Header***	Ending Tag				Tag ending the Specific Product Header structure	

Table 5-10 SPH of the DGG Current RFI Product

Concernig the List_of_Data_Sets, these are following Data Set Names that should be included in each Data_Set structure for the AUX_DGGRFI products:

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
DGG_CUR_RFI_FILE	AUX_DGGRFI
L2_SM_UDP_FILE	MIR_SMUDP2
L2_OS_UDP_FILE	MIR_OSUDP2

Table 5-11 AUX_DGGRFI Reference Data Set Name

5.2.5.2 Data Block

This ADF contains only one MDS, and there are 8 DSRs in this MDS. Each DSR contains a variable number of nodes sorted by node ID. The ID of the last node in each DSR is specified in the "Table 5-26-SPH for the DGG Current RFI Product", specifically in the Last_Grid_Point_ID_1 ... 8 fields.

The following table describes the XML schema structure used to decode the binary content of the DSR in this product.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Current_RFI					Init of binary Data Set containing the ***Current_RFI*** records organized in zones.	
	List_of_RFI_Zones					Start of list of 8 ***RFI _Zone*** Data Set record structures.	
	RFI_Zone					Start of ***RFI_Zone*** data set record structure.	
01	***Num_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of points in Dataset	INT
	List_of_Current_RFI_Datas					Start of list of Num_Points ***Current_RFI_Datas*** structures, repeated Num_Points times	
	Current_RFI_Data					Start of ***Current_RFI_Data*** structure.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
02	***Grid_Point_ID***	identifie r	N/A	unsigned integer (4 bytes)	1 element (for ISEA 4-9, maximum of 2.7M pixels)	Unique identifier for Earth fixed grid point.	INT
03	***Latitude***	Real	deg	float (4 bytes)	1 element	Latitude of the DGG node. Range: [-90-90]	INT
04	***Longitude***	Real	deg	float (4 bytes)	1 element	Longitude of the DGG node. Range: [0-360]	INT
05	***N_Snap_Asc***	integer	NA	unsigned integer (4 bytes)	1 element	Accumulated valid snapshots (for ascending orbits) from the UDPs (sum of M_AVA over land/coast, sum of Dg_num_meas_over_ocean) plus one plus the snapshots affected by RFI (X or Y).	INT
06	***N_RFI_X_Asc***	integer	NA	unsigned integer (4 bytes)	1 element	Accumulated number of snapshots (for ascending orbits) considered significantly affected by RFI in X polarisation on specific DGG cell.	INT
07	***N_RFI_Y_Asc***	integer	NA	unsigned integer (4 bytes)	1 element	Accumulated number of snapshots (for ascending orbits) considered significantly affected by RFI in Y polarisation on specific DGG cell.	INT
08	***N_Snap_Desc***	integer	NA	unsigned integer (4 bytes)	1 element	Accumulated valid snapshots (for descending orbits) from the UDPs (sum of M_AVA over land/coast, sum of Dg_num_meas over ocean) plus one plus the snapshots affected by RFI (X or Y).	INT
09	***N_RFI_X_Desc***	integer	NA	unsigned integer (4 bytes)	1 element	Accumulated number of snapshots (for descending orbits) considered significantly affected by RFI in X polarisation on specific DGG cell.	INT
10	***N_RFI_Y_Desc***	integer	NA	unsigned integer (4 bytes)	1 element	Accumulated number of snapshots (for descending orbits) considered significantly affected by RFI in Y polarisation on specific DGG cell.	INT
	Current_RFI_Data					End of ***Current_RFI_Data*** structure.	
	List_of_Current_RFI_Datas					End of list of ***Current_RFI_Datas*** structures.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	RFI_Zone					End of ***RFI_Zone*** data set record structure.	
	List_of_RFI_Zones					End of list of ***RFI _Zone*** Data Set record structures.	
	Current_RFI					Init of binary Data Set containing the ***Current_RFI*** records organized in zones.	
	Data_Block					End of binary Data Block in the product.	

Table 5-12 Binary Content of a DSR in the DGG Current RFI Product

5.3 AUXILIARY LEVEL 2 SOIL MOISTURE DATA TYPES BLOCKS SPECIFICATIONS

5.3.1 DFFG Fractions Product (AUX_DFFFRA)

As is specified in [RD.6], the AUX_DFFFRA Auxiliary Data Product provides the percentage equivalents of 10 fractions and their associated land cover class codes, along with the definition and specification parameters, to each DFFG. The information is given at DFFG cell.

The considered fractions are listed below:

- *FNO*: Vegetated soil + sand (nominal fraction)
- *FFO*: Forest
- *FWL*: Wetlands
- *FWP*: Open fresh water

- *FWS*: Open Saline Water
- *FEB*: Barren
- *FEI*: Ice and Permanent Snow
- *FEU*: Urban
- *FTS*: Strong Topography
- *FTM*: Moderate Topography

Note that neither FTS nor FTM have associated class codes

5.3.1.1 Specific Product Header

The SPH for this ADF follows the format described below:

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2	
14	***Num_ Polar_Zones***	integer	N/A	3 bytes	%03d	Number of polar zones contained in the datablock. The total number of Polar Zones is 2.	Hard Coded
15	***Num_Equator_Zones***	integer	N/A	3 bytes	%03d	Number of equator zones contained in the datablock. The total number of Equator Zones is 72.	Hard Coded
16	***Digits_To_Shift***	integer	N/A	2 bytes	%02d	The location of the zone number component in the global index. It indicates how many digits are used to represent the DFFG sequence number within a zone	Hard Coded

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
17-28	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
29	***Specific_Product_Header***	Ending Tag				Tag ending the Specific Product Header structure	

Table 5-13 XML Structure of the SPH for the DFFG Fractions Product

5.3.1.2 Data Block

The AUX_DFFFRA auxiliary data product consists of 1 data set DFFG_Area containing values of the percentage equivalents of 10 fractions for each DFFG cell. The Data Block is organised as a 3D variable array.

The DFFG is partitioned according to the EEAP5deg which divides the Earth from latitude −89° to 89° into 74 zones. Zone#0 is bounded by latitudes 89° and 75°, Zone#1 is bounded by latitudes −75° and −89°, Zone#2 is bounded by latitudes 75° and −75° and longitudes 0° and 5°, and so on.

According to the definition of DFFG, Zone#0 and Zone#1 have the same number of DFFG cells, being this number different for Zone#2 to Zone#73.

The following table describes the XML schema structure used to decode the binary content of a DSR in this product:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	DFFG_Area					Init of binary Data Set containing the DFFG_Area parameters.	
	List_of_Zone_Datas					Init of list of ***Zone_Data*** data set record structure. The number of DSR is fixed to 74.	
	Zone_Data					Init of ***Zone_Data*** data set record structure	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
01	***Zone_ID***	identifier	N/A	unsigned integer (4 bytes)	1 element	EEAP5deg Zone number of this DFFG	INT
02	***Delta***	Real value	km	float (4 bytes)	1 element	Desired length of a region. See [RD.6], section 4.1.3.1, for more information.	INT
03	***Lat_a***	Real value	deg	float (4 bytes)	1 element	Latitude comprising southern edge of designated boundary in DFFG definition (Lat a< Lat b)	INT
04	***Lat_b***	Real value	deg	float (4 bytes)	1 element		INT
05	***Lon_a***	Real value	deg	float (4 bytes)	1 element	Longitude comprising western edge of designated boundary in DFFG definition (Lon a<Lon b)	INT
06	***Lon_b***	Real value	deg	float (4 bytes)	1 element		INT
07	***R***	Real value	km	float (4 bytes)	1 element	Earth ellipsoid model semi-major radius. See [RD.6], section 4.1.3.1, for more information.	INT
08	***I***	Real value	N/A	float (4 bytes)	1 element	Inverse of Earth ellipsoid model flattening coefficient. . See [RD.6], section 4.1.3.1, for more information.	INT
09	***Delta_Lat***	Real value	deg	float (4 bytes)	1 element	Latitude degree covered by latitude row	INT
10	***Delta_Lat_km***	Real value	km	float (4 bytes)	1 element	Distance on Earth covered by Delta_Lat	INT
11	***N_Lat***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of latitude rows in DFFG Area	INT
	List_of_Row_Struct_Datas					Start of list of ***Row_Structs_Datas*** structures.	
	Row_Struct_Data					Start of ***Row_Struct_Data*** structure.	
12	***N_Lon***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total number of regions at current latitude row	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
13	***Long_Step_Size_Ang***	Real value	deg	float (4 bytes)	1 element	Longitude degree covered by region at current latitude row	INT
14	***Long_Step_Size_Km***	Real value	km	float (4 bytes)	1 element	Distance on Earth covered by Long_Step_Size	INT
15	***Cumulated_N_Lon***	Integer value	N/A	unsigned integer (4 bytes)	1 element	The total number of DFFG Regions from latitude 1st row to latitude (N – 1)th row, where N is the index of the current latitude row.	INT
	Row_Struct_Data					End of ***Row_Struct_Data*** structure.	
	List_of_Row_Struct_Datas					Endof list of ***Row_Struct_Data*** structures.	
16	***Num_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total Number of cells in specified zone	INT
	List_of_DFFG_Fractions_Point_Datas					Start of list of ***DFFG_Fractions_Points_Data*** structures repeated Num_Points times	
	DFFG_Fractions_Point_Data					Start of ***DFFG_Fractions_Points*** structure.	
17	***FNO***	real value (code as integer)	0.5%	unsigned char (1 byte)	1 element	Vegetated soil + sand	INT
18	***FNO_Class_Code***	character	N/A	unsigned char (1 byte)	1 element	Land cover class code for FNO	INT
19	***FFO***	real value (code as integer)	0.5%	unsigned char (1 byte)	1 element	Percentage of forest fraction	INT
20	***FFO_Class_Code***	character	N/A	unsigned char (1 byte)	1 element	Land cover class code for FFO	INT
21	***FWL***	real value (code as	0.5%	unsigned char (1 byte)	1 element	Percentage of wetlands fraction	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
		integer)					
22	***FWL_Class_Code***	character	N/A	unsigned char (1 byte)	1 element	Land cover class code for FWL	INT
23	***FWP***	real value (code as integer)	0.5%	unsigned char (1 byte)	1 element	Percentage of open fresh water fraction	INT
24	***FWP_Class_Code***	character	N/A	unsigned char (1 byte)	1 element	Land cover class code for FWP	INT
25	***FWS***	real value (code as integer)	0.5%	unsigned char (1 byte)	1 element	Percentage of open saline water fraction	INT
26	***FWS_Class_Code***	character	N/A	unsigned char (1 byte)	1 element	Land cover class code for FWS	INT
27	***FEB***	real value (code as integer)	0.5%	unsigned char (1 byte)	1 element	Percentage of barren fraction	INT
28	***FEB_Class_Code***	character	N/A	unsigned char (1 byte)	1 element	Land cover class code for FEB	INT
29	***FEI***	real value (code as integer)	0.5%	unsigned char (1 byte)	1 element	Percentage ice & permanent snow fraction	INT
30	***FEI_Class_Code***	character	N/A	unsigned char (1 byte)	1 element	Land cover class code for FEI	INT
31	***FEU***	real value (code as integer)	0.5%	unsigned char (1 byte)	1 element	Percentage urban fraction	INT
32	***FEU_Class_Code***	character	N/A	unsigned char (1 byte)	1 element	Land cover class code for FEU	INT
33	***FTS***	real value (code as	0.5%	unsigned	1 element	Percentage of strong topography fraction	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
		integer)		char (1 byte)			
34	***FTM***	real value (code as integer)	0.5%	unsigned char (1 byte)	1 element	Percentage of moderate topography fraction	INT
	DFFG_Fractions_Point_Data					End of ***DFFG_Fractions_Points*** structure.	
	List_of_DFFG_Fractions_Point_Datas					End of list of ***DFFG_Fractions_Points*** structures.	
	Zone_Data					End of ***Zone_Data*** data set record structure	
	List_of_Zone_Datas					End of list of ***Zone_Data*** data set record structures.	
	DFFG_Area					End of binary Data Set containing the ***DFFG_Area*** parameters.	
	Data_Block					End of binary Data Block in the product.	

Table 5-14 Binary Content of a DSR in the MDS of the DFFG Fractions Product

5.3.2 DFFG XYZ Product (AUX_DFFXYZ)

Global Coordinate systems are used to locate positions on the Earth. The AUX_DFFXYZ Auxiliary Data Product provides the Earth Centered Earth Fixed (ECEF) Cartesian coordinate for each DFFG by means of three dimensional coordinates with respect to the center of mass of the reference ellipsoid. The Z-axis points toward the North Pole. The X-axis is the intersection of the prime meridian plane and the equatorial plane. The Y-axis completes a right-handed orthogonal system by a plane 90° east of the X-axis and its intersection with the equator.

The coordinates (X, Y, Z) of each DFFG are essential to compute the parameter that will be used to identify the weighting values of WEF and MEAN WEF for each DFFG.

5.3.2.1 Specific Product Header

The SPH for this ADP follows the format described in section 5.1.2, adding the fields listed below in the Specific Product Information structure:

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as definedin Table 5-2	
14	***Num_ Polar_Zones***	integer	N/A	3	%03d	Number of polar zones contained in the datablock. The total number of Polar Zones is 2.	Hard Coded
15	***Num_Equator_Zones***	integer	N/A	3	%03d	Number of equator zones contained in the datablock. The total number of Equator Zones is 72.	Hard Coded
16	***Digits_To_Shift***	integer	N/A	2	%02d	The location of the zone number component in the global index. It indicates how many digits are used to represent the DFFG sequence number within a zone	Hard Coded
17-28	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
29	***Specific_Product_Header***	Ending Tag				Tag ending the Specific Product Header structure	

Table 5-15 XML Structure of the SPH for the DFFG XYZ Product

5.3.2.2 Data Block

The ***AUX_DFFXYZ*** auxiliary data product consists of 1 data set ***DFFG_XYZ*** containing the ECEF for each DFFG cell.

The Data Block is organised as a 3D variable array.

The table showed below describes the XML schema structure used to decode the binary content of a DSR in this product:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	DFFG_XYZ					Init of binary Data Set containing the ***DFFG_XYZ*** parameters.	
	List_of_Zone_Datas					Init of list of ***Zone_Data*** data set record structure. The number of DSR is fixed to 74.	
	Zone_Data					Init of ***Zone_Data*** data set record structure	
01	***Zone_ID***	identifier	N/A	unsigned integer (4 bytes)	1 element	EEAP5deg Zone number of this DFFG	INT
02	***Delta***	Real value	km	float (4 bytes)	1 element	Desired length of a region. See [RD.6], section 4.1.3.1, for more information.	INT
03	***Lat_a***	Real value	deg	float (4 bytes)	1 element	Latitude comprising southern edge of designated boundary in DFFG definition	INT
04	***Lat_b***	Real value	deg	float (4 bytes)	1 element	(Lat a < Lat b)	INT
05	***Lon_a***	Real value	deg	float (4 bytes)	1 element	Longitude comprising western edge of designated boundary in DFFG definition	INT
06	***Lon_b***	Real value	deg	float (4 bytes)	1 element	(Lon a < Lon b)	INT
07	***R***	Real value	km	float (4 bytes)	1 element	Earth ellipsoid model semi-major radius. See [RD.6], section 4.1.3.1, for more information.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
08	***l***	Real value	N/A	float (4 bytes)	1 element	Inverse of Earth ellipsoid model flattening coefficient. See [RD.6], section 4.1.3.1, for more information.	INT
09	***Delta_Lat***	Real value	deg	float (4 bytes)	1 element	Latitude degree covered by latitude row	INT
10	***Delta_Lat_km***	Real value	km	float (4 bytes)	1 element	Distance on Earth covered by Delta_Lat	INT
11	***N_Lat***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of latitude rows in DFFG Area	INT
	List_of_Row_Struct_Datas					Start of list of ***Row_Structs_Data*** structures.	
	Row_Struct_Data					Start of ***Row_Struct_Data*** structure.	
12	***N_Lon***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total number of regions at current latitude row	INT
13	***Long_Step_Size_Ang***	Real value	deg	float (4 bytes)	1 element	Longitude degree covered by region at current latitude row	INT
14	***Long_Step_Size_Km***	Real value	km	float (4 bytes)	1 element	Distance on Earth covered by Long_Step_Size	INT
15	***Cumulated_N_Lon***	Integer value	N/A	unsigned integer (4 bytes)	1 element	The total number of DFFG Regions from latitude 1st row to latitude (N – 1)th row, where N is the index of the current latitude row.	INT
	Row_Struct_Data					End of ***Row_Struct_Data*** structure.	
	List_of_Row_Struct_Datas					End of list of ***Row_Struct_Data*** structures.	
16	***Num_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total Number of cells in specified zone	INT
	List_of_DFFG_XYZ_Point_Datas					Start of list of ***DFFG_XYZ_Points_Data*** structures, repeated Num_Points times	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	DFFG_XYZ_Point_Data					Start of ***DFFG_ XYZ_Points_Data*** structure.	
17	***X***	Real value	m	Float (4 bytes)	1 element	X coordinate in ECEF Cartesian coordinate	INT
18	***Y***	Real value	m	Float (4 bytes)	1 element	Y coordinate in ECEF Cartesian coordinate	INT
19	***Z***	Real value	m	Float (4 bytes)	1 element	Z coordinate in ECEF Cartesian coordinate	INT
	DFFG_XYZ_Point_Data					End of ***DFFG_ XYZ_Points*** structure.	
	List_of_DFFG_XYZ_Point_ Datas					End of list of ***DFFG_XYZ_Points*** structures.	
	Zone_Data					End of ***Zone_Data*** data set record structure	
	List_of_Zone_Datas					End of list of ***Zone_Data*** data set record structure	
	DFFG_XYZ					End of binary Data Set containing the ***DFFG_XYZ*** parameters.	
	Data_Block					End of binary Data Block in the product.	

Table 5-16 Binary Content of a DSR in the MDS of the DFFG XYZ Product

5.3.3 DFFG LAI Product (AUX_DFFLAI)

The AUX_DFFLAI Auxiliary Data Product provides value for the Leaf Area Index (LAI) parameter for each DFFG point. The effects of vegetation on microwave emission as measured from above the canopy are two-fold. The vegetation may absorb or scatter the radiation emanating from the soil, but it also emits its own radiation. In areas of sufficiently dense canopy, the emitted soil radiation is masked, and the observed emissivity will largely be due to the vegetation's emissions rather than the soil's. These effects are computed using the Leaf Area Index (LAI). For broadleaf canopies, LAI is defined as the one-sided-green-leaf area per unit of ground area. For needle canopies, LAI is defined as the projected needle-leaf area per unit of ground area. Thus LAI is considered an important structural property of a plant canopy. LAI values are used to compute the optical opacity of the vegetation canopy.

The contents of this product will be supplied by MODIS.

The data content will be updated every 8 days.

5.3.3.1 Specific Product Header

The SPH for this ADF follows the format described below:

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as definedin Table 5-2	
14	***Num_ Polar_Zones***	integer	N/A	3	%03d	Number of polar zones contained in the datablock. The total number of Polar Zones is 2.	Hard Coded
15	***Num_Equator_Zones***	integer	N/A	3	%03d	Number of equator zones contained in the datablock. The total number of Equator Zones is 72.	Hard Coded
16	***Digits_To_Shift***	integer	N/A	2	%02d	The location of the zone number component in the global index. It indicates how many digits are used to represent the DFFG	Hard Coded

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						sequence number within a zone	
17	***Offset***	real	m^2 m^{-2}	10	%10.6f	Offset for LAI.	From MODIS LAI
18	***Scaling_Factor***	real	N/A	10	%10.8f	Scaling factor for LAI	From MODIS LAI
19	***LAI_Update_Threshold***	Integer	Days	3	%03d	If the number of days since the LAI value was written to the AUX_DFFLAI is > than this threshold then it is considered to be too old and should be replaced by an ECOCLIMAP LAI value considered to be more meaningful	ICNF
19-30	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
31	***Specific_Product_Header***	Ending Tag				Tag ending the Specific Product Header structure	

Table 5-17 SPH of the DFFG LAI Product

Concernig the List_of_Data_Sets, these are following Data Set Names that should be included in each Data_Set structure for the AUX_DFFLAI products:

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
DFFG_ECOLAI_FILE	AUX_ECOLAI
MODIS_FILE	MYD15A2.AYYYYDDD.hHH.vVV.ppp.yyyydddhhmmss.hdf
DFFG_LAI_FILE	AUX_DFFLAI

Table 5-18 AUX_DFFLAI Reference Data Set Name

5.3.3.2 Data Block

The ***AUX_DFFLAI*** auxiliary data product consists of 1 data set ***DFFG_LAI*** containing the Leaf Area Index for each DFFG cell.

The following table describes the XML schema structure used to decode the binary contents of a DSR in this product:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	DFFG_LAI					Init of binary Data Set containing the ***DFFG_LAI*** parameters.	
	List_of_Zone_Datas					Init of list of ***Zone_Data*** data set record structure. The number of DSR is fixed to 74.	
	Zone_Data					Init of ***Zone_Data*** data set record structure	
01	***Zone_ID***	identifier	N/A	unsigned integer (4 bytes)	1 element	EEAP5deg Zone number of this DFFG	INT
02	***Delta***	Real value	km	float (4 bytes)	1 element	Desired length of a region. See [RD.6], section 4.1.3.1, for more information.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
03	***Lat_a***	Real value	deg	float (4 bytes)	1 element	Latitude comprising southern edge of designated boundary in DFFG definition	INT
04	***Lat_b***	Real value	deg	float (4 bytes)	1 element	(Lat a < Lat b)	INT
05	***Lon_a***	Real value	deg	float (4 bytes)	1 element	Longitude comprising western edge of designated boundary in DFFG definition	INT
06	***Lon_b***	Real value	deg	float (4 bytes)	1 element	(Lon a < Lon b)	INT
07	***R***	Real value	km	float (4 bytes)	1 element	Earth ellipsoid model semi-major radius. See [RD.6], section 4.1.3.1, for more information.	INT
08	***I***	Real value	N/A	float (4 bytes)	1 element	Inverse of Earth ellipsoid model flattening coefficient.. See [RD.6], section 4.1.3.1, for more information.	INT
09	***Delta_Lat***	Real value	deg	float (4 bytes)	1 element	Latitude degree covered by latitude row	INT
10	***Delta_Lat_km***	Real value	km	float (4 bytes)	1 element	Distance on Earth covered by Delta_Lat	INT
11	***N_Lat***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of latitude rows in DFFG Area	INT
	List_of_Row_Struct_Datas					Start of list of ***Row_Struct_Data*** structures.	
	Row_Struct_Data					Start of ***Row_Struct_Data*** structures.	
12	***N_Lon***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total number of regions at current latitude row	INT
13	***Long_Step_Size_Ang***	Real	deg	float (4 bytes)	1 element	Longitude degree covered by region at current	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
		value				latitude row	
14	***Long_Step_Size_Km***	Real value	km	float (4 bytes)	1 element	Distance on Earth covered by Long_Step_Size	INT
15	***Cumulated_N_Lon***	Integer value	N/A	unsigned integer (4 bytes)	1 element	The total number of DFFG Regions from latitude 1st row to latitude (N – 1)th row, where N is the index of the current latitude row.	INT
	Row_Struct_Data					End of ***Row_Struct_Data*** structure.	
	List_of_Row_Struct_Datas					End of list of ***Row_Struct_Data*** structures.	
16	***Num_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total Number of cells in specified zone	INT
	List_of_DFFG_LAI_Point_Datas					Start of list of ***DFFG_LAI_Points_Data*** structures, repeated Num_Points times	
	DFFG_LAI_Point_Data					Start of ***DFFG_ LAI_Points_Data*** structure	
17	***LAI***	integer value	m^2 m^{-2}	unsigned char (1 byte)	1 element	Index used in computing vegetation cover optical opacity and contributions to the up- welling brightness temperature The actual value is obtained using: Offset + Scaling_Factor × LAI	INT
18	***Days_Since_Last_MODIS_Update***	Integer value	Day	Unsigned integer (4 bytes)	1 element	Number of days since a valid MODIS LAI value was available for this grid point.	INT
19	***Flags***	Flag	N/A	Unsigned char (1 byte)	1 element	Flags to keep track of data quality issues	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	DFFG_LAI_Point_Data					End of ***DFFG_ LAI_Point_Data*** structure.	
	List_of_DFFG_LAI_Point _Datas					End of list of ***DFFG_LAI_Point_Data*** structures.	
	Zone_Data					End of ***Zone_Data*** data set record structure	
	List_of_Zone_Datas					End of list of ***Zone_Data*** data set record structure	
	DFFG_LAI					End of binary Data Set containing the ***DFFG_LAI*** parameters.	
	Data_Block					End of binary Data Block in the product.	

Table 5-19 Binary Content of a DSR in the MDSs of the DFFG LAI Product

Field #19 (“Flags”) includes a list of flags. All of these flags are specified in following table:

Bit # (01 → LSB)	Tag Name		Size (bits)
19.01.	***MODIS_Flag***	Used to distinguish if LAI values come from the MODIS data or come from AUX_ECOLAI static ADF. MODIS_Flag = 1 -> LAI value from ECOCLIMAP static ADF AUX_ECOLAI MODIS_Flag = 0 -> LAI value from MODIS data	1
19.02.	***Age_Flag***	Used to distinguish the case where AUX_ECOLAI LAI appears because the last MODIS LAI value is too old from the case that MODIS LAI value is updated recently. Age_Flag = 1 -> Threshold for MODIS LAI date has been exceeded Age_Flag = 0 -> Otherwise	1
19.03.	***Water_Flag***	Derived from the Total_Water_Fraction defined in the AUX_ECOLAI Water_Flag = 1 ->DFFG pixel is 100% over water Water_Flag = 0 -> Otherwise	1
19.04-19.08	***Spare bits***		5

Table 5-20 AUX_DFFLAI Flags

5.3.4 DFFG LAI Max Product (AUX_DFFLMX)

This product is very similar to the AUX_DFFLAI Auxiliary Data Product, but stores values for the maximum LAI parameters (LAI Max) instead. The average of the LAI values for July is considered to be the LAI Max value for the northern hemisphere, while the average of the LAI values for January are the LAI Max for the southern hemisphere.

Offset and scaling factor are then applied to those values for deriving the actual values of LAI Max parameters for all DFFGs

5.3.4.1 Specific Product Header

The SPH for this ADF follows the format specified below:

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	
02 *13*	***Main_SPH***	structure				Main SPH structure's fields as definedin Table 5-2	
14	***Num_ Polar_Zones***	integer	N/A	3	%03d	Number of polar zones contained in the datablock. The total number of Polar Zones is 2.	Hard Coded
15	***Num_Equator_Zones***	integer	N/A	3	%03d	Number of equator zones contained in the datablock. The total number of equator Zones is 72.	Hard Coded
16	***Digits_To_Shift***	integer	N/A	2	%02d	The location of the zone number component in the global index. It indicates how many digits are used to represent the DFFG sequence number within a zone	Hard Coded
17	***Offset***	real	$m^2 m^{-2}$	10	%10.6f	Offset for LAI_Max	Hard Coded
18	***Scaling_Factor***	real	N/A	10	%10.8f	Scaling factor for LAI_Max	Hard Coded

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
19-30	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
31	***Specific_Product_Header***	Ending Tag				Tag ending the Specific Product Header structure	

Table 5-21 SPH for the DFFG LAI Max Product

5.3.4.2 Data Block

The ***AUX_DFFLMX*** auxiliary data product consists of 1 data set ***DFFG_LAI_Max*** containing the Leaf Area Index maximum for each DFFG cell.

The following table describes the XML schema structure used to decode the binary contents of a DSR in this product.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	DFFG_LAI_Max					Init of binary Data Set containing the ***DFFG_LAI_Max*** parameters.	
	List_of_Zone_Datas					Init of list of ***Zone_Data*** data set record structure. The number of DSR is fixed to 74.	
	Zone_Data					Init of ***Zone_Data*** data set record structure	
19	***Zone_ID***	identifier	N/A	unsigned integer (4 bytes)	1 element	EEAP5deg Zone number of this DFFG	INT
20	***Delta***	Real value	km	float (4 bytes)	1 element	Desired length of a region. See [RD.6], section 4.1.3.1, for more information.	INT
21	***Lat_a***	Real value	deg	float (4 bytes)	1 element	Latitude comprising southern edge of	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
22	***Lat_b***	Real value	deg	float (4 bytes)	1 element	designated boundary in DFFG definition (Lat a < Lat b)	INT
23	***Lon_a***	Real value	deg	float (4 bytes)	1 element	Longitude comprising western edge of designated boundary in DFFG definition (Lon a < Lon b)	INT
24	***Lon_b***	Real value	deg	float (4 bytes)	1 element		INT
25	***R***	Real value	km	float (4 bytes)	1 element	Earth ellipsoid model semi-major radius. See [RD.6], section 4.1.3.1, for more information.	INT
26	***I***	Real value	N/A	float (4 bytes)	1 element	Inverse of Earth ellipsoid model flattening coefficient. . See [RD.6], section 4.1.3.1, for more information.	INT
27	***Delta_Lat***	Real value	deg	float (4 bytes)	1 element	Latitude degree covered by latitude row	INT
28	***Delta_Lat_km***	Real value	km	float (4 bytes)	1 element	Distance on Earth covered by Delta_Lat	INT
29	***N_Lat***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of latitude rows in DFFG Area	INT
	List_of_Row_Struct_Datas					Start of list of ***Row_Struct_Data*** structures.	
	Row_Struct_Data					Start of ***Row_Struct_Data*** structure.	
30	***N_Lon***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total number of regions at current latitude row	INT
31	***Long_Step_Size_Ang***	Real value	deg	float (4 bytes)	1 element	Longitude degree covered by region at current latitude row	INT
32	***Long_Step_Size_Km***	Real value	km	float (4 bytes)	1 element	Distance on Earth covered by Long_Step_Size	INT
33	***Cumulated_N_Lon***	Integer	N/A	unsigned	1 element	The total number of DFFG Regions from latitude 1st row to	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
		value		integer (4 bytes)		latitude (N – 1)th row, where N is the index of the current latitude row.	
	Row_Struct_Data					End of ***Row_Struct_Data*** structure.	
	List_of_Row_Structs_Datas					End of list of ***Row_Struct_Data*** structures.	
34	***Num_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total Number of cells in specified zone	INT
	List_of_DFFG_LAI_Max_Point_Datas					Start of list of ***DFFG_LAI_Max_Point_Data*** structures, repeated Num_Points times	
	DFFG_LAI_Max_Point_Data					Start of ***DFFG_LAI_Max_Point_Data*** structure.	
35	***LAI_Max***	integer value	m^2 m^{-2}	unsigned char (1 byte)	1 element	This is the leaf area index for forests: maximum annual LAI for the given DFFG cell. For southern hemisphere the January LAI and for northern hemisphere the July LAI is chosen to be maximum. The range is the same as that of LAI. It is used in computing vegetation cover optical opacity and contributions to the up- welling brightness temperature. The actual value is obtained using: Offset + Scaling_Factor × LAI_Max	INT
	DFFG_LAI_Max_Point_Data					End of ***DFFG_LAI_Max_Point_Data*** structure.	
	List_of_DFFG_LAI_Max_Point_Datas					End of list of ***DFFG_LAI_Max_Point_Data*** structures.	
	Zone_Data					End of ***Zone_Data*** data set record structure	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	List_of_Zone_Datas					End of list of ***Zone_Data*** data set record structure	
	DFFG_LAI					End of binary Data Set containing the ***DFFG_LAI_Max*** parameters.	
	Data_Block					End of binary Data Block in the product.	

Table 5-22 Binary Content of a DSR in the MDS of the DFFG LAI Max Product

5.3.5 DGG XYZ Product (AUX_DGGXYZ)

Global Coordinate systems are used to locate positions on the Earth. The AUX_DGGXYZ Auxiliary Data Product provides the Earth Centered Earth Fixed (ECEF) Cartesian coordinate for each DGG by means of three dimensional coordinates with respect to the center of mass of the reference ellipsoid. The Z-axis points toward the North Pole. The X-axis is the intersection of the prime meridian plane and the equatorial plane. The Y-axis completes a right-handed orthogonal system by a plane 90° east of the X-axis and its intersection with the equator.

5.3.5.1 Specific Product Header

The SPH contains the fields included in table 5-2 and the List of Data Sets specified in Table 4-4

5.3.5.2 Data Block

This product contains only one MDS, which contains the coordinates of the ISEA4-9 points. Each point is identified by an index that is unique within the product.

The MDS is formed by 10 DSRs each one corresponding to a ISEA4-9 zones. The DSR are ordered by increasing Zone ID within a DSR appears a list of Grid Points ordered by increasing grid ID. All Data Set Records shall contain the same number of points inside, even if some of them are dummy. This will prevent having variable sized records within the product.

These zones are used to allow a fast indexing of the data for search algorithms

The name of the MDS is ECEF_CARTESIAN_DGG. The data content is in binary, and its structure is captured by an XML schema.

The following table describes the XML schema structure used to decode the binary content of a DSR in this product.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	ECEF_Cartesian_DGG					Init of binary Data Set containing the ***Grid_Points*** records organized in zones.	
	List_of_Zones_Datas					Start of list of 10 ***Zones*** structures in which the DGG is subdivided.	
	Zone_Data					Start of ***Zone*** structure.	
01	***Zone_ID***	identifier	N/A	unsigned integer (8 bytes)	1 element	Unique ID defining the zone where the points are contained. An initial approach has 10 zones formed by two adjacent triangles of the main ISEA decomposition	INT
02	***Num_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element (for ISEA 4-9, maximum of 2.7M pixels)	Number of points contained within the zone (if not used, refer to whole file). To avoid variable size records, the number of points in all zones shall be the same, even if it means that some of them will be dummy.	INT
	List_of_Grid_Point_Datas					Start of list of Num_Points ***Grid_Point_Data*** structures, repeated Num_Points times	
	Grid_Point_Data					Start of ***Grid_Point_Data*** structure.	
03	***Grid_Point_ID***	identifier	N/A	unsigned integer (4 bytes)	1 element (for ISEA 4-9, maximum of 2.7M pixels)	Unique identifier for Earth fixed grid point.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
04	***X***	real value	m	float (4 bytes)	1 element	X coordinate	INT
05	***Y***	real value	m	float (4 bytes)	1 element	Y coordinate	INT
06	***Z***	real value	m	float (4 bytes)	1 element	Z coordinate	INT
	Grid_Point_Data					End of ***Grid_Point_Data*** structure.	
	List_of_Grid_Point_Datas					End of list of ***Grid_Point_Data*** structures.	
	Zone_Data					End of ***Zone*** structure.	
	List_of_Zones_Datas					End of list of ***Zones*** structures.	
	ECEF_Cartesian_DGG					End of binary Data Set containing the ***Grid_Points*** records.	
	Data_Block					End of binary Data Block in the product.	

Table 5-23 Binary Content of a DSR in the DGG XYZ Product

5.3.6 DGG Current Tau Nadir LV Product (AUX_DGGTLV)

This product provides values of parameters of the optical thickness (Tau) value of Low Vegetation Area for each DGG cell along with other associated parameter values: the DQX of the Tau (retrieval error estimate associated with Tau), Decission Tree retrieval branch number and a date stamp.

Optical thickness is used in L2 to derive simulated TB at the nadir point for the lower vegetation (LV) cover fractions

When Tau is a free parameter, the retrieval quality is better the more-up-to-date the value of the Tau used. The most up-to-date Tau in the current retrieval will always be the one just computed during the last successful retrieval. For the very first retrieval in the cycle, for which no previous retrieval data exists, all parameters are set to “NULL” values as described in [RD.7] ”.

Offset and scaling factor are then applied to those values to derive the actual parameter values.

This data is provided by SMOS L2 internal processing and updated everyday. When the retrieval of Tau_Nadir is possible and accurate, post-processing will update this table with the retrieval values.

5.3.6.1 Specific Product Header

The SPH for this ADF follows the format specified below:

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	
02-13	***Main_SPH***	structure				Main Product SPH structure's fields as defined in Table 5-2	
14	***Offset_Tau***	real	neper	10	%10.6f	Offset for Tau_Nad_LV. Offset_Tau is currently set to 0.	ICNF
15	***Scaling_Factor_Tau***	real	N/A	10	%10.8f	Scaling factor for Tau_Nad_LV. Scaling_Factor_Tau is currently set to (1/2^14)	ICNF
16	***Offset_Tau _DQX***	real	N/A	10	%10.6f	Offset for Tau_Nad_LV_DQX. Offset_Tau_DQX is currently set to 0.	ICNF
17	***Scaling_Factor_Tau _DQX***	real	N/A	10	%10.8f	Scaling factor for Tau_Nad_LV_DQX. Scaling_Factor_Tau is currently set to (1/2^8)	ICNF
18	***Last_Grid_Point_ID_1***	integer	N/A	7	%07d	The last grid point ID of the 1st DSR	INT
19	***Last_Grid_Point_ID_2***	integer	N/A	7	%07d	The last grid point ID of the 2nd DSR	INT
20	***Last_Grid_Point_ID_3***	integer	N/A	7	%07d	The last grid point ID of the 3rd DSR	INT
21	***Last_Grid_Point_ID_4***	integer	N/A	7	%07d	The last grid point ID of the 4th DSR	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
22	***Last_Grid_Point_ID_5***	Integer	N/A	7	%07d	The last grid point ID of the 5th DSR	INT
23	***Last_Grid_Point_ID_6***	integer	N/A	7	%07d	The last grid point ID of the 6th DSR	INT
24	***Last_Grid_Point_ID_7***	integer	N/A	7	%07d	The last grid point ID of the 7th DSR	INT
25	***Last_Grid_Point_ID_8***	integer	N/A	7	%07d	The last grid point ID of the 8th DSR	INT
26-37	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
38	***Specific_Product_Header***	Ending Tag				Tag ending the Specific Product Header structure	

Table 5-24 SPH for the DGG Current Tau Nadir LV Product

Concernig the List_of_Data_Sets, these are following Data Set Names that should be included in each Data_Set structure for the AUX_DGGTLV products:

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
DGG_CUR_TAU_NAD_LV_FILE	AUX_DGGTLV
SOIL_MOISTURE_CONFIG_FILE	AUX_CNFSMD/AUX_CNFSMF
L2_SM_UDP_FILE	MIR_SMUDP2

Table 5-25 AUX_DGGTLV Reference Data Set Name

5.3.6.2 Data Block

This ADF contains only one MDS, and there are 8 DSRs in this MDS. Each DSR contains a variable number of nodes sorted by node ID. The ID of the last node in each DSR is specified in the “Table 5-20-SPH for the DGG Current Tau Nadir LV Product”, specifically in the Last_Grid_Point_ID_1 ... 8 fields.

The table showed below describes the XML schema structure used to decode the binary content of the DSR in this product.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Current_Tau_Nadir_LV					Init of binary Data Set containing the ***Current_Tau_Nadir_LV*** records organized in zones.	
	List_of_Tau_Nadir_LV_Zones					Start of list of 8 ***Tau_Nadir_LV_Zone*** Data Set record structures.	
	Tau_Nadir_LV_Zone					Start of ***Tau_Nadir_LV_Zone*** structure.	
01	***Num_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of points in Dataset	INT
	List_of_Current_Tau_Nadir_LV_Datas					Start of list of Num_Points ***Current_Tau_Nadir_LV_Data*** structures repeated Num_Points times	
	Current_Tau_Nadir_LV_Data					Start of ***Current_Tau_Nadir_LV_Data*** structure.	
02	***Grid_Point_ID***	identifier	N/A	unsigned integer (4 bytes)	1 element, maximum of 2.7M pixels)	Unique identifier for Earth fixed grid point.	INT
03	***Latitude***	Real	deg	float (4 bytes)	1 element	Latitude of the DGG node. Range: [-90-90]	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
04	***Longitude***	Real	deg	float (4 bytes)	1 element	Longitude of the DGG node. Range: [0-360]	INT
05	***Tau_Nad_LV_Asc***	real value (code as integer)	neper	unsigned integer (2 bytes)	1 element	Tau_Nad_LV_Asc is taken from the MIR_SMUDP2 Optical_Thickness_Nad and encoded as an unsigned 16 bits integer value. The actual Tau_Nad_LV_Asc floating point value can be obtained using: Offset_Tau + Tau_Nad_LV_Asc * Scaling_Factor_Tau. The raw value 2^{16}-1 indicates missing values	INT
06	***Tau_Nad_LV _DQX_Asc***	integer value	N/A	unsigned byte	1 element	Tau_Nad_LV_DQX_Asc is taken from the MIR_SMUDP2 Optical_Thickness_Nad_DQX and encoded as an unsigned 16 bits integer value. The actual Tau_Nad_LV _DQX_Asc floating value can be obtained using: Offset_Tau_DQX + Tau_Nad_LV_DQX_Asc * Scaling_Factor_Tau_DQX The raw value of 2^{16}-1 indicates missing values	INT
07	***DT_Branch_LV_Asc***	integer value	N/A	unsigned byte	1 element	Decision tree branch of DGG node obtained from ascending MIR_SMUDP2. A value of (2^{8}-1) indicates missing value	INT
08	***Date_Stamp_LV_Asc***	Date	Day	unsigned integer (2 bytes)	1 element	The day at which the product is acquired. The source is the first element (days) of Mean_Acq_Time from ascending MIR_SMUDP2. A value of (2^{16}-1) indicates missing value.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
09	***Chi_2_LV_Asc***	Integer value	N/A	unsigned byte	1 element	Chi_2 (retrieval fit quality index) obtained from ascending MIR_SMUDP2.	INT
10	***Tau_Nad_LV_Desc***	real value (code as integer)	neper	unsigned integer (2 bytes)	1 element	The same as Tau_Nad_LV_Asc but from UDPs in descending orbits	INT
11	***Tau_Nad_LV _DQX_Desc***	integer value	N/A	unsigned byte	1 element	The same as Tau_Nad_LV_DQX_Asc but from UDPs in descending orbits	INT
12	***DT_Branch_LV_Desc***	integer value	N/A	unsigned byte	1 element	The same as DT_Branch_LV_Asc but from UDPs in descending orbits	INT
13	***Date_Stamp_LV_Desc***	Date	Day	unsigned integer (2 bytes)	1 element	The same as Date_Stamp_LV_Asc but from UDPs in descending orbits	INT
14	***Chi_2_LV_Desc***	Integer value	N/A	Unsigned byte	1 element	The same as Chi_2_LV_Asc but from UDPs in descending orbits.	INT
	Current_Tau_Nadir_LV_Data					End of ***Current_Tau_Nadir_LV_Data*** structure.	
	List_of_Current_Tau_Nadir_LV_Datas					End of list of ***Current_Tau_Nadir_LV_Datas*** structures.	
	Tau_Nadir_LV_Zone					End of ***Tau_Nadir_LV_Zone*** data set record structure.	
	List_of_Tau_Nadir_LV_Zones					End of list of ***Tau_Nadir_LV_Zone*** Data Set record structures.	
	Current_Tau_Nadir_LV					End of binary Data Set containing the ***Current_Tau_Nadir_LV*** records.	
	Data_Block					End of binary Data Block in the product.	

Table 5-26 Binary Content of a DSR in the DGG Current Tau Nadir LV Product

5.3.7 DGG Current Tau Nadir FO Product (AUX_DGGTFO)

AUX_DGGTFO_ Auxiliary Data Product provides the values of parameters of the optical thickness (Tau) value for Forest are for each DGG cell, along with other associated parameter values: the DQX (retrieval error estimated associated with Tau), DT retrieval branch number and a date stamp.

The forest cover fraction also uses Tau to derive simulated TB. When Tau is a free parameter, the retrieval quality is better the more up-to-date the value of the Tau used, in the same way as described for Lower Vegetation.

Offset and scaling factor are then applied to those values to derive the actual parameter values.

5.3.7.1 Specific Product Header

The SPH for this ADF follows the format described below.

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2	
14	***Offset_Tau***	real	Np	10	%10.6f	Offset for Tau_Nad_FO. Offset_Tau is currently set to 0.	ICNF
15	***Scaling_Factor_Tau***	real	N/A	10	%10.8f	Scaling factor for Tau_Nad_FO. Scaling_Factor_Tau is currently set to (1/2^14)	ICNF
16	***Offset_Tau _DQX***	real	N/A	10	%10.6f	Offset for Tau_Nad_FO_DQX. Offset_Tau_DQX is currently set to 0.	ICNF
17	***Scaling_Factor_Tau _DQX***	real	N/A	10	%10.8f	Scaling factor for Tau_Nad_FO_DQX. Scaling_Factor_Tau is currently set to (1/2^8)	ICNF
18	***Last_Grid_Point_ID_1***	integer	N/A	7	%07d	The last grid point ID of the 1st DSR	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
19	***Last_Grid_Point_ID_2***	integer	N/A	7	%07d	The last grid point ID of the 2nd DSR	INT
20	***Last_Grid_Point_ID_3***	integer	N/A	7	%07d	The last grid point ID of the 3rd DSR	INT
21	***Last_Grid_Point_ID_4***	integer	N/A	7	%07d	The last grid point ID of the 4th DSR	INT
22	***Last_Grid_Point_ID_5***	integer	N/A	7	%07d	The last grid point ID of the 5th DSR	INT
23	***Last_Grid_Point_ID_6***	integer	N/A	7	%07d	The last grid point ID of the 6th DSR	INT
24	***Last_Grid_Point_ID_7***	integer	N/A	7	%07d	The last grid point ID of the 7th DSR	INT
25	***Last_Grid_Point_ID_8***	integer	N/A	7	%07d	The last grid point ID of the 8th DSR	INT
26-37	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
38	***Specific_Product_Header***	Ending Tag				Tag ending the Specific Product Header structure	

Table 5-27 SPH of the DGG Current Tau Nadir FO Product

Concernig the List_of_Data_Sets, these are following Data Set Names that should be included in each Data_Set structure for the AUX_DGGTFO products:

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
DGG_CUR_TAU_NAD_FO_FILE	AUX_DGGTFO
SOIL_MOISTURE_CONFIG_FILE	AUX_CNFSMD/AUX_CNFSMF
L2_SM_UDP_FILE	MIR_SMUDP2

Table 5-28 AUX_DGGTFO Reference Data Set Name

5.3.7.2 Data Block

This ADF contains only one MDS, and there are 8 DSRs in this MDS. Each DSR contains a variable number of nodes sorted by node ID. The ID of the last node in each DSR is specified in the "Table 5-22-SPH for the DGG Current Tau Nadir FO Product", specifically in the Last_Grid_Point_ID_1 ... 8 fields.

The following table describes the XML schema structure used to decode the binary content of the DSR in this product.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Current_Tau_Nadir_FO					Init of binary Data Set containing the ***Current_Tau_Nadir_FO*** records organized in zones.	
	List_of_Tau_Nadir_FO_Zones					Start of list of 8 ***Tau_Nadir_FO_Zone*** Data Set record structures.	
	Tau_Nadir_FO_Zone					Start of ***Tau_Nadir_FO_Zone*** structure.	
01	***Num_Points***	counter	N/A	Unsigned integer (4 bytes)	1 element	Number of points in Dataset	INT
	List_of_Current_Tau_Nadir_FO_Datas					Start of list of Num_Points ***Current_Tau_Nadir_FO_Datas*** structures, repeated Num_Points times.	
	Current_Tau_Nadir_FO_Data					Start of ***Current_Tau_Nadir_FO_Data*** structure.	
02	***Grid_Point_ID***	identifier	N/A	Unsigned integer (4 bytes)	1 element (for ISEA 4-9, maximum of 2.7M pixels)	Unique identifier for Earth fixed grid point.	INT
03	***Latitude***	Real	deg	float (4 bytes)	1 element	Latitude of the DGG node. Range: [-90-90]	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
04	***Longitude***	Real	deg	float (4 bytes)	1 element	Longitude of the DGG node. Range: [0-360]	INT
05	***Tau_Nad_FO_Asc***	real value (code as integer)	neper	unsigned integer (2 bytes)	1 element	Tau_Nad_FO_Asc is taken from the MIR_SMUDP2 Optical_Thickness_Nad and encoded as an unsigned 16 bits integer value. The actual Tau_Nad_FO_Asc floating point value can be obtained using: Offset_Tau + Tau_Nad_FO_Asc * Scaling_Factor_Tau. The raw value of 2^{16}-1 indicates missing values	INT
06	***Tau_Nad _FO_DQX_Asc***	Integer value	N/A	unsigned byte	1 element	Tau_Nad_FO_DQX_Asc is taken from the MIR_SMUDP2 Optical_Thickness_Nad_DQX and encoded as an unsigned 16 bits integer value. The actual Tau_Nad_FO_DQX_Asc floating value can be obtained using: Offset_Tau_DQX + Tau_Nad_FO_DQX_Asc * Scaling_Factor_Tau_DQX The raw value 2^{16} - 1 indicates missing values.	INT
07	***DT_Branch_FO_Asc***	Integer value	N/A	unsigned byte	1 element	Decision Tree branch of DGG node obtained from ascending MIR_SMUDP2. A value of (2^{8}-1) indicates missing value	INT
08	***Date_Stamp_FO_Asc***	Date	Day	unsigned integer (2 bytes)	1 element	The day at which the product is acquired. The source is the first element (days) of Mean_Acq_Time from ascending MIR_SMUDP2. A value of (2^{16}-1) indicates missing value	INT
09	***Chi_2_FO_Asc***	Integer value	N/A	Unsigned byte	1 element	Chi_2 (retrieval fit quality index) obtained from Ascending MIR_SMUDP2.	INT
10	***Tau_Nad_FO_Desc***	real	neper	unsigned	1 element	The same as Tau_Nad_FO_Asc but from UDPs	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
		value (code as integer)		integer (2 bytes)		in descending orbits	
11	***Tau_Nad _FO_DQX_Desc***	Integer value	N/A	unsigned byte	1 element	The same as Tau_Nad_FO_DQX_Asc but from UDPs in descending orbits	INT
12	***DT_Branch_FO_Desc***	Integer value	N/A	unsigned byte	1 element	The same as DT_Branch_FO_Asc but from UDPs in descending orbits	INT
13	***Date_Stamp_FO_Desc***	Date	Day	unsigned integer (2 bytes)	1 element	The same as DT_Stamp_FO_Asc but from UDPs in descending orbits	INT
14	***Chi_2_FO_Desc***	Integer value	N/A	Unsigned byte	1 element	The same as Chi_2_FO_Asc but from UDPs in descending orbits.	INT
	Current_Tau_Nadir_FO_Data					End of ***Current_Tau_Nadir_FO_Data*** structure.	
	List_of_Current_Tau_Nadir_FO_Datas					End of list of ***Current_Tau_Nadir_FO_Datas*** structures.	
	Tau_Nadir_FO_Zone					End of ***Tau_Nadir_FO_Zone*** data set record structure.	
	List_of_Tau_Nadir_FO_Zones					End of list of ***Tau_Nadir_FO_Zone*** Data Set record structures.	
	Current_Tau_Nadir_FO					End of binary Data Set containing the ***Current_Tau_Nadir_FO*** records.	
	Data_Block					End of binary Data Block in the product.	

Table 5-29 Binary Content of a DSR in the DGG Current Tau Nadir FO Product

5.3.8 DGG Current Roughness H Product (AUX_DGGROU)

This product provides supplies values of parameters of the roughness parameter HR for each DGG cell along with other associated Decission Tree retrieval branch number and a date stamp.

To correct the effects of surface roughness on TB, a land surface parameter (the function of the soil composition, soil texture properties, frequency and the polarization mode of the observing sensor) is used.

5.3.8.1 Specific Product Header

The SPH for this ADF follows the format described below.

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2	
14	***Offset_HR***	real	Np	10	%10.6f	Offset for HR. Offset_HR is currently set to 0.	ICNF
15	***Scaling_Factor_HR***	real	N/A	10	%10.8f	Scaling factor for HR. Scaling_Factor_Tau is currently set to (1/2^14)	ICNF
16	***Offset_HR_DQX***	real	N/A	10	%10.6f	Offset for HR_DQX. Offset_HR_DQX is currently set to 0.	ICNF
17	***Scaling_Factor_HR_DQX***	real	N/A	10	%10.8f	Scaling factor for HR_DQX. Scaling_Factor_Tau_DQX is currently set to (1/2^8)	ICNF
18	***Last_Grid_Point_ID_1***	integer	N/A	7	%07d	The last grid point ID of the 1st DSR	INT
19	***Last_Grid_Point_ID_2***	integer	N/A	7	%07d	The last grid point ID of the 2nd DSR	INT
20	***Last_Grid_Point_ID_3***	integer	N/A	7	%07d	The last grid point ID of the 3rd DSR	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
21	***Last_Grid_Point_ID_4***	integer	N/A	7	%07d	The last grid point ID of the 4th DSR	INT
22	***Last_Grid_Point_ID_5***	integer	N/A	7	%07d	The last grid point ID of the 5th DSR	INT
23	***Last_Grid_Point_ID_6***	integer	N/A	7	%07d	The last grid point ID of the 6th DSR	INT
24	***Last_Grid_Point_ID_7***	integer	N/A	7	%07d	The last grid point ID of the 7th DSR	INT
25	***Last_Grid_Point_ID_8***	integer	N/A	7	%07d	The last grid point ID of the 8th DSR	INT
26-37	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
38	***Specific_Product_Header***	Ending Tag				Tag ending the Specific Product Header structure	

Table 5-30 SPH of the DGG Current Roughness H Product

Concernig the List_of_Data_Sets, these are following Data Set Names that should be specified in each Data_Set structure for the AUX_DGGROU products:

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
DGG_CUR_ROUGHNESS_H_FILE	AUX_DGGROU
SOIL_MOISTURE_CONFIG_FILE	AUX_CNFSMD/AUX_CNFSMF
L2_SM_UDP_FILE	MIR_SMUDP2

Table 5-31 AUX_DGGROU Reference Data Set Name

5.3.8.2 Data Block

This ADF contains only one MDS, and there are 8 DSRs in this MDS. Each DSR contains a variable number of nodes sorted by node ID. The ID of the last node in each DSR is specified in the “Table 5-24-SPH for the DGG Current Roughness H Product”, specifically in the Last_Grid_Point_ID_1 ... 8 fields.

The following table describes the XML schema structure used to decode the binary content of the DSR in this product.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Current_Roughness_H					Init of binary Data Set containing the ***Current_Roughness_H*** records organized in zones.	
	List_of_Roughness_H_Zones					Start of list of 8 ***Roughness_H _Zone*** Data Set record structures.	
	Roughness_H_Zone					Start of ***Roughness_H_Zone*** data set record structure.	
01	***Num_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of points in Dataset	INT
	List_of_Current_Roughness_H_Datas					Start of list of Num_Points ***Current_Roughness_H_Datas*** structures, repeated Num_Points times	
	Current_Roughness_H_Data					Start of ***Current_Roughness_H_Data*** structure.	
02	***Grid_Point_ID***	identifier	N/A	unsigned integer (4	1 element	Unique identifier for Earth fixed grid point.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
				bytes)			
03	***Latitude***	Real	deg	float (4 bytes)	1 element	Latitude of the DGG node. Range: [-90-90]	INT
04	***Longitude***	Real	deg	float (4 bytes)	1 element	Longitude of the DGG node. Range: [0-360]	INT
05	***HR_Asc***	real value (code as integer)	N/A	unsigned integer (2 bytes)	1 element	HR_Asc is taken from the MIR_SMUDP2 Roughness_Param and encoded as an unsigned 16 bits integer value. The actual HR_Asc floating point value is obtained using: Offset_HR + HR_Asc * Scaling_Factor_HR The raw value 2^{16} - 1 indicates missing values.	INT
06	***HR_DQX_Asc***	Integer value	N/A	unsigned byte	1 element	HR_DQX_Asc is taken from the MIR_SMUDP2 Roughness_Param_DQX and encoded as an unsigned 16 bits integer value. The actual HR_DQX_Asc floating point value is obtained using: Offset_HR + HR_DQX_Asc * Scaling_Factor_HR_DQX The raw value 2^{16} - 1 indicates missing values.	INT
07	***DT_branch_HR_Asc***	Integer value	N/A	unsigned byte	1 element	Decission tree branch of DGG node obtained from ascending MIR_SMUDP2. A value of (2^{8}-1) indicates missing value	INT
08	***Date_Stamp_HR_Asc***	Date	N/A	unsigned integer (2 bytes)	1 element	The day at which the product is acquired. The source is the first element (days) of Mean_Acq_Time from ascending MIR_SMUDP2.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						A value of (2^{16}-1) indicates missing value	
09	***Chi_2_HR_Asc***	Integer value	N/A	unsigned byte	1 element	Chi_2 (retrieval fit quality index) obtained from ascending MIR_SMUDP2	INT
10	***HR_Desc***	real value (code as integer)	N/A	unsigned integer (2 bytes)	1 element	The same as HR_Asc but from UDPs in descending orbits	INT
11	***HR_DQX_Desc***	Integer value	N/A	unsigned byte	1 element	The same as HR_DQX_Asc but from UDPs in descending orbits	INT
12	***DT_branch_HR_Desc***	Integer value	N/A	unsigned byte	1 element	The same as DT_Branch_HR_Asc but from UDPs in descending orbits	INT
13	***Date_Stamp_HR_Desc***	Date	N/A	unsigned integer (2 bytes)	1 element	The same as DT_Stamp_HR_Asc but from UDPs in descending orbits	INT
14	***Chi_2_HR_Desc***	Integer value	N/A	Unsigned byte	1 element	The same as Chi_2_HR_Asc but from UDPs in descending orbits.	INT
	Current_Roughness_H_Data					End of ***Current_Roughness_H_Data*** structure.	
	List_of_ Current_Roughness_H_Datas					End of list of ***Current_Roughness_H_Datas*** structures.	
	Roughness_H_Zone					End of ***Roughness_H_Zone*** data set record structure.	
	List_of_Roughness_H_Zones					End of list ***Roughness_H _Zone*** Data Set record structures.	
	Current_Roughness_H					End of binary Data Set containing the ***Current_Roughness_H*** records.	
	Data_Block					End of binary Data Block in the product.	

Table 5-32 Binary Content of a DSR in the DGG Current Roughness H Product

5.3.9 DGG Current Flood Product (AUX_DGGFLO)

The probability of flood flag FL_FLOOD_PROB is to be set when the ECMWF precipitation is greater than the threshold TH_RAIN.. The Data Source will be the Level 2 Soil Moisture User Data Product.

5.3.9.1 Specific Product Header

The SPH for this ADF follows the format described below:

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2	
14	***Last_Grid_Point_ID_1***	integer	N/A	7	%07d	The last grid point ID of the 1st DSR	INT
15	***Last_Grid_Point_ID_2***	integer	N/A	7	%07d	The last grid point ID of the 2nd DSR	INT
16	***Last_Grid_Point_ID_3***	integer	N/A	7	%07d	The last grid point ID of the 3rd DSR	INT
17	***Last_Grid_Point_ID_4***	integer	N/A	7	%07d	The last grid point ID of the 4th DSR	INT
18	***Last_Grid_Point_ID_5***	integer	N/A	7	%07d	The last grid point ID of the 5th DSR	INT
19	***Last_Grid_Point_ID_6***	integer	N/A	7	%07d	The last grid point ID of the 6th DSR	INT
20	***Last_Grid_Point_ID_7***	integer	N/A	7	%07d	The last grid point ID of the 7th DSR	INT
21	***Last_Grid_Point_ID_8***	integer	N/A	7	%07d	The last grid point ID of the 8th DSR	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
22-33	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
34	***Specific_Product_Header***	Ending Tag				Tag ending the Specific Product Header structure	

Table 5-33 SPH of the DGG Current Flood Product

Concernig the List_of_Data_Sets, these are following Data Set Names that should be included in each Data_Set structure for the AUX_DGGRFI products:

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
DGG_CUR_FLOOD_FILE	AUX_DGGFLO
L2_SM_UDP_FILE	MIR_SMUDP2

Table 5-34 AUX_DGGFLO Reference Data Set Name

5.3.9.2 Data Block

This ADF contains only one MDS, and there are 8 DSRs in this MDS. Each DSR contains a variable number of nodes sorted by node ID. The ID of the last node in each DSR is specified in the "Table 5-28-SPH for the DGG Current Flood Product", specifically in the Last_Grid_Point_ID_1 ... 8 fields.

The following table describes the XML schema structure used to decode the binary content of the DSR in this product.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Current_Flood					Init of binary Data Set containing the ***Current_Flood*** records organized in zones,	
	List_of_Flood_Zones					Start of list of 8 ***Flood _Zone*** Data Set record structures.	
	Flood_Zone					Start of ***Flood_Zone*** data set record structure.	
01	***Num_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of points in Dataset	INT
	List_of_Current_Flood_Datas					Start of list of Num_Points ***Current_Flood_Datas*** structures, repeated Num_Points times.	
	Current_Flood_Data					Start of ***Current_Flood_Data*** structure.	
02	***Grid_Point_ID***	identifier	N/A	unsigned integer (4 bytes)	1 element (for ISEA 4-9, maximum of 2.7M pixels)	Unique identifier for Earth fixed grid point.	INT
03	***Latitude***	Real	deg	float (4 bytes)	1 element	Latitude of the DGG node. Range: [-90-90]	INT
04	***Longitude***	Real	deg	float (4 bytes)	1 element	Longitude of the DGG node. Range: [0-360]	INT
05	***FL_Flood_Prob_Asc***	integer value	N/A	unsigned byte	1 element	The probability of Flood Flag. This value is generated from UDPs in ascending orbits.	INT
06	***FL_Flood_Prob_Desc***	integer value	N/A	unsigned byte	1 element	The same as FL_Flood_Prob_Asc but from UDPs in descending orbits.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Current_Flood_Data					End of ***Current_Flood_Data*** structure.	
	List_of_Current_Flood_Datas					End of list of ***Current_Flood_Datas*** structures.	
	Flood_Zone					End of ***Flood_Zone*** data set record structure.	
	List_of_Flood_Zones					End of list of 8 ***Flood _Zone*** Data Set record structures.	
	Current_Flood					Init of binary Data Set containing the ***Current_Flood*** records organized in zones.	
	Data_Block					End of binary Data Block in the product.	

Table 5-35 Binary Content of a DSR in the DGG Current Flood Product

5.3.10 WEF Product (AUX_WEF___)

This product provides weights that are applied to every DFFG at every viewing angle as the WEF value used to compute fractions and Brightness Temperature for Forward Models.

Each L1c DGG cell has a synthetic antenna pattern after the processing of the MIRAS interferometer data. This pattern is a rather narrow, centro-symmetric, time/space-independent function in the Director Cosine (DC) domain. The boresight of the function is the strongest factor contributing to the pattern. These weighting contribution factors are captured for use in the L2 SM Processor in order to determine their corresponding equivalent fractions, free or fixed parameters to the forward models. In the L2 processing, a weighting function assigns appropriate weighting factors reflecting these contributions. This product stores the values of the weighting function (WEF).

The WEF values are used to compute, for each incidence angle, the equivalent fractions of a DGG cell, which in turn are used to derive the TB and reference values for fixed parameters.

5.3.10.1 Specific Product Header

The SPH contains the fields included in Table 5-2 and the List of Data Sets specified in Table 4-5

5.3.10.2 Data Block

Since the weighting function is based on a rather narrow, centro-symmetric, and time-independent 2-D pattern in the DC domain that is independent of the location of the viewing point in the FOV, only one set of weights needs to be stored for the DC distance; thus, a one-dimensional array (stored in this auxiliary data product) is sufficient to store all the weights.

This product contains a single data set holding the WEF values used for every DGG cell at every viewing angle. The content is binary, stored in a data block file without headers, and consists of a single Data Set Record containing all the WEF information.

The following table describes the XML schema structure used to decode the binary contents of the DSR in this product.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	WEF					Init of binary Data Set containing the Weighting Function.	
01	***Step_Size***	real value	N/A	float (4 bytes)	1 element	Step size	INT
02	***Num_Entries***	Counter	N/A	unsigned integer (2 bytes)	1 element	Number of entries in array	INT
	List_of_WEF_Datas					Start of list of ***Num_Entries WEF_Value*** structures, repeated Num_entries times	
	WEF_Data					Start of ***WEF_Value*** structure.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
03	***WEF_Value***	real value	N/A	float (4 bytes)	1 element	The WEF value.	INT
	WEF_Data					End of ***WEF_Value*** structure.	
	List_of_WEF_Datas					End of list of ***Num_Entries WEF_Value*** structures.	
	WEF					Init of binary Data Set containing the ***WEF***.	
	Data_Block					End of binary Data Block in the product.	

Table 5-36 Binary Content of a DSR of the WEF Product

5.3.11 Mean WEF Product (AUX_MN_WEF)

The AUX_MN_WEF Auxiliary Data Product provides weights to be applied to every parameter mapped on the DFFG.

Like for WEF, only one set of weights needs to be stored for the DC distance, which is only defined as Earth surface distance divided by 1000 here; thus, a one-dimensional array (stored in this auxiliary data product.) is sufficient to store all the necessary weights.

5.3.11.1 Specific Product Header

The SPH contains the fields included in Table 5-2 and the List of Data Sets specified in Table 4-5

5.3.11.2 Data Block

This product contains a single data set holding the Mean WEF values applied to every DFFG point. The content is binary, stored in a data block file without headers, and consists of a single Data Set Record containing all the Mean WEF information.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Mean_WEF					Init of binary Data Set containing the Mean Weighting Function.	
01	***Step_Size***	real value	N/A	float (4 bytes)	1 element	Step size	INT
02	***Num_Entries***	Counter	N/A	unsigned integer (2 bytes)	1 element	Number of entries in array	INT
	List_of_Mean_WEF_Datas					Start of list of ***Mean_WEF_Value*** structures, repeated Num_entries times.	
	Mean_WEF_Data					Start of ***Mean_WEF_Value*** structure.	
03	***Mean_WEF_Value***	real value	N/A	float (4 bytes)	1 element	The Mean WEF value.	INT
	Mean_WEF_Data					End of ***Mean_WEF_Value*** structure.	
	List_of_Mean_WEF_Datas					End of list of ***Mean_WEF_Value*** structures.	
	Mean_WEF					Init of binary Data Set containing the Mean Weighting Function.	
	Data_Block					End of binary Data Block in the product.	

Table 5-37 Binary Content of a DSR in the Mean WEF Product

5.3.12 DFFG Soil Properties Product (AUX_DFFSOI)

This product provides for each DFFG cell, soil properties including ratios of sand and clay, mass of dry per unit bulk volume (bulk density parameter ρb), and interpolating temperature coefficients among other data.

AUX_DFFSOI supplies values for the parameters of soil properties and soil temperature used in the Dobson and Mironov Model so that the processor can compute the soil dielectric constant. Offset and scaling factor are then applied to thse values to derive the actual parameter values.

This product provides:

- Percentages of sand and clay;
- mass of dry soil per unit bulk volume (bulk density parameter (ρb));
- w0 and bw0: interpolating temperature coefficients that depend on soil texture and structure;
- XMVT, a transition moisture point, is a function of the sand, S, and the clay, C, fractions. It is for computing the HR(SM): roughness as a piecewise function of SM;
- FC, the field moisture capacity, is also a function of the sand, S, and the clay, C, fractions. It is for computing the HR(SM): roughness as a piecewise function of SM.

5.3.12.1 Specific Product Header

The SPH for this ADF follows the format described below.

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2	
14	***Num_Polar_Zones***	integer	N/A	3	%03d	Number of polar zones contained in the datablock. The total number of Polar Zones is 2.	Hard Coded
15	***Num_Equator_Zones***	integer	N/A	3	%03d	Number of equator zones contained in the datablock. The total number of Equator Zones is 72.	Hard Coded
16	***Digits_To_Shift***	integer	N/A	2	%02d	The location of the zone number component in the global index. It indicates how many digits are used to represent the DFFG sequence number within a zone	Hard Coded
17	***Offset_SBD***	real	N/A	10	%010.6f	Offset for soil bulk density	ICNF
18	***Scaling_Factor_SBD***	real	N/A	12	%012f	Scaling factor for soil bulk density	ICNF

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
19	***Offset_W0***	real	N/A	10	%010.6f	Offset for soil W_0	ICNF
20	***Scaling_Factor_W0***	real	N/A	12	%012f	Scaling factor for W_0	ICNF
21	***Offset_BW0***	real	TBD	10	%010.6f	Offset for B_W0	ICNF
22	***Scaling_Factor_BW0***	real	N/A	12	%012f	Scaling factor for B_W0	ICNF
23	***Offset_XMVT***	real	N/A	10	%010.6f	Offset for XMVT	ICNF
24	***Scaling_Factor_XMVT***	real	N/A	12	%012f	Scaling factor for XMVT	ICNF
25	***Offset_FC***	real	N/A	10	%010.6f	Offset for FC	ICNF
26	***Scaling_Factor_FC***	real	N/A	12	%012f	Scaling factor for FC	ICNF
24-35	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
36	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	

Table 5-38 SPH of the DFFG Soil Properties Product

5.3.12.2 Data Block

The AUX_DFFSOI auxiliary data product consist of 1 data set ***DFFG_Soil_Properties*** containing the soil texture information for each DFFG cell.

The following table describes the XML schema structure used to decode the binary contents of a DSR in this product.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	DFFG_Soil_Properties					Init of binary Data Set containing the ***DFFG_Soil_Properties*** for the following data set.	
	List_of_Zone_Datas					Init of list of Zone_Data data set record structure. The number of DSR is fixed to 74	
	Zone_Data					Init of ***Zone_Data*** data set record structure	
01	***Zone_ID***	identifier	N/A	unsigned integer (4 bytes)	1 element	EEAP5deg Zone number of this DFFG	INT
02	***Delta***	Real value	km	Float (4 bytes)	1 element	Desired length of a region.	INT
03	***Lat_a***	Real value	deg	Float (4 bytes)	1 element	Latitude comprising southern edge of designated boundary in DFFG definition (Lat a < Lat b)	INT
04	***Lat_b***	Real value	deg	Float (4 bytes)	1 element		INT
05	***Lon_a***	Real value	deg	Float (4 bytes)	1 element	Longitude comprising western edge of designated boundary in DFFG definition (Lon a < Lon b)	INT
06	***Lon_b***	Real value	deg	Float (4 bytes)	1 element		INT
07	***R***	Real value	deg	Float (4 bytes)	1 element	Earth ellipsoid semi-major radius.	INT
08	***I***	Real value	deg	Float (4 bytes)	1 element	Inverse of Earth ellipsoid model flattening coefficient	INT
09	***Delta_Lat***	Real value	deg	Float (4 bytes)	1 element	Latitude degree covered by latitude row	INT
10	***Delta_Lat_Km***	Real value	Km	Float (4 bytes)	1 element	Distance on Earth covered by Delta_Lat	INT
11	***N_Lat***	Real value	N/A	unsigned integer (4 bytes)	1 element	Number of latitude rows in DFFG_Area	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	List_of _Row_Struct_Datas					Start of list of ***List_of _Row_Struct_Datas*** structures, repeated Num_rows times	
	Row_Struct_Data					Start of ***Row_Struct_Data*** structure.	
12	***N_Lon***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total number of regions at current latitude row	INT
13	***Long_Step_Size_Ang***	Real value	deg	Float (4 bytes)	1 element	Longitude degree covered by region at current latitude row	INT
14	***Long_Step_Size_Km***	Real value	Km	Float (4 bytes)	1 element	Distance on Earth covered by Long_Step_Size	INT
15	***Cumulated_N_Lon***	Integer value	N/A	unsigned integer (4 bytes)	1 element	The total number of DFFG Regions from latitude 1st row to latitude (N-1)th row, where N is the index of the current latitude row.	
	Row_Struct_Data					End of Row_Struct_Data structure.	
	List_of_Row_Struct_Datas					End of list of Row_Struct_Data structure	
16	***Num_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total Number of cells in specified zone.	INT
	List_of_DFFG_Soil_Properties_Point_Datas					Start of list of ***DFFG_Soil_Properties_Data*** structures, repeated Num_Points times.	
	DFFG_Soil_Properties_Point_Data					Start of ***DFFG_Soil_Properties_Data*** structure.	
17	***PC_Sand***	integer value	%	unsigned byte	1 element	Percentage of sand	INT
18	***PC_Clay***	integer value	%	unsigned byte	1 element	Percentage of clay	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
19	***Soil_Bulk_Density***	Real value (code as integer)	g cm^{-3}	unsigned integer (2 bytes)	1 element	Soil bulk density, i.e. mass of dry soil per unit bulk volume The actual value is obtained using: Offset_SBD + Scaling_Factor_SDB × Soil_Bulk_Den.	INT
20	***W_0***	integer	m^3m^{-3}	unsigned integer (2 bytes)	1 element	w0 – parameter used in computing effective soil temperature The actual value is obtained using: Offset_W0+ Scaling_Factor_W0 × W_0.	INT
21	***B_W0***	integer	N/A	unsigned integer (2 bytes)	1 element	bw0 – Parameter used in computing effective soil temperature The actual value is obtained using: Offset_B_W0 + Scaling_Factor_ B_W0 × B_W0.	INT
22	***XMVT***	integer	N/A	unsigned integer (2 bytes)	1 element	XMVT: soil parameter that has relationship with soil moisture and surface roughness The actual value is obtained using: Offset_XMVT + Scaling_Factor_ XMVT × XMVT.	INT
23	***FC***	integer	N/A	unsigned integer (2 bytes)	1 element	FC: soil parameter that has relationship with soil moisture and surface roughness The actual value is obtained using: Offset_FC + Scaling_Factor_ FC × FC.	INT
	DFFG_Soil_Properties_Point_Data					End of ***DFFG_Soil_Properties_Point_Data*** structure.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	List_of_DFFG_Soil_Properties_Point_Datas					End of list of ***List_of_DFFG_Soil_Properties_Point_Datas*** structures.	
	Zone_Data					End of ***Zone_Data*** structure.	
	List_of_Zone_Datas					End of list of ***List_of_Zone_Datas*** structures.	
	DFFG_Soil_Properties					End of binary Data Set containing the ***DFFG_Soil_Properties*** for each cell.	
	Data_Block					End of binary Data Block in the product.	

Table 5-39 Binary Content of a DSR of the MDS DFFG Soil Properties Product

5.3.13 DFFG Snow Product (AUX_DFFSNO)

This product provides, for each DFFG cell, the percentage of snow coverage. The product is expected to be updated daily based on IMS (NOAA) daily products. Information is available only for northern hemisphere. The use of this product in the processor is controlled by a switch in the AUX_CNFSMx.

5.3.13.1 Specific Product Header

The SPH for this ADF follows the format described below.

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2	
14	***Num_Polar_Zones***	integer	N/A	3	%03d	Number of polar zones contained in the datablock. The total number of Polar Zones is 2.	Hard Coded
15	***Num_Equator_Zones***	integer	N/A	3	%03d	Number of equator zones contained in the datablock. The total number of Equator Zones is 72.	Hard Coded
16	***Digits_To_Shift***	integer	N/A	2	%02d	The location of the zone number component in the global index. It indicates how many digits are used to represent the DFFG sequence number within a zone	Hard Coded
17-28	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
29	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	

Table 5-40 SPH of the DFFG Snow Product

5.3.13.2 Data Block

The AUX_DFFSNO auxiliary data product consists of 1 data set DFFG_Snow containing the snow cover percentage for each DFFG cell. The following table describes the XML scheme structure used to decode the binary contents of a DSR in this product.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	DFFG_Snow					Init of binary Data Set containing the ***DFFG_Snow*** for the following data set.	
	List_of_Zone_Datas					Init of list of Zone_Data data set record structure. The number of DSR is fixed to 74	
	Zone_Data					Init of ***Zone_Data*** data set record structure	
01	***Zone_ID***	identifier	N/A	unsigned integer (4 bytes)	1 element	EEAP5deg Zone number of this DFFG	INT
02	***Delta***	Real value	km	Float (4 bytes)	1 element	Desired length of a region.	INT
03	***Lat_a***	Real value	deg	Float (4 bytes)	1 element	Latitude comprising southern edge of designated boundary in DFFG definition (Lat a < Lat b)	INT
04	***Lat_b***	Real value	deg	Float (4 bytes)	1 element		INT
05	***Lon_a***	Real value	deg	Float (4 bytes)	1 element	Longitude comprising western edge of designated boundary in DFFG definition (Lon a < Lon b)	INT
06	***Lon_b***	Real value	deg	Float (4 bytes)	1 element		INT
07	***R***	Real value	deg	Float (4 bytes)	1 element	Earth ellipsoid semi-major radius.	INT
08	***I***	Real value	deg	Float (4 bytes)	1 element	Inverse of Earth ellipsoid model flattening coefficient	INT
09	***Delta_Lat***	Real value	deg	Float (4 bytes)	1 element	Latitude degree covered by latitude row	INT
10	***Delta_Lat_Km***	Real value	Km	Float (4 bytes)	1 element	Distance on Earth covered by Delta_Lat	INT
11	***N_Lat***	Real value	N/A	unsigned integer (4 bytes)	1 element	Number of latitude rows in DFFG_Area	INT
	List_of _Row_Struct_Datas					Start of list of ***List_of _Row_Struct_Datas*** structures, repeated Num_rows times	
	Row_Struct_Data					Start of ***Row_Struct_Data*** structure.	
12	***N_Lon***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total number of regions at current latitude row	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
13	***Long_Step_Size_Ang***	Real value	deg	Float (4 bytes)	1 element	Longitude degree covered by region at current latitude row	INT
14	***Long_Step_Size_Km***	Real value	Km	Float (4 bytes)	1 element	Distance on Earth covered by Long_Step_Size	INT
15	***Cumulated_N_Lon***	Integer value	N/A	unsigned integer (4 bytes)	1 element	The total number of DFFG Regions from latitude 1st row to latitude (N-1)th row, where N is the index of the current latitude row.	
	Row_Struct_Data					End of Row_Struct_Data structure.	
	List_of_Row_Struct_Datas					End of list of Row_Struct_Data structure	
16	***Num_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total Number of cells in specified zone.	INT
	List_of_DFFG_Snow_Point_Datas					Start of list of ***DFFG_Snow_Point_Datas*** structures, repeated Num_Points times.	
	DFFG_Snow_Point_Data					Start of ***DFFG_Snow_Point_Data*** structure.	
17	***SnowPercentage***	integer value	%	unsigned byte	1 element	Percentage of snow cover actual value =raw value / 2. Missing data is represented as 255.	INT
	DFFG_Snow_Point_Data					End of ***DFFG_Snow_Point_Data*** structure.	
	List_of_DFFG_ Snow_Point_Datas					End of list of ***List_of_DFFG_ Snow_Point_Datas*** structures.	
	Zone_Data					End of ***Zone_Data*** structure.	
	List_of_Zone_Datas					End of list of ***List_of_Zone_Datas*** structures.	
	DFFG_Snow					End of binary Data Set containing the ***DFFG_Snow*** for each cell.	
	Data_Block					End of binary Data Block in the product.	

Table 5-41 Binary Content of a DSR in the MDS of the DFFG Snow Product

5.3.14 SM Galaxy Map Product (AUX_GAL_SM)

The generation of the different galaxy maps related to the galactic L-band emission is the same in all the processors from a conceptual point of view. In general, it weights the original galactic map with different antenna patterns in order to save time in the processing computations. But the antenna patterns used are different in each processor

To generate the L2 Soil Moisture Galaxy Map, once derived TBv and TBh from the Stokes component, the algorithm integrate sky TBh and TBv and the synthetic antenna pattern (central part of the MEAN_WEF) to obtain the final product TB_sky_H and TB_sky_V. The auxiliary data product name is AUX_GAL_SM.

5.3.14.1 Specific Product Header

The Specific Product Header is described below:

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	*Specific_Product_Header*	Tag				Tag starting the Specific Product Header structure	
02-13	*Main_SPH*	structure				Main SPH structure's fields as defined in Table 5-2	
14	*Coordinates_Info*	StartingTag				Structure containing cords info	
15	*Min_RA*	Float	deg	7	%f	Minimum Right Ascension of Sky contribution direction in Earth Fixed Reference	INT
16	*Max_RA*	Float	deg	7	%f	Maximum Right Ascension of Sky contribution direction in Earth Fixed Reference	INT
17	*Min_DEC*	Float	deg	7	%f	Minimum Declination of Sky contribution direction in Earth Fixed Reference	INT
18	*Max_DEC*	Float	deg	7	%f	Maximum Declination of Sky contribution direction in Earth Fixed Reference	INT

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
19	***DELTA_RA***	Float	deg	7	%f	Step for the Right Ascension of Sky Contribution	INT
20	***DELTA_DEC***	Float	deg	7	%f	Step for the Declination of Sky Contribution	INT
21	***Coordinates_Info***	Ending Tag				Tag ending the Coordinates Info Data Set	
22	***Reference_epoch***	Starting Tag				Tag starting the Reference epoch Data Set	
23	***Epoch***	String	N/A	5	%5s	Reference system used to compute the Sky Map	INT
24	***Reference_epoch***	Ending Tag				Tag ending the Reference epoch Data Set	
25-36	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
37	***Specific_Product_Header***	Tag				Tag ending the Specific Product Header structure	

Table 5-42 SPH of the SM Galaxy Map Product

5.3.14.2 Data Block

The following table describes the XML schema structure used to decode the binary contents of a DSR in this product:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Galaxy_Map_Data					Init of binary Data Set containing the L-Band galactic contribution for each cell of Right Ascension and Declination.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
01	***TB_Sky_H***	Matrix of Real values	K	Float (4 bytes for each element contained in 721x1441 real valued matrix)	Matrix of 721x1441 elements	Sky TB at (alpha,delta) for horizontal polarization given by the integral over the antenna pattern around (alpha, delta)	INT
02	***TB_Sky_V***	Matrix of Real values	K	Float (4 bytes for each element contained in 721x1441 real valued matrix)	Matrix of 721x1441 elements	Sky TB at (alpha,delta) for vertical polarization given by the integral over the antenna pattern around (alpha, delta)	INT
	Galaxy_Map_Data					End of binary Data Set containing the L-Band galactic contribution for each cell of Right Ascension and Declination.	
	Data_Block					End of binary Data Block in the product.	

Table 5-43 Binary Content of a DSR of the SM Galaxy Map Product

5.3.15 Land Cover Class Product (AUX_LANDCL)

This product provides parameters associated to the DFFG Landcover ecosystem description/code.

Each code is linked to a class with static properties, such as Low Vegetation properties, Forest properties, Soil roughness, etc.

This data is used in various processes (e.g. as an aggregation key to allow the building of relevant fractions for the decision tree).

5.3.15.1 Specific Product Header

The SPH contains the fields included in Table 5-3

5.3.15.2 Data Block

The following table describes the ASCII XML format of the ***Land_Cover_Classes*** product data block:

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Data_Block***	Starting Tag				Init of XML ASCII Data Block in the product	
02	***Land_Cover_Classes***	Starting tag				Init of XML ASCII Data Block of the product describing the land cover clases	
03	***Num_Classes***	unsigned integer	N/A	3	%03d	Number of class	CEC
04	***List_of_Land_Cover_Class_Datas***	Starting tag				Start of list of Num_Classes ***Land_Cover_Class_Data*** structures, repeated Num_Classes times	
05	***Land_Cover_Class_Data***	Starting tag				Start of ***Land_Cover_Class_Data*** data set records	
06	***Ecosystem_Code***	unsigned integer	N/A	3	%03d	ECOCLIMAP ecosystem code	CEC
07	***Surface_Roughness***	real	N/A	10	%10.8f	HR – surface roughness, a dimensionless parameter: HR = 2 k σ2 where k is the wave number, σ is the surface RMS height representing an effective surface roughness	CEC
08	***Surface_Roughness_Pol_ Coupling***	real	N/A	10	%10.8f	QR –surface roughness polarisation coupling parameter (polarisation coupling factor, describing polarisation mixing induced by the surface roughness)	CEC
09	***COS_Power_Law_H***	real	N/A	10	%10.6f	NRH – power law of cos (θ) for horizontal polarisation	CEC
10	***COS_Power_Law_V***	real	N/A	10	%10.6f	NRV – power law of cos (θ) for vertical polarisation	CEC
11	***C_L***	real	m^2kg^{-1}	10	%10.8f	CL – Low Vegetation & Forest (litter coefficient)	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
12	***BS_L***	real	m^2kg^{-1}	10	%10.7f	Low Vegetation & Forest (parameter used in computing litter layer water content)	CEC
13	***a_L***	real	N/A	10	%10.7f	Parameter used in computing moisture content for litter layer – applicable to Low Vegetation & Forest cases only	CEC
14	***b_L***	real	N/A	10	%10.8f	Parameter used in computing moisture content for litter layer – applicable to Low Vegetation & Forest	CEC
15	***BB***	real	m^2m^{-2}	10	%10.8f	b'S or b'F – parameter used in computation of LAI applicable to Low vegetation & Forest cases	CEC
16	***BBB***	real	m^2m^{-2}	10	%10.7f	b''S or b''F – parameter used in computing LAI – applicable to Low Vegetation & Forest cases	CEC
17	***W_H_W_F***	real	N/A	10	%10.8f	ωH or ωF – single scattering albedo, H polarisation	CEC
18	***Diff_W***	real	N/A	10	%10.7f	DIFF_ω – difference of albedo at H and V polarisation for Low Vegetation	CEC
19	***TT_H***	real	N/A	10	%10.7f	TTH. – angular correction parameter at H polarisation (accounting for dependence of tau_{SP} on incidence angle) for Low Vegetation cases	CEC
20	***RTT***	real	N/A	10	%10.7f	Ratio of angular correction parameters for Low Vegetation cases (used in computing vegetation optical depth from LAI.)	CEC
21	***B_T***	real	N/A	10	%10.8f	Bt – weighting temperature parameter used in computing Tec at LAI_maximum for Low Vegetation & Forest cases	CEC
22	***HR_MIN***	real	N/A	10	%10.8f	Surface Roughness (Classic expression)	CEC
23	***DLCC***	real	N/A	10	%10.7f	Uncertainty in Reference values (cover classes)	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
24	***Land_Cover_Class_Data***	Closing Tag				End of ***Land_Cover_Class_Data*** data set record	
25	***List_of_Land_Cover_Class_Datas***	Closing Tag				Start of list of ***Land_Cover_Class_Data*** structures	
26	***Land_Cover_Class***	Closing Tag				End of XML ASCII Data Block of the product describing the land cover clases	
27	***Data_Block***	Closing Tag				End of XML ASCII Data Block in the product	

Table 5-44 XML Structure of a DSR in the Land Cover Classes Product

5.3.16 L2SM Configuration Parameters Product (AUX_CNFSMD, AUX_CNFSMF)

There are two separate L2SM Configuratuion Parameters Products: one for dual polarizarion (AUX_CNFSMD) and another for full polarization (AUX_CNFSMF). Both products provide configurable parameters for the L2SM processor.

5.3.16.1 Specific Product Header

The AUX_CNFSMD and AUX_CNFSMF share the same header format.

The SPH contains the fields included in Table 5-3

5.3.16.2 Data Block

The datablock format of both products (AUX_CNFSMD and AUX_CNFSMF) is completely identical.

The data set is in ASCII XML format. The following table describes the XML schema structure used to decode the ASCII content of a DSR in this product.

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Data_Block***	Starting Tag				Tag starting the Data Block structure	
02	***L2_SM_Configuration_Parameters***	Starting Tag				Tag starting a structure containing the Configuration Parameters	
03	***Preprocessing_Control_Data***	Starting Tag				Tag starting a structure containing parameters used to control the pre-processing	
04	***TH_Size***	real	Km	10	%f	Maximum allowable footprint dimension	CEC
05	***TH_Elongation***	real	N/A	10	%f	Maximum allowable footprint elongation (major axis to minor axis ratio)	CEC
06	***C_EAF***	real	N/A	10	%f	Factor to enhance radiometric uncertainty for extended alias-free field of view	CEC
07	***C_Border***	real	N/A	10	%f	Factor to enhance radiometric uncertainty for border views	CEC
08	***C_Sun_Tails***	real	N/A	10	%f	Factor to enhance radiometric uncertainty in the presence of the sun tails	CEC
09	***C_Sun_Glint_Area***	real	N/A	10	%f	Factor to enhance radiometric uncertainty in the presence of the Sun Glint	CEC
10	***C_1_RFI***	real	N/A	10	%f	Factors to enhance radiometric uncertainty in the presence of RFI	CEC
11	***C_2_RFI***	real	N/A	10	%f		CEC
12	***Emissivity_Min***	real	N/A	10	%f	Minimum emissivity over a representative range of surfaces used in defining a valid range to TB and hence detection of RFI	CEC
13	***Emissivity_Max***	real	N/A	10	%f	Maximum emissivity over a representative range of surfaces used in defining a valid range for TB and hence detection of RFI	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
14	***Tscene_Margin_Low***	real	K	10	%f	A user supplied margin, accounting for various uncertainties in the scene temperature, and used in defining a valid lower bound for TB. The bound is used for detection of RFI	CEC
15	***Tscene_Margin_High***	real	K	10	%f	A user supplied margin, accounting for various uncertainties in the scene temperature, and used in defining a valid upper bound for TB. The bound is used for detection of RFI	CEC
16	***DTB_Scale***	real	N/A	10	%f	A user supplied scale factor, accounting for uncertainties associated with the SMOS, and used in the computation of valid TB ranges in RFI detection.	CEC
17	***TBxy_RE_MIN***	real	K	10	%f	Antenna level TBxy range check: real part for full polarization	CEC
18	***TBxy_RE_MAX***	real	K	10	%f		CEC
19	***TBxy_IM_MIN***	real	K	10	%f	Antenna level TBxy range check: imagery part for full polarization	CEC
20	***TBxy_IM_MAX***	real	K	10	%f		CEC
21	***TH_MR2_Cond***	real	N/A	10	%f	Not used.	CEC
22	***SF_DTB***	real	K	10	%f	Scaling factor used in computing MVAL0	CEC
23	***C_VAL_2***	real	N/A	10	%f	Coefficient used in computing MVAL0. For use with dual polarisation data only.	CEC
24	***C_VAL_4***	real	N/A	10	%f	Coefficient used in computing MVAL0. For use with full polarisation data only.	CEC
25	***TH_MMin0***	real	N/A	10	%f	Minimum threshold on number of available TBs after L1c pixel filtering	CEC
26	***TH_AVA_Min***	integer	N/A		%d	Minimum number of views for applying RFI L2 test	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
27	***C_1_TBS1***	real	K	10	%f	Coefficient for RFI L2 test	CEC
28	***C_2_TBS1***	real	N/A	10	%f	Coefficient for RFI L2 test	CEC
29	***TH_HOMOGENEOUS_1ST_STOKES***	Real	N/A	10	%f	Threshold to control if the 1st stokes parameter test should be applied.	CEC
30	***TH_RFI_ST4***	real	K	10	%f	Threshold for detecting RFI using the 4th Stokes parameter. This parameter is no longer used by the processor	CEC
31	***WEF_Size***	real	Km	10	%f	Size of squared fine grid area (in km) over which MEAN_WEF fractions, WEF fractions and reference parameter values are computed	CEC
32	***DGG_Intercell_Distance***	real	Km	10	%f	Distance between DGG cells.	CEC
33	***Preprocessing_Control_Data***	Ending Tag				Tag ending a structure containing Processing Parameters Comtrol	
34	***WEF_Aproximation_Data***	Starting Tag				Tag starting the WEF_Aproximation structure containing the parameters used to approximate the weighting function (WEF)	
35	***C_WEF_1***	real	N/A	10	%f	Coefficient 1 in WEF approximation	CEC
36	***C_WEF_2***	real	N/A	10	%f	Coefficient 2 in WEF approximation	CEC
37	***C_WEF_3***	real	N/A	10	%f	Coefficient 3 in WEF approximation	CEC
38	***C_WEF_4***	real	N/A	10	%f	Coefficient 4 in WEF approximation	CEC
39	***WEF_Aproximation_Data***	Ending Tag				Tag ending a structure containing the parameters of WEF_Aproximation	
40	***Mean_WEF_Aproximation_Data***	Starting Tag				Tag starting the structure containing the parameters used to approximate the mean weighting function (MEAN_WEF)	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
41	***C_MWEF_1***	real	km	10	%f	Parameter 1 in MEAN_WEF approximation	CEC
42	***C_MWEF_2***	real	N/A	10	%f	Parameter 2 in MEAN_WEF approximation	CEC
43	***Mean_WEF_Aproximation_Data***	Ending Tag				Tag ending the structure	
44	***All_Surface_Land_Models_Data***	Starting Tag				Tag starting a structure containing the Surface_Land_Models parameters	
45	***T_g***	real	K	10	%f	Default soil effective temperature (used as ECMWF fall back value)	CEC
46	***All_Surface_Land_Models_Data***	Ending Tag				Tag ending a structure containing the Surface_Land_Models parameters	
47	***Soil_Dobson_Model_Data***	Starting Tag				Tag starting a structure containing the Dobson Model parameters used to compute wet soil dielectric constant using Dobson Model	
48	***Soil_Particle_Den***	real	$g \cdot m^{-3}$	10	%f	Soil particle density	CEC
49	***C_Dobson_Emp***	real	N/A	10	%f	Dobson model empirical coefficients	CEC
50	***Soil_Salinity***	real	ppt	10	%f	Soil salinity	CEC
51	***C_CPA_1***	real	$(F \cdot m^{-1})^{1/2}$	10	%f	Coefficients for computing dielectric constant of solid particles ε_{pa}: $\varepsilon_{pa} = (CPA_1 + CPA_2 * \rho_s)^2 + CPA_3$	CEC
52	***C_CPA_2***	real	$(F \cdot m^2 \cdot g)^{1/2}$	10	%f		CEC
53	***C_CPA_3***	real	(F·m)	10	%f		CEC
54	***Dielec_Const_Particle***	real	$F \cdot m^{-1}$	10	%f	Dielectric constant of solid particles	CEC
55	***C_Sigma_eff_1***	real	N/A	10	%f	Coefficients for computing σ_{eff}	CEC
56	***C_Sigma_eff_2***	real	N/A	10	%f		CEC
57	***C_Sigma_eff_3***	real	N/A	10	%f		CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
58	*C_Sigma_eff_4*	real	N/A	10	%f	$\sigma_{eff} = SGEF_1 + SGEF_2\ \rho_b + SGEF_3\ S + SGEF_4\ C$	CEC
59	*C_Beta_Re_1*	real	N/A	10	%f	Coefficients for computing $\beta_{\varepsilon'}$: $\beta_{\varepsilon'}$=$BERE_1$+$BERE_2$S+$BERE_3$C	CEC
60	*C_Beta_Re_2*	real	N/A	10	%f		CEC
61	*C_Beta_Re_3*	real	N/A	10	%f		CEC
62	*C_Beta_Im_1*	real	N/A	10	%f	Coefficients for computing $\beta_{\varepsilon''}$: $\beta_{\varepsilon''}$= $BEIM_1$+$BEIM_2$S+$BEIM_3$C	CEC
63	*C_Beta_Im_2*	real	N/A	10	%f		CEC
64	*C_Beta_Im_3*	real	N/A	10	%f		CEC
65	*Soil_Dobson_Model_Data*	Ending Tag				Tag ending a structure containing the Dobson Model parameters	
66	*Soil_Mironov_Model_Data*	Starting Tag				Tag starting a structure containing the parameters used to compute soil dielectric constant using Mironov model	
67	*PERMIT0*	real	F/m	Variable	%g	Permittivity of free space	CEC
68	*EPWI0*	real	F/m	Variable	%g	High frequency limity of static water dielectric constant	CEC
69	*ND0*	real	N/A	Variable	%g	Parameter to compute refractive index of dry soil n_d	CEC
70	*ND1*	real	N/A	Variable	%g	Parameter to compute refractive index of dry soil n_d	CEC
71	*ND2*	real	N/A	Variable	%g	Parameter to compute refractive index of dry soil n_d	CEC
72	*KD0*	real	N/A	Variable	%g	Parameter to compute normalized attenuation coefficient of dry soil K_d	CEC
73	*KD1*	real	N/A	Variable	%g	Parameter to compute normalized attenuation	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						coefficient of dry soil K_d	
74	***XMVT0***	real	N/A	Variable	%g	Parameter to compute maximum bound water fraction xm_{vt}	CEC
75	***XMVT1***	real	N/A	Variable	%g	Parameter to compute maximum bound water fraction xm_{vt}	CEC
76	***TF0***	real	N/A	Variable	%g	Starting temperature	CEC
77	***E0PB0***	real	N/A	Variable	%g	Parameter to compute ε_{0b}	CEC
78	***E0PB1***	real	N/A	Variable	%g	Parameter to compute ε_{0b}	CEC
79	***E0PB2***	real	N/A	Variable	%g	Parameter to compute ε_{0b}	CEC
80	***BVB0***	real	N/A	Variable	%g	Parameter to compute volumetric expansion coefficient β_b	CEC
81	***BVB1***	real	N/A	Variable	%g	Parameter to compute volumetric expansion coefficient β_b	CEC
82	***BVB2***	real	N/A	Variable	%g	Parameter to compute volumetric expansion coefficient β_b	CEC
83	***BVB3***	real	N/A	Variable	%g	Parameter to compute volumetric expansion coefficient β_b	CEC
84	***BVB4***	real	N/A	Variable	%g	Parameter to compute volumetric expansion coefficient β_b	CEC
85	***BSGB0***	real	N/A	Variable	%g	Parameter to compute temperature incrementation coefficient for conductivity $\beta_{\sigma b}$	CEC
86	***BSGB1***	real	N/A	Variable	%g	Parameter to compute temperature incrementation coefficient for conductivity $\beta_{\sigma b}$	CEC
87	***BSGB2***	real	N/A	Variable	%g	Parameter to compute temperature incrementation coefficient for conductivity $\beta_{\sigma b}$	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
88	***BSGB3***	real	N/A	Variable	%g	Parameter to compute temperature incrementation coefficient for conductivity $\beta_{\sigma b}$	CEC
89	***BSGB4***	real	N/A	Variable	%g	Parameter to compute temperature incrementation coefficient for conductivity $\beta_{\sigma b}$	CEC
90	***DHBR0***	real	N/A	Variable	%g	Parameter to compute activation energy ΔH_b	CEC
91	***DHBR1***	real	N/A	Variable	%g	Parameter to compute activation energy ΔH_b	CEC
92	***DHBR2***	real	N/A	Variable	%g	Parameter to compute activation energy ΔH_b	CEC
93	***DSRB0***	real	N/A	Variable	%g	Parameter to compute entropy of activation ΔS_b	CEC
94	***DSRB1***	real	N/A	Variable	%g	Parameter to compute entropy of activation ΔS_b	CEC
95	***DSRB2***	real	N/A	Variable	%g	Parameter to compute entropy of activation ΔS_b	CEC
96	***TAUB0***	real	N/A	Variable	%g	Parameter to compute relaxation time z_b	CEC
97	***SBT0***	real	N/A	Variable	%g	Parameter to compute ohmic conductivity σ_b	CEC
98	***SBT1***	real	N/A	Variable	%g	Parameter to compute ohmic conductivity σ_b	CEC
99	***E0PU***	real	N/A	Variable	%g	Parameter to compute dielectric constant ε_{uo}	CEC
100	***BVU0***	real	N/A	Variable	%g	Parameter to compute volumetric expansion coefficient β_u	CEC
101	***BVU1***	real	N/A	Variable	%g	Parameter to compute volumetric expansion coefficient β_u	CEC
102	***BSGU0***	real	N/A	Variable	%g	Parameter to compute temperature incrementation coefficient for conductivity $\beta_{\sigma u}$	CEC
103	***BSGU1***	real	N/A	Variable	%g	Parameter to compute temperature incrementation coefficient for conductivity $\beta_{\sigma u}$	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
104	***DHUR0***	real	N/A	Variable	%g	Parameter to compute activation energy ΔH_u	CEC
105	***DHUR1***	real	N/A	Variable	%g	Parameter to compute activation energy ΔH_u	CEC
106	***DSUR0***	real	N/A	Variable	%g	Parameter to compute entropy of activation ΔS_u	CEC
107	***DSUR1***	real	N/A	Variable	%g	Parameter to compute entropy of activation ΔS_u	CEC
108	***TAUU0***	real	N/A	Variable	%g	Parameter to compute relaxation time τ_u	CEC
109	***SUT0***	real	N/A	Variable	%g	Parameter to compute ohmic conductivity σ_u	CEC
110	***SUT1***	real	N/A	Variable	%g	Parameter to compute ohmic conductivity σ_u	CEC
111	***Soil_Mironov_Model_Data***	Ending tag				Tag ending a structure containing the parameters used to compute soil dielectric constant using Minorov model	
112	***Effective_Temperature_of_Soil_Data***	Starting Tag				Tag starting the XML structure containing the parameters for computing C_t used to compute effective soil temperature	
113	***w_0***	real	M^3m^{-3}	10	%f	w_0 and b_w_0 – used to obtain the weighting coeff Ct for computing T_g (these depend mainly on the soil texture and structure) Superseded by values in Soil Properties Product when available. Coefficient used in computing MVAL0	CEC
114	***b_w_0***	real	N/A	10	%f		CEC
115	***Effective_temperature of Soil_Data***	Ending Tag				Tag ending the XML structure	
116	***Dielectric_Constant_for_Saline_Water_or_Pure_Water_Data***	Starting Tag				Tag starting the structure Dielectric_Constant_for_Saline_Water_or_Pure_Water	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
117	***SST***	real	K	10	%f	Default SST: Water temperature (pure or saline) Fall back default for forecast SST	CEC
118	***SSS***	real	ppt	10	%f	Water salinity (saline water)	CEC
119	***Dielectric_Constant_for_Saline_Water_or_Pure_Water_Data***	Ending Tag				Tag ending the structure Dielectric_Constant_for_Saline_Water_or_Pure_Water	
120	***Dielectric_Klein_Swift_Model_Data***	Starting Tag				Tag Starting the XML structure containing the parameters described below	
121	***C_OW_1***	real	N/A		%g	Klein and Swift	CEC
122	***C_OW_2***	real	N/A		%g		CEC
123	***C_OW_3***	real	N/A		%g		CEC
124	***C_OW_4***	real	N/A		%g		CEC
125	***C_OW_5***	real	N/A		%g	Klein and Swift	CEC
126	***C_OW_6***	real	N/A		%g		CEC
127	***C_OW_7***	real	N/A		%g		CEC
128	***C_OW_8***	real	N/A		%g		CEC
129	***C_OW_9***	real	N/A		%g	Klein and Swift	CEC
130	***C_OW_10***	real	N/A		%g		CEC
131	***C_OW_11***	real	N/A		%g		CEC
132	***C_OW_12***	real	N/A		%g		CEC
133	***C_OW_13***	real	N/A		%g		CEC
134	***C_OW_14***	real	N/A		%g	Stogryn	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
135	***C_OW_15***	real	N/A		%g		CEC
136	***C_OW_16***	real	N/A		%g		CEC
137	***C_OW_17***	real	N/A		%g		CEC
138	***C_OW_18***	real	N/A		%g	Klein and Swift	CEC
139	***C_OW_19***	real	N/A		%g		CEC
140	***C_OW_20***	real	N/A		%g		CEC
141	***C_OW_21***	real	N/A		%g		CEC
142	***C_OW_22***	real	N/A		%g	Weyl & Stogryn	CEC
143	***C_OW_23***	real	N/A		%g		CEC
144	***C_OW_24***	real	N/A		%g		CEC
145	***C_OW_25***	real	N/A		%g		CEC
146	***C_OW_26***	real	N/A		%g		CEC
147	***C_OW_27***	real	N/A		%g	Weyl & Stogryn	CEC
148	***C_OW_28***	real	N/A		%g		CEC
149	***C_OW_29***	real	N/A		%g		CEC
150	***C_OW_30***	real	N/A		%g		CEC
151	***C_OW_31***	real	N/A		%g		CEC
152	***C_OW_32***	real	N/A		%g		CEC
153	***Dielectric_Klein_Swift_Model_Data***	Ending Tag				Tag ending the XML structure containing the parameters described below	
154	***Cardioid_Model_Data***	Starting Tag				Tag starting the XML structure containing the variables described below.	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
155	***Cardioid_U***	real	rd	10	%f	Angle parameter	CEC
156	***Cardioid_B***	real	$F{\cdot}m^{-1}$	10	%f	A constant for Cardioid model	CEC
157	***Cardioid_Model_Data***	Ending Tag				Tag ending the XML Cardioid_Model structure	
158	***Dielectric_Constants_Data***	Starting Tag				Tag starting the XML structure containing dielectric constants of solids described below	
159	***Dielec_Const_Sand_Re***	real	F/m	10	%f	Real component of the dielectric constant for dry sand	CEC
160	***Dielec_Const_Sand_Im***	real	F/m	10	%f	Imaginary component of the dielectric constant for dry sand	CEC
161	***Dielec_Const_Frz_Re***	real	F/m	10	%f	Real component of the dielectric constant for frozen soil	CEC
162	***Dielec_Const_Frz_Im***	real	F/m	10	%f	Imaginary component of the dielectric constant for frozen soil	CEC
163	***Dielec_Const_Ice_Re***	real	F/m	10	%f	Real component of the dielectric constant for ice – very small for pure ice (Currently suggested: 0.05)	CEC
164	***Dielec_Const_Ice_Im***	real	F/m	10	%f	Imaginary component of the dielectric constant for ice – very small for pure ice (Currently suggested: 0.05)	CEC
165	***Dielec_Const_Urban_Re***	real	F/m	10	%f	Real component of the dielectric constant for urban area	CEC
166	***Dielec_Const_Urban_Im***	real	F/m	10	%f	Imaginary component of the dielectric constant for urban area	CEC
167	***Dielec_Const_Rock_Re***	real	F/m	10	%f	Real component of the dielectric constant for barren areas	CEC
168	***Dielec_Const_Rock_Im***	real	F/m	10	%f	Imaginary component of the dielectric constant for barren areas	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
169	***Dielectric_Constants_Data***	Ending Tag				Tag ending the XML structure described above.	
170	***Soil_Fresnel_Law_Data***	Starting Tag				XML structure containing the Soil/water magnetic permeabilities.	
171	***Mag_Perm_Soil***	real	N/A	10	%f	Soil magnetic permeability	CEC
172	***Mag_Perm_Water***	real	N/A	10	%f	Water magnetic permeability	CEC
173	***Soil_Fresnel_Law_Data***	Ending Tag				Tag ending the XML structure	
174	***Surface_roughness_Data***	Starting Tag				Tag starting the XML structure containing the variables described below	
175	***CWP_1***	real	N/A	10	%f	Coefficient for cmputing roughnessHR(SM) as a piecewise function of SM	CEC
176	***CWP_2***	real	N/A	10	%f	Coefficient for cmputing roughnessHR(SM) as a piecewise function of SM	CEC
177	***CWP_3***	real	N/A	10	%f	Coefficient for cmputing roughnessHR(SM) as a piecewise function of SM	CEC
178	***CXMVT_1***	real	N/A	10	%f	Coefficient for cmputing roughnessHR(SM) as a piecewise function of SM	CEC
179	***CXMVT_2***	real	N/A	10	%f	Coefficient for cmputing roughnessHR(SM) as a piecewise function of SM	CEC
180	***Surface_roughness_Data***	Ending Tag				Tag ending the XML structure described above	
181	***Optical_Thickness_of_litter_tau_LH_and_tau_LV_Data***	Starting Tag				Tag starting the XML structure containing default values for ECMWF SWVL	
182	***SM_LV***	real	$m^3 \cdot m^{-3}$	10	%f	Low vegetation SM to derive optical thickness of litter when soil+low veg is not regressed but used as default contribution	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						Currently used as fallback when SWVL1 is missing. Please refer to the ECMWF gribex file for a description of SWVL1at http://www.ecmwf.int/products/data/software/grib.html	
183	***SM_FV***	real	$m^3 \cdot m^{-3}$	10	%f	Forest vegetation SM to derive optical thickness of litter when soil+low veg is not regressed but used as default contribution Currently used as fallback when SWVL1 is missing. Please refer to the ECMWF gribex file for a description of SWVL1 at http://www.ecmwf.int/products/data/software/grib.html	CEC
184	***Optical_Thickness_of_litter_tau_LH_and_tau_LV_Data***	Ending Tag				Tag ending the XML structure described above	
185	***General_Data***	Starting Tag				Tag Starting the XML structure containing default values for ECMWFSKT;STL	
186	***T_c_LV***	real	K	10	%f	Low vegetation effective vegetation temperature. Fall back default to ECMWF SKT, STL and SM unavailability.	CEC
187	***T_c_FV***	real	K	10	%f	Forest vegetation effective vegetation temperature. Fall back default to ECMWF SKT, STL and SM unavailability.	CEC
188	***TH_LSM***	real	%	10	%f	Not used.	
189	***Chi_2_Scale***	real	N/A		%g	Scale factor for converting the internally computed double Chi_2 value to an unsigned	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						byte to be written to the UDP. Unsigned byte value = truncate((double value / Chi_2_Scale) * 255 + 0.5)	
190	***Chi_2_Rescale_factor***	real	N/A		%g	Rescale factor for Chi_2	CEC
191	***Chi_2_Rescale_offset***	real	N/A		%g	Rescale offset for Chi_2	CEC
192	***General_Data***	Ending Tag				Tag Ending the XML structure described above.	
193	***Parameters_for_Snow_Model_Data***	Starting Tag				Tag Starting the XML structure described below	
194	***SCR***	real	m	10	%f	Minimum snow mass that ensures complete coverage of an ECMWF grid box – used in computing snow fraction. It is used for applying dynamic effects	CEC
195	***Dielec_Const_Snow_Re***	real	[F/m]	10	%f	Real component of the dielectric constant for snow Not currently used.	CEC
196	***Dielec_Const_Snow_Im***	real	[F/m]	10	%f	Imaginary component of the dielectric constant for snow Not currently used.	CEC
197	***Parameters_for_Snow_Model_Data***	Ending Tag				Tag Ending the XML structure	
198	***Atmosphere_Forecast_Parameter_Data***	Starting Tag				Tag starting XML structure containing the Default values for ECMWF 2T, SP, TCWV	
199	***T_2m***	real	K	10	%f	Temperature at 2 meters Fall back default to ECMWF 2T unavailability	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
200	***P_Surf***	real	hPa	10	%f	Surface pressure Fall back default to ECMWF SP unavailability	CEC
201	***WVC***	real	$kg \cdot m^{-2}$	10	%f	Total water vapor content Fall back default to ECMWF TWVC unavailability	CEC
202	***Atmosphere_Forecast_Parameter_Data***	Ending Tag				Tag ending the XML structure containing the variables described above	
203	***Atmosphere_Optical_Thickness_tau_atm_Data***	Starting Tag				Tag starting the XML structure containing the O2 and H2O optical thickness	
204	***k0_Tau_O2***	real	Np		%g	Oxygen optical thickness parameters fit	CEC
205	***kT0_Tau_O2***	real	$Np \cdot K^{-1}$		%g		CEC
206	***kP0_Tau_O2***	real	$Np \cdot hPa^{-1}$		%g		CEC
207	***kT02_Tau_O2***	real	$Np \cdot K^{-2}$		%g		CEC
208	***kP02_Tau_O2***	real	$Np \cdot hPa^{-2}$		%g		CEC
209	***kT0P0_Tau_O2***	real	$Np \cdot K^{-1} \cdot hPa^{-1}$		%g		CEC
210	***k0_Tau_H2O***	real	Np		%g	H_2O optical thickness parameters fit	CEC
211	***k1_Tau_H2O***	real	$Np \cdot hPa^{-1}$		%g		CEC
212	***k2_Tau_H2O***	real	$Np \cdot m^{2} \cdot kg^{-1}$		%g		CEC
213	***Atmosphere_Optical_Thickness_tau_atm_Data***	Ending Tag				Tag ending the XML structure containing the coefficients described above	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
214	***Atmospheric_Layer_Equivalent_Temperature_Tau_atm_Data***	Starting Tag				Tag starting the XML structure containing the coefficients for O2 and H2O layer temperature differences	
215	***k0_DT_O2***	real	K		%g	Oxygen temperature contribution parameters fit	CEC
216	***kT0_DT_O2***	real	N/A		%g		CEC
217	***kP0_DT_O2***	real	$K \cdot hPa^{-1}$		%g		CEC
218	***kT02_DT_O2***	real	$1 \cdot K^{-1}$		%g		CEC
219	***kP02_DT_O2***	real	$K \cdot hPa^{-2}$		%g		CEC
220	***kT0P0_DT_O2***	real	$1 \cdot hPa^{-1}$		%g		CEC
221	***k0_DT_H2O***	real	K		%g	H_2O temperature contribution parameters fit	CEC
222	***k1_DT_H2O***	real	$K \cdot hPa^{-1}$		%g		CEC
223	***k2_DT_H2O***	real	$K \cdot m^2 \cdot kg^{-1}$		%g		CEC
224	***Atmospheric_Layer_Equivalent_Temperature_Tau_atm_Data***	Ending Tag				Tag ending the XML structure	
225	***Galactic_Contribution_Parameters_Data***	Starting Tag				Not used by the processor.	
226	***C_GST0_0***	real	N/A		%g	Ephemeris of Greenwich Sidereal Time Origin (00:00 UTC). Polynomial approximation: GST0 = C_GST0_0 + C_GST0_1 × U0 + C_GST0_2 × $U0^2$ + C_GST0_4 × $U0^3$	CEC
227	***C_GST0_1***	real	N/A		%g		CEC
228	***C_GST0_2***	real	N/A		%g		CEC
229	***C_GST0_4***	real	N/A		%g		CEC
230	***Galactic_Contribution_Parameters_Data***	Ending Tag				Tag ending the XML structure	
231	***Thresholds_for_Selecting_Classes_D***	Starting				Tag starting the XML structure containing the thresholds used to decide snow state and	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
	ata	Tag				sand flag	
232	***TH_T_Dry***	real	°C	10	%f	Temperature below which non-permanent snow is considered dry	CEC
233	***TH_T_Wet***	real	°C	10	%f	Temperature above which non-permanent snow is considered wet	CEC
234	***TH_Sand***	real	%	10	%f	Scene flag is raised when sand fraction is above this threshold	CEC
235	***Thresholds_for_Selecting_Classes_Data***	Ending Tag				Tag ending the XML structure	
236	***Thresholds_for_external_conditions_to_update_the_DFFG_pixel_context_Data***	Starting Tag				Tag starting the XML structure containing the thresholds used for applying dynamic effects	
237	***TH_PWATER_FRZ***	real	K	10	%f	Pure water to ice threshold	CEC
238	***TH_SWATER_FRZ***	real	K	10	%f	Saline water to ice threshold	CEC
239	***TH_SOIL_FRZ***	real	K	10	%f	Soil to frozen soil threshold	CEC
240	***TH_Tau_Winter***	real	neper	10	%f	Threshold for canopy opacity of (1-FFO) fraction to Obtaining the final aggregated radiometric fractions for WA_{DFFG}	CEC
241	***TH_TAU_F1***	real	%	10	%f	Threshold for winter FFO fraction	CEC
242	***TH_TAU_F2***	real	%	10	%f	Threshold for non-winter FFO fraction	CEC
243	***TH_TAU_FN***	real	%	10	%f	Threshold for canopy opacity of FFO fraction to determine if FNO+FFO retrieval is applied.	CEC
244	***TH_VEG_FRZ***	real	K	10	%f	Threshold for frozen vegetation	CEC
245	***Thresholds_for_external_conditions_to_update_the_DFFG_pixel_context_***	Ending Tag				Tag ending the XML structure	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
	Data						
246	***Decision_Tree_Fraction_Thresholds_ Data***	Starting Tag				XML structure containing the decision tree parameters:stage1	
247	***Num_Thresholds***	integer	N/A	2	%2d	Number of thresholds	CEC
248	***TH_W2***	real	%	10	%f	Threshold: applies to Open Water	CEC
249	***TH_W2_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
250	***TH_W2_D***	integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
251	***TH_W2_R***	integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
252	***TH_W1***	real	%	10	%f	Threshold: applies to Open Water	CEC
253	***TH_W1_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
254	***TH_W1_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
255	***TH_W1_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
256	***TH_TS***	real	%	10	%f	Threshold: applies to Topography (strong)	CEC
257	***TH_TS_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
258	***TH_TS_D***	integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
259	***TH_TS_R***	integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
260	***TH_TM***	real	%	10	%f	Threshold: applies to Topography (moderate)	CEC
261	***TH_TM_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
262	***TH_TM_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)v	CEC
263	***TH_TM_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
264	***TH_S2W***	real	%	10	%f	Threshold: applies to non permanent (wet) snow	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
265	***TH_S2W_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
266	***TH_S2W_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
267	***TH_S2W_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
268	***TH_S2M***	real	%	10	%f	Threshold: applies to non permanent (mixed) snow	CEC
269	***TH_S2M_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
270	***TH_S2M_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
271	***TH_S2M_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
272	***TH_S1W***	real	%	10	%f	Threshold: applies to non permanent (wet) snow	CEC
273	***TH_S1W_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
274	***TH_S1W_D***	integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
275	***TH_S1W_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
276	***TH_S1M***	real	%	10	%f	Threshold: applies to non permanent (mixed) snow	CEC
277	***TH_S1M_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
278	***TH_S1M_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
279	***TH_S1M_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
280	***TH_R2***	real	%	10	%f	Threshold: applies to NPE frozen surface	CEC
281	***TH_R2_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
282	***TH_R2_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
283	***TH_R2_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
284	***TH_R1***	real	%	10	%f	Threshold: applies to NPE frozen surface	CEC
285	***TH_R1_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
286	***TH_R1_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
287	***TH_R1_R***	integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
288	***TH_F2***	real	%	10	%f	Threshold: applies to Forest	CEC
289	***TH_F2_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
290	***TH_F2_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
291	***TH_F2_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
292	***TH_NO***	real	%	10	%f	Threshold: applies to nominal soil + low vegetation	CEC
293	***TH_NO_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
294	***TH_NO_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
295	***TH_NO_R***	Integer	N/A	1	%1d	Rank of the branch of decision tree	CEC
296	***TH_WL***	Real	%	10	%f	Threshold: applies to Wetlands	CEC
297	***TH_WL_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
298	***TH_WL_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
299	***TH_WL_R***	Integer	N/A	1	%1d	Rank of the branch of decision tree	CEC
300	***TH_EB***	real	%	10	%f	Threshold: applies to barren surfaces	CEC
301	***TH_EB_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
302	***TH_EB_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
303	***TH_EB_R***	Integer	N/A	1	%1d	Rank of the branch of decision tree	CEC
304	***TH_TI***	real	%	10	%f	Threshold: applies to total ice	CEC
305	***TH_TI_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
306	***TH_TI_D***	integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
307	***TH_TI_R***	integer	N/A	1	%1d	Rank of the branch of decision tree	CEC
308	***TH_EU***	real	%	10	%f	Threshold: applies to urban areas - high coverage.	
309	***TH_EU_N***	string	N/A	3	3*uc	Fraction FM0 key	
310	***TH_EU_D***	integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
311	***TH_EU_R***	integer	N/A	1	%1d	Rank of the branch of decision tree.	CEC
312	***Decision_Tree_Fraction_Thresholds_ Data***	Ending tag				End of XML structure containing the variables described above	
313	***Decision_Tree_Model_ Selection_Data***	Starting Tag				XML structure containing the variables described below The structure contains two one-dimensional arrays to store two conceptually two-dimensional data of forward model values and retrieved fraction values according to decision tree branches and aggregated fractions. There are 17 types of decision tree branches ranked from 1 to 17. There are 10 types of aggregated fractions. Each of them is assigned to a fixed number: FWP =1, FWS = 2, FSN = 3, FRZ = 4, FFO = 5, FNO = 6, FWL = 7, FEB = 8, FEI = 9, FEU	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						= 10. The one-dimensional arrays first index all the aggregated fractions for the 1st ranked decision branch, then for the 2nd and so on. Thus, the index can be easily computed in the following way: index = i × Num_Aggregated_Fractions + j where i is the rank of the decision tree branch and j is the number of the aggregated fraction.	
314	***List_of_Aggregated_Fractions_Datas***	Starting Tag				Init of list of Aggregated Fractions with a counter as attribute –there are ten fractions	
315	***Aggregated_Fractions_Data***	Starting Tag				Tag Starting Aggregated-Fractions structure	
316	***List_of_Decision_Tree_ Branches_Datas***	Starting Tag				Init of list of Decision_Tree_Branches with a counter as atribute	
317	***Decision_Tree_ Branches_Data***	Starting tag				Tag Starting Decission Tree_Branches structure –there are 17 branches	
318	***Forward_Model***	string	N/A	variable	%s		CEC
319	***Retrieved_Fraction***	integer	N/A	1	%1d	Fractions are set as free for retrieval	CEC
320	***Decission_Tree_Branches_Data***	Ending Tag				End of Decission Tree Branches structure	
321	***List_of_Decision_Tree_ BranchesDatas***	Ending Tag				End of list of Decision_Tree_Branches structures	
322	***Aggregated_Fractions_Data***	Ending Tag				End of the Aggregated_Fractions structure	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
323	***List_of_Aggregated_Fractions_Datas***	Ending Tag				End of list of Aggregated Fractions with a counter as atribute	
324	***Decision_Tree_Model_ Selection_Data***	Ending Tag				Tag ending the XML structure containing above	
325	***Decision_Tree_Stage_2_Retrieval_Condition_Thresholds_Data***	Starting Tag				XML structure containing the Decision tree parameters: stage2	
326	***TH_MMin1***	real	N/A	10	%f	Thresholds to select retrieval richness	CEC
327	***TH_MMin2***	real	N/A	10	%f		CEC
328	***TH_MMin3***	real	N/A	10	%f		CEC
329	***TH_Tau_R_23***	real	neper	10	%f	TAU_R threshold for selecting prior standard deviation values on free parameters	CEC
330	***TH_Tau_R_34***	real	neper	10	%f	TAU_R threshold for selecting prior standard deviation values on free parameters	CEC
331	***Decision_Tree_Stage_2_Retrieval_Condition_Thresholds_Data***	Ending Tag				End of XML structure containing the variables described above	
332	***Prior_SD_2nd_Decision_ Tree_Data***	Starting Tag				Name describing Data Set – XML structure containing variables described below The structure contains a one-dimensional array to store the conceptually three-dimensional data of forward models according to decision tree branches and aggregated fractions. There are 3 types of opacity options: 0 for [0, TH_23], 1 for [TH_23, TH_34], 2 for > TH_34.	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						There are 3 types of modes: 0 for MD, 1 for MN, 2 for MW There are 3 types of retrieval options: 0 for option 2, 1 for option 3, 2 for option 4 The one-dimensional arrays first retrieves opacity options, then modes, and finally retrieval options. Thus, the index can be easily computed in the following way: index = i × Num_Retrieval_Options × Num_Modes + j × Num_Modes + k where i is the opacity option, j is mode and k is the retrieval option. Hence the elements at “index” position represents the parameter value for opacity option “I”, model “j”, and retrieval condition “k”	
333	***List_of_Opacity_Options_Datas***	Starting Tag				Tag starting a list of Opacity_options structure, with the counter Num_Opacity_Options as attribute. Num_Opacity_options Counter specifies the number of Opacity intervals (TAU_R) used to specifiy the standard deviation.	
334	***Opacity_Options_Data***	Starting Tag				Tag Starting the XML structure containing the varibles described below	
335	***List_of_Models_Datas***	Starting Tag				Tag starting a list of Models structure, with Num_Models counter as attribute specifying the number of forward models.	
336	***Models_Data***	Starting Tag				Tag Starting the XML structure containing the varibles described below.	
337	***List_of_Retrieval_Options_Datas***	Starting				Tag starting a list of retrieval_Options, with Num_of_Retrieval_Options Counter as	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
		Tag				attribute indicating the number of retrieval conditions: 2,3 or 4(full retrieval versus poor based on the number of views)	
338	***Retrieval_Options_Data***	Starting Tag				Tag starting the XML structure containing the variables described below	
339	***Sigma_0_TSurf_Vector_Data***	Starting Tag				XML structure containing the variables described below	
340	***Sigma_0_TSurf***	real	N/A	10	%f	standard deviation for TSurf based on Thau, Forward Model and Condition number	CEC
341	***Sigma_0_TSurf_Vector_Data***	Ending Tag				Tag ending the XML structure containing the variables described above.	
342	***Sigma_0_A_Card_vector_Data***	Starting Tag				Tag starting Sigma_0_A_Card vector.	
343	***Sigma_0_A_Card***	real	N/A	10	%f	standard deviation for A_Card parameter based on Thau, Forward Model and Conditionnumber	CEC
344	***Sigma_0_A_Card_vector_Data***	Ending Tag				Tag ending Sigma_0_A_Card vector.	
345	***Sigma_0_SM_Vector_Data***	Starting Tag				XML structure containing the variables described below	
346	***Sigma_0_SM***	real	N/A	10	%f	standard deviation for SM parameter based on Thau, Forward Model and Conditionnumber	CEC
347	***Sigma_0_SM_Vector_Data***	Ending Tag				XML structure containing the variables described above.	
348	***Sigma_0_HR_Vector_Data***	Starting Tag				XML structure containing the variables described below	
349	***Sigma_0_HR***	real	N/A	10	%f	standard deviation for HR parameter based on Thau, Forward Model and Conditionnumber	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
350	***Sigma_0_HR_Vector_Data***	Ending Tag				XML structure containing the variables described above.	
351	***Sigma_0_Tau_Vector_Data***	Starting Tag				XML structure containing the variables described below	
352	***Sigma_0_Tau***	real	N/A	10	%f	standard deviation for Tau parameter based on Thau, Forward Model and Conditionnumber	CEC
353	***Sigma_0_Tau_Vector_Data***	Ending Tag				XML structure containing the variables described above.	
354	***Sigma_0_TTH_Vector_Data***	Starting Tag				XML structure containing the variables described below	
355	***Sigma_0_TTH***	real	N/A	10	%f	standard deviation for TT_H parameter based on Thau, Forward Model and Conditionnumber	CEC
356	***Sigma_0_TTH_Vector_Data***	Ending Tag				Tag ending the XML structure	
357	***Sigma_0_RTT_Vector_Data***	Starting Tag				XML structure containing the variables described below	
358	***Sigma_0_RTT***	real	N/A	10	%f	standard deviation for RTT parameter based on Thau, Forward Model and Condition number	CEC
359	***Sigma_0_RTT_Vector_Data***	Ending Tag				Tag ending the XML structure	
360	***Sigma_0_OMH_Vector_Data***	Starting Tag				XML structure containing the variables described below	
361	***Sigma_0_OMH***	real	N/A	10	%f	standard deviation for $\omega_H$parameter based on Thau, Forward Model and Conditionnumber	N/A
362	***Sigma_0_OMH_Vector_Data***	Ending				Tag ending the XML structure	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
		Tag					
363	***Sigma_0_Diff_OM_Vector_Data***	Starting Tag				XML structure containing the variables described below	
364	***Sigma_0_Diff_OM***	real	N/A	10	%f	standard deviation for $DIFF_{\omega}$ parameter based on Tau, Forward Model and Conditionnumber	CEC
365	***Sigma_0_Diff_OM_Vector_Data***	Ending Tag				Tag ending the XML structure	
366	***Retrieval_Options_Data***	Ending Tag				Tag Ending Retrieval_Options Structure	
367	***List_of_Retrieval_options_Datas***	Ending Tag				Tag ending the list of Retrieval_Option structures	
368	***Models_Data***	Ending Tag				Tag Ending Models_Structure	
369	***List_of_Models_Datas***	Ending Tag				Tag ending the list of Model Data structures	
370	***Opacity_Options_Data***	Ending Tag				Tag ending Opacity_Options structure	
371	***List_of_Opacity_Options_Datas***	Ending tag				Tag ending the list of Opacity_Options structure	
372	***Prior_SD_2nd_Decision_ Tree_Data***	Ending Tag				Tag ending the Prior_SD_2nd_Decision_Tree_Data structure	
373	***Free_Parameters_Prior_Values_and_ Derivate_Increment_Data***	Starting Tag				Tag Starting the XML structure containing the Free Parameters described below	
374	***SM***	real	%	10	%f	Soil moisture prior value ECMWF fallback for STL values	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
375	***Diff_SM***	real	%	10	%f	Soil moisture increment for computing derivatives (DPD)	CEC
376	***A_Card***	real	F/M	10	%f	Default cardioid magnitude prior value. To be used with MDd retrieval.	CEC
377	***Diff_A_Card***	real	F/M	10	%f	Cardioid magnitude increment for computing derivatives (DPD)	CEC
378	***Diff_Tau_Nad***	real	neper	10	%f	Tau nadir increment for computing derivatives (DPD)	CEC
379	***T_Surf***	real	K	10	%f	Surface effective temperature parameter prior value. Fall back value for missing either ECMWF STL1, SSTK, ISTL1 and TSN.	CEC
380	***Diff_T_Surf***	real	K	10	%f	T_{surf} increment for computing derivatives (DPD)	CEC
381	***Diff_TT_H***	real	N/A	10	%f	TT_H increment for computing derivatives (DPD)	CEC
382	***Diff_RTT***	real	N/A	10	%f	RTT increment for computing derivatives (DPD)	CEC
383	***Diff_OM_H***	real	N/A	10	%f	ω_H increment for computing derivatives (DPD)	CEC
384	***Diff_Diff_Omega***	real	N/A	10	%f	DIFFω increment for computing derivatives (DPD)	CEC
385	***Diff_HR***	real	N/A	10	%f	Roughness H_{SOIL} parameter increment for computing derivatives (DPD)	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
386	***Free_Parameters_Prior_Values_and_Derivate_Increment_Data***	Ending Tag				Tag Ending the XML structure	
387	***Global_Algorithm_Control_Data***	Starting Tag				XML structure containing the Levenberg-Marquardt control parameters described below	
388	***Max_Iterations***	integer	N/A		%d	Maximum number of iterations	CEC
389	***KDIA***	real	N/A	10	%f	Initial value of the diagonal increment (Levenberg-Marquardt)	CEC
390	***KDIA_Max***	real	N/A	10	%f	Maximum value allowed for the diagonal increment (Levenberg-Marquardt)	CEC
391	***FDIA***	real	N/A	10	%f	Dividing factor for KDIA (Levenberg-Marquardt)	CEC
392	***FCV1***	real	N/A	10	%f	Convergence test on parameters variation	CEC
393	***F_Con***	real	N/A		%g	Test for matrix conditioning (Levenberg-Marquardt)	CEC
394	***Use_TAU_L_In_Inv***	integer	N/A	1	%1d	A switch to control if tau litter is modelled in the retrieval. 1= tau litter is modelled. 0 = tau litter is not modelled.	CEC
395	***Standard_User_Mode***	integer	N/A	1	%1d	To control the usage and output of negative retrieval values. 1=negative geophysical parameters suppressed. 0= negative geophysical parameters are reported (this is the non-standard, debug or ESL mode).	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
396	***C_R_A_Card***	Real	N/A	10	%f	Coefficient to compute the extended validity range for A_Card	CEC
397	***C_R_Diff_OM***	Real	N/A	10	%f	Coefficient to compute the extended validity range for Diff_OM	CEC
398	***C_R_HR***	Real	N/A	10	%f	Corefficient to compute the extended validity range for HR	CEC
399	***C_R_OMH***	Real	N/A	10	%f	Coefficient to compute the extended validity range for OMH.	CEC
400	***C_R_RTT***	Real	N/A	10	%f	Coefficient to compute the extended validity range for RTT.	CEC
401	***C_R_SM***	Real	N/A	10	%f	Coefficient to compute the extended validity range for SM	CEC
402	***C_R_Tau***	Real	N/A	10	%f	Coefficient to compute the extended validity range for Tau.	CEC
403	***C_R_TSurf***	Real	N/A	10	%f	Coefficient to compute the extended validity range for TSurf	CEC
404	***C_R_TTH***	Real	N/A	10	%f	Coefficient to compute the extended validity range for TTH.	CEC
405	***Use_AUX_DFFSNO***	Integer	N/A	1	%1d	Use of AUX_DFFSNO product if available with default value set to 0 (Do not use).	CEC
406	***Generate_DAP***	Integer	N/A	1	%1d	Switch to control whether the DAP is to be generated. 1=generate DAP. 0=do not generate DAP.	CEC
407	***Operating_Mode***	Integer	N/A		%d	0 = Full Data Mode. This mode uses the full set of TBs containing cross polarization measurements if available. 1 = Dual in Full Mode (the “default” mode). All	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						TBXY are eliminated, but TBXX or TBYY from each snapshot with TBXY is kept. Therefore cross polarization measurements do not participate in the retrieval. 2 = Extended Dual in Full Mode. All measurements in any snapshot containing TBXY, including TBXX or TBYY, are eliminated. Therefore this mode uses the least amount of data during the retrieval.	
408	***Dielectric_Model_Type***	Integer	N/A		%d	A switch used to select the dielectric model (0 for Dobson and 1 for Mironov)	CEC
409	***Dielectric_Model_Sub_Type***	Integer	N/A		%d	A switch used to select the behaviour of the dielectric model computation (0 for standard, 1 for symmetrised)	CEC
410	***SM1_Thld***	real	m^3/m^3	Variable	%g	Call the prolonged version of the dielectric model when SM is in [0,SM1_Thld], and normal case otherwise	CEC
411	***Global_Algorithm_Control_Data***	Ending Tag				Tag ending the XML structure containing the variables described above	
412	***Dielectric_Constant_Data***	Starting Tag				XML structure containing the UDP Parameter range: T_Phys	
413	***SM_min***	real	%	10	%f	Soil moisture retrieval domain	CEC
414	***SM_max***	real	%	10	%f		CEC
415	***TH_DQX_SM***	real	%	10	%f	Threshold for maximum acceptable DQX_{SM} value	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
416	***A_Card_Min***	real	N/A	10	%f	Dielectric constant retrieval domain	CEC
417	***A_Card_Max***	real	N/A	10	%f		CEC
418	***TH_DQX_A_Card***	real	N/A	10	%f	Threshold for acceptable $DQXA_{\_card}$ value	CEC
419	***Dielectric_Constant_Data***	Ending Tag				Tag ending the XML Dielectric_Constant structure	
420	***Temperature***	Starting Tag				XML structure containing the variables described below	
421	***T_Surf_Min***	real	K	10	%f	Surface temperature retrieval domain	CEC
422	***T_Surf_Max***	real	K	10	%f		CEC
423	***TH_DQX_T_Surf***	real	N/A	10	%f	Threshold for maximum acceptable DQX_{Surf} value	CEC
424	***Temperature***	Ending Tag				Tag ending the XML Temperature structure	
425	***Roughness_Data***	Starting Tag				XML structure containing the variables described below	
426	***HR_min***	real	N/A	10	%f	H_{soil} retrieval domain	CEC
427	***HR_max***	real	N/A	10	%f		CEC
428	***TH_DQX_HR***	real	N/A	10	%f	Threshold for maximum acceptable DQX_{Hsoil} value	CEC
429	***HR_MIN_FSN_WET_OR_MIXED***	Real	N/A	10	%f	Roughness parameter (HRmin) of Wet or Mixed Snow.	CEC
430	***FTI_NPE_Land_Cover_Class_Code***	Unsigned integer	N/A	3	%03d	Code of Land Cover Class defining parameters for the Ice Fraction resulting from Nom-	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						Permanet Effects.	
431	***FWL_NPE_Land_Cover_Class_Code***	Unsigned integer	N/A	3	%03d	Code of the Land Cover Class defining parameters for the Wetlands Fraction resulting from Nom-Permanent Effects.	CEC
432	***Roughness_Data***	Ending Tag				XML structure containing the variables described below	
433	***Vegetation_Data***	Starting Tag				XML structure containing the variables described below	
434	***Tau_Nad_Min***	real	neper	10	%f	τ_{Nad} retrieval domain	CEC
435	***Tau_Nad_Max***	real	neper	10	%f		CEC
436	***TH_DQX_Tau_Nad***	real	N/A	10	%f	Threshold for maximum acceptable DQXτ_{Nad} value	CEC
437	***TT_H_Min***	real	N/A	10	%f	TT_H retrieval domain	CEC
438	***TT_H_Max***	real	N/A	10	%f		CEC
439	***TH_DQX_TT_H***	real	N/A	10	%f	Threshold for maximum acceptable DQX_{TTH} value	CEC
440	***RTT_Max***	real	N/A	10	%f	RTT retrieval domain	CEC
441	***RTT_Min***	real	N/A	10	%f		CEC
442	***TH_DQX_RTT***	real	N/A	10	%f	Threshold for maximum acceptable DQX_{RTT} value	CEC
443	***Omega_H_Min***	real	N/A	10	%f	ω_H retrieval domain	CEC
444	***Omega_H_Max***	real	N/A	10	%f		CEC
445	***TH_DQX_Omega_H***	real	N/A	10	%f	Threshold for maximum acceptable DQXω_H	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						value	
446	***DIFF_Omega_Min***	real	N/A	10	%f	DIFFω retrieval domain	CEC
447	***DIFF_Omega_Max***	real	N/A	10	%f		CEC
448	***TH_DQX_Diff_Omega***	real	N/A	10	%f	Threshold for maximum acceptable $DQX_{DIFF\omega}$ value	N/A
449	***Vegetation_Data***	Ending Tag				Tag ending the XML Vegetation structure	
450	***DAP_Additional_Flag_Thresholds_Data***	Starting Tag				XML structure containing the variables described below	
451	***TH_Fit***	real	N/A	10	%f	Threshold for detecting outliers	CEC
452	***TH_Sky***	real	K	10	%f	Threshold for sky TB contribution	CEC
453	***DAP_Additional_Flag_Thresholds_Data***	Ending tag				Tag ending DAP_Additional_Flag_Thresholds structure	
454	***PCD_Additional_Flag_Thresholds_Data***	Starting Tag				XML structure containing the variables described below	
455	***TH_SCENE_FEB***	Real	%	10	%f	Presence of rocks	CEC
456	***TH_SCENE_FTS***	Real	%	10	%f	Presence of strong topography	CEC
457	***TH_SCENE_FTM***	Real	%	10	%f	Presence of moderate topography	CEC
458	***TH_SCENE_FOW***	Real	%	10	%f	Presence of open water	CEC
459	***TH_SCENE_FSN***	Real	%	10	%f	Presence of snow	CEC
460	***TH_SCENE_FSW***	Real	%	10	%f	Presence of Wet Snow	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
461	***TH_SCENE_FSD***	Real	%	10	%f	Presence of Dry Snow	CEC
462	***TH_SCENE_FFO***	Real	%	10	%f	Presence of forest	CEC
463	***TH_SCENE_TAU_FO***	Real	N/A	10	%f	Large forest optical thickness	CEC
464	***TH_SCENE_FNO***	Real	%	10	%f	Presence of nominal soil	CEC
465	***TH_SCENE_FRZ***	Real	%	10	%f	Presence of frost	CEC
466	***TH_SCENE_FWL***	Real	%	10	%f	Presence of wetlands	CEC
467	***TH_SCENE_FUL***	Real	%	10	%f	Presence of limited urban area	CEC
468	***TH_SCENE_FUH***	Real	%	10	%f	Presence of large urban area	CEC
469	***TH_SCENE_FTI***	Real	%	10	%f	Presence of permanent ice/snow	CEC
470	***TH_SAND***	Real	%	10	%f	Presence of high sand fraction	CEC
471	***TH_TEC***	Real	10^{16} electrons/m^2	10	%f	Threshold to raise a flag using the snapshot data from the first validated TB	CEC
472	***TH_Rain***	Real	mm/h	10	%f	Rain threshold	CEC
473	***TH_FLOOD***	Real	m^3/m^3	10	%f	Rain intensity threshod for flood flag	CEC
474	***TH_ Snow***	Real	%	10	%f	Snow threshold used in conjuction with the AUX_DFFSNO product to decide if snow effect should be applied to the fractions	CEC
475	***TH_Dry_Snow***	Real	%	10	%f	Threshold of Dry Snow	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
476	***TH_TAU_Litter***	Real	neper	10	%f	Threshold for mean litter opacity, which is used in setting FL_Litter flag.	CEC
477	***TH_PR***	Real	N/A	10	%f	Threshold for vegetation interception event flag.	CEC
478	***TH_Intercep***	Real	m	10	%f	ECMWF interception	CEC
479	***TH_Sea_Ice***	Real	%	10	%f	Percentage of sea ice	CEC
480	***TH_Chi_2_P_Min***	Real	N/A	10	%f	Threshold for χ^2 interpretation. Interval for Chi_2_P interpretation. Used to set/unset FCVAL flag	CEC
481	***TH_Chi_2_P_Max***	Real	N/A	10	%f	Threshold for χ^2 interpretation. Used to set/unset FCVAL flag	CEC
482	***PCD_Additional_Flag_Thresholds_Data***	Ending Tag				Tag ending the PCD_Additional_Flag_Thresholds structure	
483	***ASL_Modelled_Brightness_Temperature_Data***	Starting Tag				XML structure containing the variables described below	
484	***Theta_B***	real	°	10	%f	Angle to generate modelled ASL brightness temperature for User Data Product	CEC
485	***TH_Theta_B***	real	°	10	%f	Threshold used in the search for an incidence angle closest to Theta_B	CEC
486	***PR_INCI***	real	°	10	%f	Angle to generate modelled ASL brightness temperature for computing vegetation interception PR index	CEC
487	***ASL_Modelled_Brightness_Temperature_Data***	Ending Tag				Tag ending the XML ASL_Modelled_Brightness_Temperature structure	
488	***DGG_Current_Controls_Data***	Starting				XML structure containing the variables	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
		Tag				described below	
489	***Use_Current_RFI***	integer	N/A	1	%1d	Switch controlling which map is used for RFI map: 0 = Do not use values from Current files 1 = Uses values from Current file	CEC
490	***Use_Current_Tau_Nad_LV***	integer	N/A	1	%1d	Switch controlling which maps are used for optical thickness Tau for Low Vegetation cover: 0 = Do not use values from Current files 1 = Uses values from Current file	CEC
491	***Use_Current_Tau_Nad_FO***	integer	N/A	1	%1d	Switch controlling which maps are used for optical thickness Tau for Forest cover: 0 = Do not use values from Current files 1 = Uses values from Current file	CEC
492	***Use_Current_HR***	integer	N/A	1	%1d	Switch controlling which maps are used for roughness parameter HR: 0 = Do not use values from Current files 1 = Uses values from Current file	CEC
493	***Use_Current_Flood***	Integer	N/A	1	%1d	Switch to control where the DGG Current Flood Product is to be used. 1=use values from current. 0=do not use values from current.	CEC
494	***TH_Cur_HR_Val_Period***	integer	days		%d	The number of days roughness parameter (HR) will be valid from the time of its acquisition. This parameter is used to validate	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						the HR from AUX_DGGROU product	
495	***TH_Cur_Tau_Nad_FO_Val_Period***	integer	days		%d	The number of days Tau_Nad_FO will be valid from the time of its acquisition. This parameter is used to validate the Tau_Nad_FO from AUX_DGGTFO product	CEC
496	***TH_Cur_Tau_Nad_LV_Val_Period***	integer	days		%d	The number of days Tau_Nad_LV will be valid from the time of its acquisition. This parameter is used to validate the Tau_Nad_LV from AUX_DGGTLV product	CEC
497	***TH_Current_RFI_V***	real	N/A	10	%f	Threshold for current vertical RFI	CEC
498	***TH_Current_RFI_H***	real	N/A	10	%f	Threshold for current horizontal RFI	CEC
499	***Current_HR_ASTD***	real	N/A	10	%f	A priori standard deviation for HR used in generating output DQX_HR	CEC
500	***Current_Tau_ASTD***	real	neper	10	%f	A priori standard deviation for TAU	CEC
501	***MISSING_VAL***	real	N/A	10	%f	Missing value for DGG Current LUTs	CEC
502	***AUX_DGGRFI_Window_Size***	Integer	days		%d	This parameter is used to select two AUX_DGGRFI input files in order to compute the RFI probability over a window of size (AUX_DGGRFI_Window_Size – 1).	CEC
503	***TH_MVAL0_UC***	real	N/A	Variable	%g	Threshold used in setting flags that drive the update of AUX_DGGTLV, AUX_DGGTFO and AUX_DGGROU products.	CEC
504	***TH_Curr_Min_DQXTLV***	real	neper	Variable	%g	Minimum threshold for Tau_Cur_DQX in UDP when FL_Current_Tau_Nadir_LV in UDP is ON	CEC
505	***TH_Curr_Min_DQXTFO***	real	neper	Variable	%g	Minimum threshold for Tau_Cur_DQX in UDP when FL_Current_Tau_Nadir_FO in UDP is	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						ON	
506	***TH_Curr_Min_DQXROU***	real	N/A	Variable	%g	Minimum threshold for HR_Cur_DQX in UDP when FL_Current_HR in UDP is ON	CEC
507	***DGG_Current_Controls_Data***	Ending Tag				Tag ending DGG_Current_Controls_Data structure	
508	***Global_Quality_Coefficients_Data***	Starting Tag				Tag starting the XML structure containing the Parameters for overall quality (CQX coefficients)	
509	***CQX11***	real	N/A	10	%f	Radiom .TB & prior	CEC
510	***CQX21***	real	K	10	%f	Instrument	CEC
511	***CQX22***	real	Kkm^{-1}	10	%f	Instrument X_SWATH term	CEC
512	***CQX23***	real	K	10	%f	Calibration	CEC
513	***CQX24***	real	K	10	%f	Reconstruction overall bias	CEC
514	***CQX25***	real	K	10	%f	Reconstruction Coast line flag	CEC
515	***CQX26***	real	N/A	10	%f	Reconstruction Corbella term	CEC
516	***CQX31***	real	K	10	%f	Goodness of fit	CEC
517	***CQX32***	real	K	10	%f	Outliers	CEC
518	***CQX33***	real	K	10	%f	SUN in front	CEC
519	***CQX34***	real	K	10	%f	Rain	CEC
520	***CQX35***	real	K	10	%f	TEC	CEC
521	***CQX36***	real	K	10	%f	Sky	CEC
522	***CQX41***	real	K	10	%f	Default fractions	CEC
523	***CQX42***	real	K	10	%f	FNO reference values	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
524	*CQX43*	real	K	10	%f	LITTER	CEC
525	*CQX44*	real	K	10	%f	Interception	CEC
526	*CQX45*	real	K	10	%f	Interception (aux)	CEC
527	*CQX46*	real	K/%	10	%f	FLOOD probability	CEC
528	*CQX47*	real	K	10	%f	Moderate topography	CEC
529	*CQX48*	real	K	10	%f	Strong topography	CEC
530	*CQX49*	real	K	10	%f	Evening orbit	CEC
531	*Global_Quality_Coefficients_Data*	Ending Tag				Tag ending the XML structure	
532	*CCX_Function_Coefficients_Data*	Starting Tag				Tag starting the XML structure containing the Parameters for overall quality (CQX coefficients)	
533	*CCX0*	real	N/A		%g	First coefficient	CEC
534	*CCX1*	real	$\%K^{-1}$		%g	A constant	CEC
535	*CCX2*	real	K^{-1}		%g	SM factor	CEC
536	*CCX3*	real	$\%K^{-1}$		%g	Tau factor	CEC
537	*CCX4*	real	$\%^{-1}K^{-1}$		%g	SM^2 factor	CEC
538	*CCX5*	real	$\%K^{-2}$		%g	Tau^2 factor	CEC
539	*CCX6*	real	K^{-1}		%g	SM*Tau factor	CEC
540	*CCX_Function_Coefficients_Data*	Ending Tag				Tag ending the XML structure containing the Parameters for overall quality (CQX coefficients)	
541	*Overall_Quality_Thresholds*	Starting				Tag Starting the Overall_Quality_Thresholds structure containing the variables described	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
		Tag				below	
542	***Overall_Quality_Threshold_low***	integer	(10^{-2}%)	5 bytes	%05d	Low Threshold to set the SPH Overal_Quality field	
543	***Overall_Quality_Threshold_high***	integer	(10^{-2}%)	5 bytes	%05d	High Threshold to set the SPH Overal_Quality field	
544	***Overall_Quality_Thresholds***	Ending Tag				Tag Ending the Overall_Quality_Thresholds structure	
545	***Fixed_Parameter_ASTDs***	Starting Tag				Tag starting the XML structure containing the ASTD (a priori standard deviation) values of potentially free parameters as fixed parameters	
546	***Fixed_Tau_Nad_ASTD***	real	neper	10	%f	Tau Nadir is a potentially free (i.e., to be retrieved) parameter. This is the ASTD value for it if it is fixed (i.e, not retrieved).	CEC
547	***Fixed_T_Surf_ASTD***	real	K	10	%f	Surface temperature is a potentially free (i.e., to be retrieved) parameter. This is the ASTD value for it if it is fixed (i.e, not retrieved).	CEC
548	***Fixed_TT_H_ASTD***	real	N/A	10	%f	TTH is a potentially free (i.e., to be retrieved) parameter. This is the ASTD value for it if it is fixed (i.e, not retrieved).	CEC
549	***Fixed_RTT_ASTD***	real	N/A	10	%f	RTT is a potentially free (i.e., to be retrieved) parameter. This is the ASTD value for it if it is fixed (i.e, not retrieved)	CEC
550	***Fixed_OM_H_ASTD***	real	N/A	10	%f	Scattering albedo H is a potentially free (i.e., to be retrieved) parameter. This is the ASTD value for it if it is ixed (i.e, not retrieved)	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
551	***Fixed_Diff_Omega_ASTD***	real	N/A	10	%f	Difference of albedos is a potentially free (i.e., to be retrieved) parameter. This is the ASTD value for it if it is fixed (i.e, not retrieved).	CEC
552	***Fixed_HR_ASTD***	real	N/A	10	%f	Surface roughness is a potentially free (i.e., to be retrieved) parameter. This is the ASTD value for it if it is fixed (i.e, not retrieved).	CEC
553	***Fixed_Parameter_ASTDs***	Ending Tag				Tag ending the XML structure containing the ASTD values of potentially free parameters as fixed parameters	
554	***List_of_General_Purpose_Parameters***	Starting Tag				Init of list General_Purpose_Parameter with counter as attribute	
555	***General_Purpose_Parameter***	Real	N/A	Variable	%g	A parameter not used by the operational processor. It is to be used only in experimental versions of the prototype processor.	
556	***List_of_General_Purpose_Parameters***	Ending Tag				End of list General_Purpose_Parameter	
557	***L2_SM_Configuration_Parameters***	Ending Tag				Tag ending a structure containing Processing Parameters Product	
558	***Data_Block***	Ending Tag				End of Data Block in the product	

Table 5-45 Description of Configuration_Parameters Data Block

5.4 AUXILIARY LEVEL 2 OCEAN SALINITY DATA TYPES BLOCKS SPECIFICATIONS

5.4.1 Discrete Global Grid (AUX_DGG___)

See Applicable Document [AD.5]

5.4.2 Best Fit Plane (AUX_BFP___)

See Applicable Document [AD.5]

5.4.3 Mispointing Angles (AUX_MISP__)

See Applicable Document [AD.5]

5.4.4 Flat Sea coefficients (AUX_FLTSEA)

The brightness temperature can be expressed as the sum of two terms; the brightness temperature in the case of completely flat sea and the additional brightness temperature (ΔTb) due to the surface roughness, as follows:

$$T_{b,p}(\theta, SST, SSS, P_{rough}) = T_{b\,Flat,p}(\theta, SST, SSS) + \Delta T_{b\,rough,p}(\theta, SST, SSS, P_{rough})$$

This ADF provides the coefficients to comput the first term of the above equation.

5.4.4.1 Specific Product Header

The SPH for this ADF contains the field specified in Table 5-3.

5.4.4.2 Data Block

The Flat Sea module needs physical constants provided by separate auxiliary file AUX_CNFOSD or AUX_CNFOSF and three lists of coefficients for dielectric constant of sea water. They are provided by Flat_Sea_Coef data record in XML ASCII format.

The data record format is described in table below:

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Data_Block***	Starting Tag				Init of Data Block in the product	
02	***Flat_sea_coeff***	Starting Tag				Initial Data Set definition Tag. Start of Data Set XML structure containing the variables described below	
03	***List_of_M_Flatsea***	Starting Tag				Init of list of M _flatsea coefficients with a fixed counter as attribute equal to 15	CEC
04	***M_Flatsea***	real	dl		%g	First set of coefficients of the sea water dielectric constant model	CEC
05	***List_of_M_Flatsea***	Ending Tag				End of list of M Flatsea coefficients.	
06	***List_of_T_Flatsea***	Starting Tag				Init of list of T _flatsea coefficients with a fixed counter as attribute equal to 15	CEC
07	***T_Flatsea***	real	dl		%g	Second set of coefficients of the sea water dielectric constant model	CEC
08	***List_of_T_Flatsea***	Ending Tag				End of list of T _flatsea coefficients	
09	***List_of_S_Flatsea***	Starting Tag				Init of list of S _flatsea coefficients with a fixed counter as attribute equal to 15	CEC
10	***S_Flatsea***	real	dl		%g	Third set of coefficients of the sea water dielectric constant model	CEC
11	***List_of_S_Flatsea***	Ending Tag				End of list of S _flatsea coefficients	
12	***Flat_sea_coeff***	Closing Tag				End of Data Set structure	
13	***Data_Block***	Closing Tag				End of Data Block in the product	

Table 5-46 Description of Flat_Sea_Coef Data Record

5.4.5 Roughness Model 1 LUT (AUX_RGHNS1)

Sea surface roughness model 1 needs 10 LUTs for Tv0, Tv1, Tv2, Th0, Th1, Th2, U1, U2, V1, V2. All 10 LUTS have four dimensions: U10, θ, SSS and SST.

5.4.5.1 Specific Product Header

The SPH for this ADF contains the field specified in Table 5-2 and the List of Data Sets included in Table 4-5

5.4.5.2 Data Block

The 10 LUTs listed above are stored in binary data blocks.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of binary Data Set containing the ***Max_Valid*** values	
01	***MaxValid***	Real array	N/A	Float (4 bytes)	4 elements	Maximum valid LUT values for SST, SSS, U10 and θ	INT
	Max_Valid					End of binary Data Set containing the ***Max_Valid*** values	
	Min_Valid					Init of binary Data Set containing the ***Min_Valid*** values	
02	***MinValid***	Real array	N/A	Float (4 bytes)	4 elements	Minimum valid LUT values for SST, SSS, U10 and θ	INT
	Min_Valid					End of binary Data Set containing the ***Min_Valid*** values	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_Sampling_dim1					Init of binary Data Set containing the ***Data_Set_Sampling_dim1*** values.	
03	***Sampling_dim1***	Array of real values	K	Float (4 bytes each element)	9 elements	SST values of sampling (in °C in TGRD)	INT
	Data_Set_Sampling_dim1					End of binary Data Set containing the ***Data_Set_Sampling_dim1*** values.	
	Data_Set_Sampling_dim2					Init of binary Data Set containing the ***Data_Set_Sampling_dim2*** values.	
04	***Sampling_dim2***	Array of real values	psu	Float (4 bytes each element)	6 elements	SSS values of sampling	INT
	Data_Set_Sampling_dim2					End of binary Data Set containing the ***Data_Set_Sampling_dim2*** values.	
	Data_Set_Sampling_dim3					Init of binary Data Set containing the ***Data_Set_Sampling_dim3*** values.	
05	***Sampling_dim3***	Array of real values	m/s	Float (4 bytes each element)	26 elements	U_{10} values of sampling	INT
	Data_Set_Sampling_dim3					End of binary Data Set containing the ***Data_Set_Sampling_dim3*** values.	
	Data_Set_Sampling_dim4					Init of binary Data Set containing the ***Data_Set_Sampling_dim4*** values.	
06	***Sampling_dim4***	Array of real values	o	Float(4 bytes each element)	20 elements	Θ values of sampling	INT
	Data_Set_Sampling_dim4					End of binary Data Set containing the ***Data_Set_Sampling_dim4*** values.	
	Data_Set_Th0					Init of binary Data set containing the Th0 values	
07	***Th0***	LUT 4 dimensional	K	Float (4 bytes)	9*6*26*20	LUT of Th0	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_Th0					End of binary Data set containing the Th0 values	
	Data_Set_Tv0					Init of binary Data set containing the Tv0 values	
08	***Tv0***	LUT 4 dimensional	K	Float (4 bytes)	9*6*26*20	LUT of Tv0	INT
	Data_Set_Tv0					End of binary Data set containing the Tv0 values	
	Data_Set_Th1					Init of binary Data set containing the Th1 values	
09	***Th1***	LUT 4 dimensional	K	Float (4 bytes)	9*6*26*20	LUT of Th1	INT
	Data_Set_Th1					End of binary Data set containing the Th1 values	
	Data_Set_Tv1					Init of binary Data set containing the Tv1 values	
10	***Tv1***	LUT 4 dimensional	K	Float (4 bytes)	9*6*26*20	LUT of Tv1	INT
	Data_Set_Tv1					End of binary Data set containing the Tv1 values	
	Data_Set_Th2					Init of binary Data set containing the Th2 values	
11	***Th2***	LUT 4 dimensional	K	Float (4 bytes)	9*6*26*20	LUT of Th2	INT
	Data_Set_Th2					End of binary Data set containing the Th2 values	
	Data_Set_Tv2					Init of binary Data set containing the Tv2 values	
12	***Tv2***	LUT 4 dimensional	K	Float (4 bytes)	9*6*26*20	LUT of Tv2	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_Tv2					End of binary Data set containing the Tv2 values	
	Data_Set_U1					Init of binary Data set containing the U1 values	
13	***U1***	LUT 4 dimensional	K	Float (4 bytes)	9*6*26*20	LUT of U1	INT
	Data_Set_U1					End of binary Data set containing the U1 values	
	Data_Set_V1					Init of binary Data set containing the V1 values	
14	***V1***	LUT 4 dimensional	K	Float (4 bytes)	9*6*26*20	LUT of V1	INT
	Data_Set_V1					End of binary Data set containing the V1 values	
	Data_Set_U2					Init of binary Data set containing the U2 values	
15	***U2***	LUT 4 dimensional	K	Float (4 bytes)	9*6*26*20	LUT of U2	INT
	Data_Set_U2					End of binary Data set containing the U2 values	
	Data_Set_V2					Init of binary Data set containing the V2 values	
16	***V2***	LUT 4 dimensional	K	Float (4 bytes)	9*6*26*20	LUT of V2	INT
	Data_Set_V2					End of binary Data set containing the V2 values	
	Data_Block					End of binary Data Block in the product.	

Table 5-47 Description of rough_LUT data record

5.4.6 Roughness Model 2 LUT (AUX_RGHNS2)

Sea surface roughness model 2 needs 6 LUTs for $\Delta e_{Bh}(0)$, Δe_{Bh} (2),$\Delta e_{Bv}(0)$, $\Delta e_{Bv}(2)$, $\Delta e_{BU}(2)$, $\Delta e_{BV}(2)$ and a constant C_p. All 6 LUTS have five dimensions U*, Ω, θ, SST, SSS.

5.4.6.1 Specific Product Header

The SPH for this ADF contains the fields specified in Table 5-2 and the List of Data Sets included in Table 4-5

5.4.6.2 Data Block

The LUTs listed above are provided by the rough2_LUT data record. They are stored in binary data blocks. The data record format is described in table below.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of binary Data Set containing the ***Max_Valid*** elements.	
01	***MaxValid***	Real array		Float (4 bytes)	5 elements	Maximum valid LUT values for WSn, Ω, θ, SST and SSS	INT
	Max_Valid					End of binary Data Set containing the ***Max_Valid*** elements	
	Min_Valid					Init of binary Data Set containing the ***Min_Valid*** elements.	
02	***MinValid***	Real array		Float (4 bytes)	5 elements	Minimum valid LUT values for WSn, Ω, θ, SST and SSS	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Min_Valid					End of binary Data Set containing the ***Min_Valid*** elements	
	Data_Set_Sampling_dim1					Init of binary Data Set containing the ***Data_Set_Sampling_dim1*** values.	
03	***Sampling_dim1***	Real array	m/s	float (4 bytes)	23 elements	Wsn values of sampling	INT
	Data_Set_Sampling_dim1					End of binary Data Set containing the ***Data_Set_Sampling_dim1*** values.	
	Data_Set_Sampling_dim2					Init of binary Data Set containing the ***Data_Set_Sampling_dim2*** values.	
04	***Sampling_dim2***	Real array	m/s	float (4 bytes)	11 elements	Ω values of sampling	INT
	Data_Set_Sampling_dim2					End of binary Data Set containing the ***Data_Set_Sampling_dim2*** values.	
	Data_Set_Sampling_dim3					Init of binary Data Set containing the ***Data_Set_Sampling_dim3*** values.	
05	***Sampling_dim3***	Real array	º	float (4 bytes)	28 elements	θ values of sampling	INT
	Data_Set_Sampling_dim3					End of binary Data Set containing the ***Data_Set_Sampling_dim3*** values.	
	Data_Set_Sampling_dim4					Init of binary Data Set containing the ***Data_Set_Sampling_dim4*** values.	
06	***Sampling_dim4***	Real array	psu	float (4 bytes)	22 elements	SSS values of sampling	INT
	Data_Set_Sampling_dim4					End of binary Data Set containing the ***Data_Set_Sampling_dim4*** values.	
	Data_Set_Sampling_dim5					Init of binary Data Set containing the ***Data_Set_Sampling_dim5*** values.	
07	***Sampling_dim5***	Real array	K	float (4 bytes)	20 elements	SST values of sampling	INT
	Data_Set_Sampling_dim5					End of binary Data Set containing the ***Data_Set_Sampling_dim5*** values.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_ dT_h_0					Init of binary Data Set containing the ***Data_Set_ dT_h_0***values.	
08	***dT_h_0***	LUT 5 dimensional	K	float (4 bytes)	23*11*28*22*20	LUT of $\Delta e_{Bh}^{(0)}$	INT
	Data_Set_ dT_h_0					End of binary Data Set containing the ***Data_Set_ dT_h_0***values.	
	Data_Set_ dT_h_2					Init of binary Data Set containing the ***Data_Set_ dT_h_2*** values.	
09	***dT_h_2***	LUT 5 dimensional	K	float (4 bytes)	23*11*28*22*20	LUT of $\Delta e_{Bh}^{(2)}$	INT
	Data_Set_ dT_h_2					End of binary Data Set containing the ***Data_Set_ dT_h_2***values.	
	Data_Set_ dT_v_0					Init of binary Data Set containing the ***Data_Set_ dT_v_0***values.	
10	***dT_v_0***	LUT 5 dimensional	K	float (4 bytes)	23*11*28*22*20	LUT of $\Delta e_{Bv}^{(0)}$	INT
	Data_Set_ dT_v_0					End of binary Data Set containing the ***Data_Set_ dT_v_0***values.	
	Data_Set_ dT_v_2					Init of binary Data Set containing the ***Data_Set_ dT_v_2*** values.	
11	***dT_v_2***	LUT 5 dimensional	K	float (4 bytes)	23*11*28*22*20	LUT of $\Delta e_{Bv}^{(2)}$	INT
	Data_Set_ dT_v_2					End of binary Data Set containing the ***Data_Set_ dT_v_2*** values.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_ dT_U2					Init of binary Data Set containing the ***Data_Set_ dT_U2*** values.	
12	***dT_U_2***	LUT 5 dimensional	K	float (4 bytes)	23*11*28*22*20	LUT of Δe_{BU} (2)	INT
	Data_Set_ dT_U2					End of binary Data Set containing the ***Data_Set_ dT_U2*** values.	
	Data_Set_ dT_V2					Init of binary Data Set containing the ***Data_Set_ dT_V2*** values.	
13	***dT_V_2***	LUT 5 dimensional	K	float (4 bytes)	23*11*28*22*20	LUT of Δe_{BV} (2)	INT
	Data_Set_ dT_V2					End of binary Data Set containing the ***Data_Set_ dT_V2*** values.	
	Data_Block					End of binary Data Block in the product.	

Table 5-48 Description of rough2_LUT data record

5.4.7 Roughness Model 3 LUT (AUX_RGHNS3)

Sea surface roughness model 3 needs 4 LUTs for Th, Tv, U, V. All 4 LUTs have four dimensions: θ, WSn, phi_wsn and SST. They are stored in binary data blocks.

5.4.7.1 Specific Product Header

The SPH for this ADF contains the field specified in Table 5-3.

5.4.7.2 Data Block

This ADF is specified in binary format:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of binary Data Set containing the ***Max_Valid*** elements.	
01	***MaxValid***	Real Array		float (4 bytes)	4 elements	Maximum valid LUT values for θ, WSn, phi_wsn and HS	INT
	Max_Valid					End of binary Data Set containing the ***Max_Valid*** elements.	
	Min_Valid					Init of binary Data Set containing the ***Min_Valid*** elements	
02	***MinValid***	Real Array		float (4 bytes)	4 elements	Minimum valid LUT values for θ, WSn, phi_wsn and HS	
	Min_Valid					End of binary Data Set containing the ***Min_Valid*** elements	
	Data_Set_Sampling_dim1					Init of binary Data Set containing the ***Data_Set_Sampling_dim1*** values.	
03	***Sampling_dim1***	Real Array	º	float (4 bytes)	76 elements	Θ values of sampling	INT
	Data_Set_Sampling_dim1					End of binary Data Set containing the ***Data_Set_Sampling_dim1*** values.	
	Data_Set_Sampling_dim2					Init of binary Data Set containing the ***Data_Set_Sampling_dim2*** values.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
04	***Sampling_dim2***	Real Array	m,s-1	float (4 bytes)	111 elemets	WSn values of sampling	INT
	Data_Set_Sampling_dim2					End of binary Data Set containing the ***Data_Set_Sampling_dim2*** values.	
	Data_Set_Sampling_dim3					Init of binary Data Set containing the ***Data_Set_Sampling_dim3*** values.	
05	***Sampling_dim3***	Real Array	º	float (4 bytes)	36 elements	Phi values of sampling	INT
	Data_Set_Sampling_dim3					End of binary Data Set containing the ***Data_Set_Sampling_dim3*** values.	
	Data_Set_Sampling_dim4					Init of binary Data Set containing the ***Data_Set_Sampling_dim4*** values.	
06	***Sampling_dim4***	Real Array	M	float (4 bytes)	40 elements	HS values of sampling	INT
	Data_Set_Sampling_dim4					End of binary Data Set containing the ***Data_Set_Sampling_dim4*** values.	
	Data_Set_Th					Init of binary Data Set containing the ***Th*** values.	
07	***Th***	LUT 4 dimensional	K	float (4 bytes)	76*111*36*40	LUT of Th	INT
	Data_Set_Th					End of binary Data Set containing the ***Th*** values.	
	Data_Set_Tv					Init of binary Data Set containing the ***Tv*** values.	
08	***Tv***	LUT 4 dimensional	K	float (4 bytes)	76*111*36*40	LUT of Tv	INT
	Data_Set_Tv					End of binary Data Set containing the ***Tv*** values.	
	Data_Set_U					Init of binary Data Set containing the ***U***	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						values.	
09	***U***	LUT 4 dimensional	K	float (4 bytes)	76*111*36*40	LUT of U	INT
	Data_Set_U					End of binary Data Set containing the ***U*** values.	
	Data_Set_V					Init of binary Data Set containing the ***V*** values.	
10	***V***	LUT 4 dimensional	K	float (4 bytes)	76*111*36*40	LUT of V	INT
	Data_Set_V					Init of binary Data Set containing the ***V*** values.	
	Data_Block					End of binary Data Block in the product.	

Table 5-49 Rough3_LUT Binary Datablock

5.4.8 OS Galaxy Map Product (AUX_GAL_OS)

To generate the L2 Ocean Salinity Galaxy map same procedure as in the L2SM is applied, except that a centre-symetrical WEF will be used instead of the MEAN_WEF, and the errors are a fixed value (0.5 K)as in the original map.

5.4.8.1 Specific Product Header

The SPH follows the format described in section 5.1.2 and it includes, in addition, the fields listed below:

Field #	Field Name	Type	Unit	String Length	C Format	Comment
01	***Specific_Product_Header***	Tag				Tag starting the Specific Product Header structure
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2
14	***Coordinates_Info***	StartingTag				Structure containing cords info
15	***Min_RA***	Float	deg	7	%+7.2f	Minimum Right Ascension of Sky contribution direction in Earth Fixed Reference
16	***Max_RA***	Float	deg	7	%+7.2f	Maximum Right Ascension of Sky contribution direction in Earth Fixed Reference
17	***Min_DEC***	Float	deg	7	%+7.2f	Minimum Declination of Sky contribution direction in Earth Fixed Reference
18	***Max_DEC***	Float	deg	7	%+7.2f	Maximum Declination of Sky contribution direction in Earth Fixed Reference
19	***DELTA_RA***	Float	deg	7	%+7.2f	Step for the Right Ascension of Sky Contribution
20	***DELTA_DEC***	Float	deg	7	%+7.2f	Step for the Declination of Sky Contribution
21	***Coordinates_Info***	Ending Tag				Tag ending the Coordinates Info Data Set
22	***Reference_epoch***	Starting Tag				Tag starting the Reference epoch Data Set
23	***Epoch***	String	N/A	5	%5s	Reference system used to compute the Sky Map
24	***Reference_epoch***	Ending Tag				Tag ending the Reference epoch Data Set
25-36	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4
37	***Specific_Product_Header***	Tag				Tag ending the Specific Product Header structure

Table 5-50 AUX_GAL_OS SPH

5.4.8.2 Data Block

The data record format is described in table below:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of ***Max_Valid*** binary Data Set	
01	***MaxValid***	Real value	deg	Float (4 bytes)	2 elements	Maximum valid LUT values for right ascension and declination	INT
	Max_Valid					End of ***Max_Valid*** binary Data Set	
	Min_Valid					Init of ***Min_Valid*** binary Data Set	
02	***MinValid***	Real value	deg	Float (4 bytes)	2 elements	Minimum valid LUT values for right ascension and declination	INT
	Min_Valid					End of ***Min_Valid*** binary Data Set	
	Data_Set_Sampling_dim1					Init of ***Data_Set_Sampling_dim1***binary Data Set	
03	***Sampling_dim1***	Real value	deg	Float (4 bytes)	721 elements	Declination values of sampling	INT
	Data_Set_Sampling_dim1					End of ***Data_Set_Sampling_dim1***binary Data Set	
	Data_Set_Sampling_dim2					Init of ***Data_Set_Sampling_dim2***binary Data Set	
04	***Sampling_dim2***	Real value	deg	Float (4 bytes)	1441 elements	Right ascension values of sampling	INT
	Data_Set_Sampling_dim2					End of ***Data_Set_Sampling_dim2*** binary Data Set	
	Data_Set_I_CSWeF					Init of ***Data_Set_ I_CSWeF*** binary Data Set	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
05	***I_CSWeF***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441 values	Galactic noise integrated with a centrosymmetrical WeF given in equatorial coordinates (Total intensity = H)	INT
	Data_Set_I_CSWeF					End of ***Data_Set_ I_CSWeF*** binary Data Set	
	Data_Set_Q_CSWeF					Init of ***Data_Set_Q_CSWeF*** binary Data Set	
06	***Q_CSWeF***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441 values	Galactic noise weighted by a centrosymmetric WeF given in equatorial coordinates (Second Stokes = H-V)	INT
	Data_Set_Q_CSWeF					End of ***Data_Set_Q_CSWeF*** binary Data Set	
	Data_Set_U_CSWeF					Init of ***Data_Set_U_CSWeF*** binary Data Set	
07	***U_CSWeF***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441 values	Galactic noise weighted by a centrosymmetric WeF given in equatorial coordinates (third Stokes)	INT
	Data_Set_U_CSWeF					End of ***Data_Set_U_CSWeF*** binary Data Set	
	Data_Set_ Error_I_CSWeF					Init of ***Data_Set_ Error_I_CSWeF*** binary Data Set	
08	***Error_I_CSWeF***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441 values	Uncertainty on the galactic noise total intensity due to centrosymmetrical WeF assumption.	INT
	Data_Set_ Error_I_CSWeF					End of ***Data_Set_ Error_I_CSWeF*** binary Data Set	
	Data_Set_ Error_Q_CSWeF					Init of ***Data_Set_ Error_Q_CSWeF*** binary Data Set	
09	***Error_Q_CSWeF***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441 values	Uncertainty on the second Stokes parameter of the galactic noise due to centrosymmetrical WeF assumption.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_ Error_Q_CSWeF					End of ***Data_Set_ Error_Q_CSWeF*** binary Data Set	
	Data_Set_ Error_U_CSWeF					Init of ***Data_Set_ Error_U_CSWeF*** binary Data Set	
10	***Error_U_CSWeF***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441 values	Uncertainty on the third Stokes parameter of the galactic noise due to centrosymmetrical WeF assumption	INT
	Data_Set_ Error_U_CSWeF					End of ***Data_Set_ Error_U_CSWeF*** binary Data Set	
	Data_Set_delta_I					Init of ***Data_Set_delta_I*** binary Data Set	
11	***delta_I***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441 values	Potential error due to strong point sources	INT
	Data_Set_delta_I					End of ***Data_Set_delta_I*** binary Data Set	
	Data_Block					End of binary Data Block in the product.	

Table 5-51 Description of AUX_GAL_OS data record

5.4.9 OS Galaxy Map Product 2 (AUX_GAL2OS)

5.4.9.1 Specific Product Header

The SPH follows the format described in section 5.1.2 and it includes, in addition, the fields listed below:

Field #	Field Name	Type	Unit	String Length	C Format	Comment
01	***Specific_Product_Header***	Tag				Tag starting the Specific Product Header structure
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2
14	***Reference_epoch***	Starting Tag				Tag starting the Reference epoch Data Set
15	***Epoch***	String	N/A	5	%5s	Reference system used to compute the Sky Map
16	***Reference_epoch***	Ending Tag				Tag ending the Reference epoch Data Set
17-28	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4
29	***Specific_Product_Header***	Tag				Tag ending the Specific Product Header structure

Table 5-52 AUX_GAL2OS SPH

5.4.9.2 Data Block

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of ***Max_Valid*** binary Data Set	
01	***MaxValid***	Real value	deg	Float (4 bytes)	5 elements	Maximum valid LUT values for declination, right ascension, wind speed, incidence angle and psi angle	INT
	Max_Valid					End of ***Max_Valid*** binary Data Set	
	Min_Valid					Init of ***Min_Valid*** binary Data Set	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
02	***MinValid***	Real value	deg	Float (4 bytes)	5 elements	Minimum valid LUT values for declination, right ascension, wind speed, incidence angle and psi angle	INT
	Min_Valid					End of ***Min_Valid*** binary Data Set	
	Data_Set_Sampling_dim1					Init of ***Data_Set_Sampling_dim1***binary Data Set	
03	***Sampling_dim1***	Real value	$m*s^{-1}$	Float (4 bytes)	8 elements	10 meter wind speed values of sampling	INT
	Data_Set_Sampling_dim1					End of ***Data_Set_Sampling_dim1***binary Data Set	
	Data_Set_Sampling_dim2					Init of ***Data_Set_Sampling_dim2***binary Data Set	
04	***Sampling_dim2***	Real value	deg	Float (4 bytes)	15 elements	Incidence angle values of sampling	INT
	Data_Set_Sampling_dim2					End of ***Data_Set_Sampling_dim2*** binary Data Set	
	Data_Set_Sampling_dim3					Init of ***Data_Set_Sampling_dim3*** binary Data Set	
05	***Sampling_dim3***	Real value	deg	Float (4 bytes)	19 elements	Psi angles values of sampling	INT
	Data_Set_Sampling_dim3					End of ***Data_Set_Sampling_dim3*** binary Data Set	
	Data_Set_Sampling_dim4					Init of ***Data_Set_Sampling_ dim4*** binary Data Set	
06	***Sampling_dim4***	Real value	deg	Float (4 bytes)	51 elements	Declination values of sampling	INT
	Data_Set_Sampling_ dim4					End of ***Data_Set_Sampling_ dim4*** binary Data Set	
	Data_Set_Sampling_dim5					Init of ***Data_Set_Sampling_ dim5*** binary Data Set	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
07	***Sampling_dim5***	Real value	deg	Float (4 bytes)	99 elements	Right ascension values of sampling	INT
	Data_Set_Sampling_ dim5					End of ***Data_Set_Sampling_ dim5*** binary Data Set	
	Data_Set_LUT_th_symm_A					Init of ***Data Set LUT_th_symm*** binary Data Set for ascending orbits	
08	***LUT_th_symm_A***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*9 9 elements	$\tilde{A}_h^{(0)}$ harmonic amplitude H-pol component for ascending orbits	INT
	Data_Set_LUT_th_symm_A					End of ***Data Set LUT_th_symm*** binary Data Set for ascending orbits	
	Data_Set_LUT_tv_symm_A					Init of ***Data Set LUT_tv_symm for*** binary Data Set for ascending orbits	
09	***LUT_tv_symm_A***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*9 9 elements	$\tilde{A}_v^{(0)}$ harmonic amplitude V-pol component for ascending orbits	INT
	Data_Set_LUT_tv_symm_A					End of ***Data Set LUT_th_symm*** binary Data Set for ascending orbits	
	Data_Set_LUT_th_hc_A					Init of ***Data_Set_ LUT_th_hc*** binary Data Set for ascending orbits	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
10	***LUT_th_hc_A***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*9 9 elements	$\tilde{A}_h^{(2)}\cos(2\varphi_i)$ harmonic amplitude H-Pol for ascending orbits	INT
	Data_Set_LUT_th_hc_A					End of ***Data_Set_ LUT_th_hc*** binary Data Set for ascending orbits	
	Data_Set_LUT_tv_hc_A					Init of ***Data_Set_ LUT_tv_hc*** binary Data Set for ascending orbits	
11	***LUT_tv_hc_A***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*9 9 elements	$\tilde{A}_v^{(2)}\cos(2\varphi_i)$ harmonic amplitude V-pol for ascending orbits	INT
	Data_Set_LUT_tv_hc_A					End of ***Data_Set_ LUT_tv_hs*** binary Data Set for ascending orbits	
	Data_Set_LUT_th_hs_A					Init of ***Data_Set_ LUT_th_hs*** binary Data Set for ascending orbits	
12	***LUT_th_hs_A***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*9 9 elements	$\tilde{B}_h^{(2)}\sin(2\varphi_i)$ harmonic amplitude H-pol for ascending orbits	INT
	Data_Set_ LUT_th_hs_A					End of ***Data_Set_ LUT_th_hs*** binary Data Set for ascending orbits	
	Data_Set_LUT_tv_hs_A					Init of ***Data_Set_ LUT_tv_hs*** binary Data Set for ascending orbits	
13	***LUT_tv_hs_A***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*9 9 elements	$\tilde{B}_v^{(2)}\sin(2\varphi_i)$ harmonic amplitude V-pol for ascending orbits	INT
	Data_Set_LUT_tv_hs_A					End of ***Data_Set_ LUT_tv_hs***	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						binary Data Set for ascending orbits	
	Data_Set_LUT_th_symm_D					Init of binary ***Data_Set_LUT_th_symm_D*** Data Set for descending orbits	
14	***LUT_th_symm_D***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*9 9 elements	$\tilde{A}_h^{(0)}$ symmetric H-pol component for descending orbits	INT
	Data_Set_LUT_th_symm_D					End of binary ***Data_Set_LUT_th_symm_D*** Data Set for descending orbits	
	Data_Set_LUT_tv_symm_D					Init of binary ***Data_Set_LUT_tv_symm_D*** Data Set for descending orbits	
15	***LUT_tv_symm_D***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*9 9 elements	$\tilde{A}_v^{(0)}$ symmetric V-pol component for descending orbits	INT
	Data_Set_LUT_tv_symm_D					End of binary ***Data_Set_LUT_tv_symm_D*** Data Set for descending orbits	
	Data_Set_ LUT_th_hc_D					Init of binary ***Data_Set_ LUT_th_hc_D*** Data Set for descending orbits	
16	***LUT_th_hc_D***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*9 9 elements	$\tilde{A}_h^{(2)}$ cos(2φ'_W) harmonic amplitude H-pol for descending orbits	INT
	Data_Set_ LUT_th_hc_D					End of binary ***Data_Set_ LUT_th_hc_D*** Data Set for descending orbits	
	Data_Set_ LUT_tv_hc_D					Init of binary ***Data_Set_ LUT_tv_hc_D*** Data Set for descending orbits	
17	***LUT_tv_hc_D***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*9 9 elements	$\tilde{A}_v^{(2)}$ cos(2φ'_W) harmonic amplitude V-pol for descending orbits	INT
	Data_Set_ LUT_tv_hc_D					End of binary ***Data_Set_ LUT_tv_hc_D*** Data Set for descending orbits	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_ LUT_th_hs_D					Init of binary ***Data_Set_ LUT_th_hs_D*** Data Set for descending orbits	
18	***LUT_th_hs_D***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*9 9 elements	$\tilde{B}_h$ (2) sin(2φ'_W) harmonic amplitude H-pol for descending orbits	INT
	Data_Set_ LUT_th_hs_D					End of binary ***Data_Set_ LUT_th_hs_D*** Data Set for descending orbits	
	Data_Set_ LUT_tv_hs_D					Init of binary ***Data_Set_ LUT_tv_hs_D*** Data Set for descending orbits	
19	***LUT_tv_hs_D***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*9 9 elements	$\tilde{B}_h$ (2) sin(2φ'_W) harmonic amplitude V-pol for descending orbits	INT
	Data_Set_ LUT_tv_hs_D					End of binary ***Data_Set_ LUT_tv_hs_D*** Data Set for descending orbits	
	Data_Block					End of binary Data Block in the product.	

Table 5-53 Description of AUX_GAL2OS data record

5.4.10 Foam_LUT (AUX_FOAM__)

Several experiments have demonstrated that the presence of foam also increases the emitted brightness temperature at L-Band, since it acts as a transition layer that adapts the wave impedance of the two media: water and air. The increase depends on the fraction of the sea surface covered by foam and its thickness, which can be parametrized in terms of the local wind strength, but it depends as well on other factors, such as the air sea-temperature difference, the sea water temperature, the fetch….

The Foam model needs three LUTs for foam fraction F_foam and brightness temperature of foam in H and V polarisation directions (TB_foam(0) and TB_foam(1)). LUT for F_foam has two dimensions, WS, Tair-sea, and TB_foam(0) and TB_foam(1) have five dimensions: θ□□,SST, SSS, WS, Tair-sea.

5.4.10.1 Specific Product Header

The SPH for this ADF contains the field specified in Table 5-2 and the List of Data Sets included in Table 4-5

5.4.10.2 Data Block

The data record format is described in table below:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of binary Data Set containing the ***Max_Valid*** elements.	
01	***MaxValid***	Real array		float (4 bytes)	5 elements	Maximum valid LUT values for WS, Tair-sea, SSS, SST and θ	INT
	Max_Valid					End of binary Data Set containing the ***Max_Valid*** elements.	
	Min_Valid					Init of binary Data Set containing the ***Min_Valid*** elements.	
02	***MinValid***	Real array		float (4 bytes)	5 elements	Minimum valid LUT values for WS, Tair-sea, SSS, SST and θ	INT
	Min_Valid					End of binary Data Set containing the ***Min_Valid*** elements.	
	Data_Set_Sampling_dim1					Init of binary Data Set containing the ***Data_Set_Sampling_dim1*** elements.	
03	***Sampling_dim1***	Real array	$m.s^{-1}$	float (4 bytes)	31 elements	WS values of sampling	INT
	Data_Set_Sampling_dim1					End of binary Data Set containing the ***Data_Set_Sampling_dim1*** elements	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_Sampling_dim2					Init of binary Data Set containing the ***Data_Set_Sampling_dim2*** elements	
04	***Sampling_dim2***	Real array	K	float (4 bytes)	29 elements	Tsea_air values of sampling	INT
	Data_Set_Sampling_dim2					End of binary Data Set containing the ***Data_Set_Sampling_dim2*** elements	
	Data_Set_Sampling_dim3					Init of binary Data Set containing the ***Data_Set_Sampling_dim3*** elements	
05	***Sampling_dim3***	Real array	psu	float (4 bytes)	22 elements	SSS values of sampling	INT
	Data_Set_Sampling_dim3					End of binary Data Set containing the ***Data_Set_Sampling_dim3*** elements	
	Data_Set_Sampling_dim4					Init of binary Data Set containing the ***Data_Set_Sampling_dim4*** elements	
06	***Sampling_dim4***	Real array	K	float (4 bytes)	20 elements	SST values of sampling	INT
	Data_Set_Sampling_dim4					End of binary Data Set containing the ***Data_Set_Sampling_dim4*** elements	
	Data_Set_Sampling_dim5					Init of binary Data Set containing the ***Data_Set_Sampling_dim5*** elements	
07	***Sampling_dim5***	Real array	deg	float (4 bytes)	28 elements	Θ values of sampling	INT
	Data_Set_Sampling_dim5					End of binary Data Set containing the ***Data_Set_Sampling_dim5*** elements	
	Data_Set_Foam_Fraction					Init of binary Data Set containing the ***Data_Set_ Foam_Fraction*** elements	
08	***foam_fraction***	LUT 2 dimensional	N/A	float (4 bytes)	31*29	F_foam LUT (WS, $T_{sea\text{-}air}$)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_Foam_Fraction					End of binary Data Set containing the ***Data_Set_ Foam_Fraction*** elements	
	Data_Set_ Foam_tb_h					Init of binary Data Set containing ***Data_Set_ Foam_tb_h*** elements	
09	***Foam_tb_h***	LUT 5 dimensional	dl	float (4 bytes)	31*29*22*20 *28	TB_foam(0) LUT (WS, Tsea-air, SSS, SST, θ)	INT
	Data_Set_ Foam_tb_h					End of binary Data Set containing ***Data_Set_ Foam_tb_h*** elements	
	Data_Set_ Foam_tb_v					Init of binary Data Set containing ***Data_Set_ Foam_tb_v*** elements	
10	***Foam_tb_v***	LUT 5 dimensional	dl	float (4 bytes)	31*29*22*20 *28	TB_foam(1) LUT (WS, Tsea-air, SSS, SST, θ)	INT
	Data_Set_ Foam_tb_v					End of binary Data Set containing ***Data_Set_ Foam_tb_v*** elements	
	Data_Block					End of binary Data Block in the product.	

Table 5-54 Description of Foam_LUT data record

5.4.11 Sun Glint Contamination (AUX_SGLINT)

The sun is an extremely strong radiation source at L-Band, exhibiting a time-dependent blackbody temperature that ranges between 100000K and 10 million K, depending on the solar activity.

Two distinct mechanisms may contribute to the solar radiation intercepted by a radiometer antenna:

- The reflection of sun-radiations by the Earth-surface
- The direct sun contribution into the antenna, which is compensated by the L1 processor.

The Sun glint model needs four LUTs for bi-static scattering coefficients σHH, σVV, σVH, σHV All four LUTs have four dimensions: U*, θsun, φ, $\theta_{smos.}$

In these LUTs, θsun is the angle between zenith direction and target-to-Sun direction.

5.4.11.1 Specific Product Header

The SPH for this ADF contains the field specified in Table 5-2 and the List of Data Sets included in Table 4-5

5.4.11.2 Data Block

The following table shows the binary Data record format:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of binary Data Set containing the ***Max_Valid*** elements.	
01	***MaxValid***	real array		float (4 bytes)	4 elements	Maximum valid LUTs for WS, θ_{sun}, φ, θ_{smos}	INT
	Max_Valid					End of binary Data Set containing the ***Max_Valid*** elements.	
	Min_Valid					Init of binary Data Set containing the ***Min_Valid*** elements.	
02	***MinValid***	real array		float (4 bytes)	4 elements	Minimum valid LUTs for WS, θ_{sun}, φ, θ_{smos}	INT
	Min_Valid					End of binary Data Set containing general information on the Sunglintmap LUTs.	
	Data_Set_Sampling_dim1					Init of binary Data Set containing the ***Data_Set_Sampling_dim1*** elements.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
03	***Sampling_dim1***	real array	$m.s^{-1}$	float (4 bytes)	7 elements	WS values of sampling	INT
	Data_Set_Sampling_dim1					End of binary Data Set containing the ***Data_Set_Sampling_dim1*** elements.	
	Data_Set_Sampling_dim2					Init of binary Data Set containing the ***Data_Set_Sampling_dim2*** elements.	
04	***Sampling_dim2***	real array	deg	Float (4 bytes)	107 elements	θ_{sun} values of sampling	INT
	Data_Set_Sampling_dim2					End of binary Data Set containing the ***Data_Set_Sampling_dim2*** elements.	
	Data_Set_Sampling_dim3					Init of binary Data Set containing the ***Data_Set_Sampling_dim3*** elements.	
05	***Sampling_dim3***	real array	deg	float (4 bytes)	261 elements	φ values of sampling	INT
	Data_Set_Sampling_dim3					End of binary Data Set containing the ***Data_Set_Sampling_dim3*** elements.	
	Data_Set_Sampling_dim4					Init of binary Data Set containing the ***Data_Set_Sampling_dim4*** elements.	
06	***Sampling_dim4***	real array	deg	float (4 bytes)	107 elements	θ_{smos} values of sampling	INT
	Data_Set_Sampling_dim4					End of binary Data Set containing the ***Data_Set_Sampling_dim4*** elements.	
	Data_Set_ Sigma_HH					Init of binary Data Set containing the ***Data_Set_ Sigma_HH*** elements.	
07	***Sigma_HH***	LUT 4 dimensional	dl	float (4 bytes)	7*107*261*107	σHH LUT	INT
	Data_Set_ Sigma_HH					End of binary Data Set containing the ***Data_Set_ Sigma_HH*** elements.	
	Data_Set_ Sigma_HV					Init of binary Data Set containing the ***Data_Set_ Sigma_HV*** elements.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
08	***sigma_HV***	LUT 4 dimensional	dl	float (4 bytes)	7*107*261*107	σHV LUT	INT
	Data_Set_ Sigma_HV					End of binary Data Set containing the ***Data_Set_ Sigma_HV*** elements.	
	Data_Set_ Sigma_VH					Init of binary Data Set containing the ***Data_Set_ Sigma_VH*** elements.	
09	***Sigma_VH***	LUT 4 dimensional	dl	float (4 bytes)	7*107*261*107	σVH LUT	INT
	Data_Set_ Sigma_VH					End of binary Data Set containing the ***Data_Set_ Sigma_VH*** elements.	
	Data_Set_ Sigma_VV					Init of binary Data Set containing the ***Data_Set_ Sigma_VV*** elements.	
10	***sigma_VV***	LUT 4 dimensional	dl	float (4 bytes)	7*107*261*107	σVV LUT	INT
	Data_Set_ Sigma_VV					End of binary Data Set containing the ***Data_Set_ Sigma_VV*** elements.	
	Data_Block					End of binary Data Block in the product.	

Table 5-55 Description of Sunglint_LUT data record

5.4.12 Sun brightness (AUX_SUN_BT)

The Sun glint model need an estimated sun L-band brightness temperature.

5.4.12.1 Specific Product Header

The SPH for this ADF contains the field specified in Table 5-2 and the List of Data Sets included in Table 4-5

5.4.12.2 Data Block

The following table shows the binary Data record format:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Brightness_Temperature_List					Init of ***Brightness_Temperature_List*** Data Set	
01	***Sun_BT_Counter***	Counter	dl	unsigned integer (4 bytes)	1 element	Number of sun brighness temperature records	INT
	List_of_Brightness_Temperatures					Init of list of ***Brightness_Temperature*** data set record structures repeated ***Sun_BT_Counter*** times.	
	Brightness_Temperature					Init of ***Brightness_Temperature*** data set record structure	
02	***Date***	date	dl	unsigned integer (4 bytes)	1 elements	Date of estimated brighness temperature (yyyymmdd format)	INT
03	***Time***	date	s	unsigned integer (4 bytes)	1 elements	Time of estimated brighness temperature (seconds)	INT
04	***Sun_BT***	real value	K	Float (4 bytes)	1 element	Estimated brightness temperature	INT
	Brightness_Temperature					End of ***Brightness_Temperature*** data set record structure	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	List_of_Brightness_Temperatures					End of list of ***Brightness_Temperature*** data set record structures.	
	Brightness_Temperature_List					End of ***Brightness_Temperature_List*** Data Set	
	Data_Block					End of binary Data Block in the product.	

Table 5-56 Description of Sun brightness data record

5.4.13 Atmosphere_constants (AUX_ATMOS_)

Several components of the atmosphere are radiatively active, which generates effects to be accounted for in the Radiative Transfer Equation (RTE). The following atmospheric components are considered:

- Dry atmosphere, being the oxygen the radiatively active component
- Water vapour

5.4.13.1 Specific Product Header

The SPH for this ADF contains the field specified in Table 5-3.

5.4.13.2 Data Block

The atmospheric contamination model needs coefficients that are included in the atmosphere_constant data block.

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Data_Block***	Starting Tag				Init of Data Block in the product.	
02	***Atmosphere_constants***	Starting Tag				Init of Data Set containing the atmosphere_constant elements.	
03	***List_of_DT_H2O_Datas***	Starting Tag				Tag starting the list of ***DT_H2O_Datas*** XML structure with a "count" as attribute. Default=3 times	
04	***DT_H2O_coef***	real			%g	Coefficients for DTH2O computation.	CEC
05	***List_of_DT_H2O_Datas***	Ending Tag				Tag ending the list of ***DT_H2O_Datas*** XML structure.	
06	***List_of_DT_O2_Datas***	Starting Tag				Tag starting the list of ***DT_O2_Datas*** XML structure with a "count" as attribute. Default= 6 times.	
07	***DT_O2_coef***	real			%g	Coefficients for DTO2 computation.	CEC
08	***List_of_DT_O2_Datas***	Ending Tag				Tag ending the list of ***DT_O2_Datas*** XML structure.	
09	***List_of_tau_H2O_Datas***	Starting Tag				Tag starting the list of ***tau_H2O _Datas*** XML structure with a "count" as attribute. Default= 3 times.	
10	***tau_H2O_coef***	real			%g	Coefficients for tauH2O computation.	CEC
11	***List_of_ tau_H2O _Datas***	ending Tag				Tag ending the list of ***tau_H2O _Datas*** XML structure.	
12	***List_of_ tau_O2_Datas***	Starting Tag				Tag starting the list of ***tau_O2_Datas*** XML structure with a "count" as attribute. Default= 6 times.	
13	***tau_O2_coef***	real			%g	Coefficients for tauO2 computation.	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
14	***List_of_ tau_O2_Datas***	Ending Tag				Tag ending the list of ***tau_O2_Datas*** XML structure.	
15	***Atmosphere_constants***	Ending Tag				End of Data Set containing the atmosphere_constant elements.	
16	***Data_Block***	Ending Tag				End of Data Block in the product.	

Table 5-57 Description of Atmosphere_Constant data record

5.4.14 Maps and Configuration

5.4.14.1 Coast Distance Map (AUX_DISTAN)

The Data Block contains the following information: Grid point ID, flags and distance to coast line, thresholds for footprint elongation and length of semi-major axis of the ellipse and Ice climatology

5.4.14.1.1 Specific Product Header

The SPH for this ADF contains the field specified in Table 5-2 and the List of Data Sets included in Table 4-5

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Tag				Init of ***Specific Product Header*** structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2	

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
14	***Dland1***	Integer	Km	3 bytes	%3s	Lower Distance to coast used to set the Fg_Land_Sea_Coast1 in the product	Hard Coded
15	***Dland2***	Integer	Km	3 bytes	%3s	Highest Distance to coast used to set the Fg_Land_Sea_Coast2 in the product	Hard Coded
16-27	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
28	***Specific_Product_Header***	Tag				End of ***Specific Product Header*** structure	

5.4.14.1.2 Data Block

For Land_Sea_Coast1 and Land_Sea_Coast2 flags definition, thresholds Dland1 and Dland2 (being Dland1 and Dland 2 distances to coast in Km) will be defined later and may change during SMOS mission. Baseline is Dland1=40km and Dland2=200km. If Dland1 and Dland2 shall be modified often during validation and SMOS mission phases, they will be added to the processor configuration file. Land_Sea_Coast1 and Land_Sea_Coast2 will be computed on the fly by the processor using the Dist information.
For the land sea mask four categories are defined using two Booleans in order to represent the four states:

Land_Sea_Coast1	Land_Sea_Coast2	Categorie
false	false	Land
false	true	Water, with distance to coast<=Dland1
true	true	Water, with distance to coast between Dland1 and Dland2
true	false	Water, with distance to coast >Dland2,

The records are listed below:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Distan_Data					Init of binary Data Set containing the ***Distan_Data*** Data set.	
	List_of_Grid_Points					Start of list of structures in which the DGG is subdivided with a "counter" as attribute The number of Grid Points is fixed and equal to 2621442	
	Grid_Point					Start of ***Grid_Point*** data set record structure.	
01	***Grid_Point_ID***	identifier	N/A	unsigned integer (4 bytes)	1 element	Unique identifier for Earth fixed grid point.	INT
02	***Flag***	flag	N/A	Unsigned char (1 byte)	1 element	Flag with definitions below: Fg_Land_Sea_Coast1_tot: Land flag (to be combined with Fg_Land_Sea_Coast2_tot) Fg_Land_Sea_Coast2_tot: Land flag (to be combined with Fg_Land_Sea_Coast1_tot)	INT
03	***Dist***	real value	Km	float (4 bytes)	1 element	Distance to coastline	INT
04	***Tg_resol_max_ocean***	real value(code as integer)	Km	float (4 bytes)	1 element	Limit of acceptable resolution for coast ocean pixel or ocean pixel.	INT
05	***Sea_Ice_Mask***	Set of flags	dl	unsigned short (2 bytes)	1 element	Boolean. Ice Mask. Twelve bits one per month. January is 2^0 and December 2^{11}	INT
	Grid_Point					End of ***Grid_Point_Mask_Data*** data set record structure	
	List_of_Grid_Point					End of list of ***Grid_Point_Mask_Data*** data set record structures.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Distan_Data					End of binary Data Set containing the ***Distan_Data*** Data set.	
	Data_Block					End of binary Data Block in the product.	

Table 5-58 Coast Distance data record

5.4.14.2 SSS Climatology Map (AUX_SSS___)

This product provides the Sea Surface Salinity monthly mean value on the ISEA grid for ascending and descending orbits.

5.4.14.2.1 Specific Product Header

The SPH for this ADF contains the field specified in Table 5-2 and the List of Data Sets included in Table 4-5

5.4.14.2.2 Data Block

The following table shows the binary Data record format:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Data_Set_Climatology_LUT_A					Init of binary Data Set containing ***Data_Set_Climatology_LUT_A***	
	List_of_Grid_Point_Data_As					Init of ***List_of_Grid_Point_Datas*** structures. The number of grid points is fixed and equal to 2621442.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Grid_Point_Data_A					Init of ***Grid_Point_Data_A*** structure	
01	***Grid_Point_ID_A***	Identifie r	N/A	Unsigned integer (4 bytes)	1 element	Unique identifier for Earth fixed grid point.	INT
	List_of_Climatology_As					Init of ***List_of_Climatology_As*** structures. This is repeated 12 times.	
	Climatology_A					Start of ***Climatology_A*** data set record structure, repeated 12 times	
02	***SSSa***	Real value	psu	Unsigned integer (2 bytes)	1 element	SSS ascending orbit climatology (nominally from WOA2009), scaled by 1000.	INT
03	***SSSb***	Real value	psu	Unsigned integer (2 bytes)	1 element	SSS ascending orbit climatology (nominally from WOA2009), scaled by 1000.	INT
04	***SSSa_quality***	Real value	dl	Unsigned char (1 byte)	1 element	Quality metrics for SSSa (ascending orbits)	INT
05	***SSSb_quality***	Real value	dl	Unsigned char (1 byte)	1 element	Quality metrics for SSSb (ascending orbits)	INT
	Climatology_A					End of ***Climatology_A*** data set record structure	
	List_of_Climatology_As					End of ***List_of_Climatology_As*** structures.	
	Grid_Point_Data_A					End of ***Grid_Point_Data_A*** structure	
	List_of_Grid_Point_Data_As					End of ***List_of_Grid_Point_Datas*** structures.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_Climatology_LUT_A					End of binary Data Set containing the ***Data_Set_Climatology_LUT_A***	
	Data_Set_Climatology_LUT_D					Init of binary Data Set containing the ***Data_Set_Climatology_LUT_D***	
	List_of_Grid_Point_Data_Ds					Init of ***List_of_Grid_Point_Datas*** structures. The number of grid points is fixed and equal to 2621442.	
	Grid_Point_Data_D					Init of ***Grid_Point_Data_D*** structure	
06	***Grid_Point_ID_D***	Identifier	N/A	Unsigned integer (4 bytes)	1 element	Unique identifier for Earth fixed grid point.	INT
	List_of_Climatology_Ds					Init of ***List_of_Climatology_Ds*** structures. This is repeated 12 times.	
	Climatology_D					Start of ***Climatology_D*** data set record structure, repeated 12 times	
07	***SSSa***	Real value	psu	Unsigned integer (2 bytes)	1 element	SSS descending orbit climatology (nominally from WOA2009), scaled by 1000.	INT
08	***SSSb***	Real value	psu	Unsigned integer (2 bytes)	1 element	SSS descending orbit climatology (nominally from WOA2009), scaled by 1000.	INT
09	***SSSa_quality***	Real value	dl	Unsigned char (1 byte)	1 element	Quality metrics for SSSa (descending orbits)	INT
10	***SSSb_quality***	Real value	dl	Unsigned char (1 byte)	1 element	Quality metrics for SSSb (descending orbits)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Climatology_D					End of ***Climatology_D*** data set record structure	
	List_of_Climatology_Ds					End of ***List_of_Climatology_Ds*** structures.	
	Grid_Point_Data_D					End of ***Grid_Point_Data_D*** structure	
	List_of_Grid_Point_Data_Ds					End of ***List_of_Grid_Point_Datas*** structures.	
	Data_Set_Climatology_LUT_D					End of binary Data Set containing the ***Data_Set_Climatology_LUT_D***	
	Data_Block					End of binary Data Block in the product.	

Table 5-59 SSS Climatological LUT

5.4.14.3 Constants and LUTs used by the Auxiliary Data Processor (AUX_AGDPT_)

This file provides Auxiliary Geophysical Data Processor Tables

Please note that this file is not used by the L2OS processor. The plan is to use AUX_AGDPT with the prototype processor (given to the ESLs) during commissioning to investigate ways of improving salinity retrieval.

5.4.14.3.1 Specific Product Header

The SPH contains the fields included in Table 5-2 and the List of Data Sets specified in Table 4-5

5.4.14.3.2 Data Block

The following produts provide necessary Constants and LUTs used by the Auxiliary Data Processor.

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of ***Max_Valid*** binary data set	
01	***MaxValid***	Real array	dl	float (4 bytes)	Vector array of 4 elements	Maximum valid LUT values	
	Max_Valid					End of ***Max_Valid*** binary data set	
	Min_valid					Init of ***Min_Valid*** binary data set	
02	***MinValid***	Real array	dl	float (4 bytes)	Vector array of 4 elements	Minimum valid LUT values	
	Min_valid					End of ***Min_Valid*** binary data set	
	Data_Set_Sampling_dim1					Init of Sampling_dim1 data set	
03	***Sampling_dim1***	Real array	°	Float (4 bytes)	181 elements	Latitude values of sampling	
	Data_Set_Sampling_dim1					Init of Sampling_dim1 data set	
	Data_Set_Sampling_dim2					Init of Sampling_dim2 data set	
04	***Sampling_dim2***	Real array	°	Float (4 bytes)	361	Longitude values of sampling	
	Data_Set_Sampling_dim2					Init of Sampling_dim2 data set	
	Data_Set_Sampling_dim3					Init of Sampling_dim3 data set	
05	***Sampling_dim3***	Real array	month	Float (4 bytes)	12 elements	time values of sampling (12 months)	INT
	Data_Set_Sampling_dim4					End of Sampling_dim4 data set	
	Data_Set_Sampling_dim4					Init of ***Sampling_dim4*** data set	
06	***Sampling_dim4***	Real array	dl	Float (4 bytes)	16 elements	LUT values of sampling	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_Sampling_dim4					End of ***Sampling_dim4*** data set	
	Data_Set_LUT_bias1					Init of ***Data_Set_LUT_bias1*** binary data set	
07	***LUT_bias1***	LUT	dl	Float (4 bytes)	181*361*12*16	LUT for geophysical parameters bias1	
	Data_Set_LUT_bias1					End of ***Data_Set_LUT_bias1*** binary data set	
	Data_Set_LUT_bias2					Init of ***Data_Set_LUT_bias2*** binary data set	
08	***LUT_bias2***	LUT	dl	Float (4 bytes)	181*361*12*16	LUT for geophysical parameters bias2	
	Data_Set_LUT_bias2					End of ***Data_Set_LUT_bias2*** binary data set	
	Data_Set_LUT_sigabs					Init of ***Data_Set_LUT_sigabs*** binary data set	
09	***LUT_sigabs***	LUT	dl	Float (4 bytes)	181*361*12*16	LUT for geophysical parameter theoretical uncertainty (sigma)	
	Data_Set_LUT_sigabs					End of ***Data_Set_LUT_sigabs*** binary data set	
	Data_Set_LUT_sigrel					Init of ***Data_Set_LUT_sigrel***binary data set	
10	***LUT_sigrel***	LUT	dl	Float (4 bytes)	181*361*12*16	LUT for geophysical parameter theoretical uncertainty (sigma)	
	Data_Set_LUT_sigrel					End of ***Data_Set_LUT_sigrel*** binary data set	
	Data_Set_LUT_first					Init of ***Data_Set_LUT_first*** binary data set	
11	***LUT_first***	LUT	dl	Float (4 bytes)	181*361*12*16	LUT for geophysical parameter first guess	
	Data_Set_LUT_first					End of ***Data_Set_LUT_first*** binary data set	
	ParamName					Init of ***ParamName*** binary data set	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
12	***ParamName***	string	dl	String (12 bytes)	1 element	Geophysical parameter name. The last 2 characters of the logical file name processor version number (ie v2 & v3 in v1v2v3) encode the geophysical parameter index (as defined in AUX_CNFOSD/F) corresponding to the ParamName; v1 is set to "3".	
	ParamName					End of ***ParamName*** binary data set	
	Data_Block					End of binary Data Block in the product.	

Table 5-60 LUTs used by the auxiliary data processor for parameter initialisation

N	ind_XXX	Variable	Description
1	***ind_SST***	ind_SST	Index of sea surface temperature in p_tot_aux vector
2	***ind_SSS***	ind_SSS	Index of sea surface salinity in p_tot_aux vector
3	***ind_WS***	ind_WS	Index of wind module in p_tot_aux vector
4	***ind_WSn***	ind_WSn	Index of neutral wind module in p_tot_aux vector
5	***ind_phi_wsn***	ind_phi_wsn	Index of phi_wsn in p_tot_aux vector
6	***ind_Tsea_air***	ind_Tair_sea	Index of Tsea-air in p_tot_aux vector
7	***ind_UST***	ind_UST	Index of friction velocity from atmospheric model in p_tot_aux vector
8	***ind_OMEGA***	ind_omega	Index of the inverse wave age parameter in p_tot_aux vector
9	***ind_HS***	ind_HS	Index of wave height in p_tot_aux vector

N	ind_XXX	Variable	Description
10	***ind_MSQS***	ind_MSQS	Index of mean square slope in p_tot_aux vector
11	***ind_TAU***		Index of the optical thickness of air at the nadir
12	***ind_TatmEq***		Index of the atmospheric emission at the nadir
13	***ind_Tair***	ind_Tair	Index of Tair in p_tot_aux vector
14	***ind_TCWV***	ind_TCWV	Index of total column water vapour in p_tot_aux vector
15	***ind_tec***	ind_tec	Index of tec parameter in p_tot_aux vector
16	***ind_Tp***	ind_Tp	Index of mean period of wind waves in p_tot_aux vector
17	***ind_U***		
18	***ind_Uwav***	ind_Uwav	Index of wave model friction velocity in p_tot_aux vector
19	***ind_2mDT***	ind_2mDT	Index of 2 m dewpoint temperature
20	***ind_Cd***	ind_Cd	Index of drag coefficient with waves in p_tot_aux vector
21	***ind_phi_wind***	ind_phi_wind	Index of phi_wind in p_tot_aux vector
22	***ind_SHWW***	ind_SHWW	Index of significant height of wind waves in p_tot_aux vector
23	***ind_SLP***	ind_SLP	Index of sea level pressure
24	***ind_SP***	ind_SP	Index of surface pressure
25	***ind_UN10***	ind_UN10	Index of wind zonal component in p_tot_aux vector
26	***ind_VN10***	ind_VN10	Index of wind meridian component in p_tot_aux vector
27	***ind_WSwav***	ind_WSwav	Index of wave model 10 m wind speed in p_tot_aux vector
28	***ind_WS_U***	ind_WS_U	Index of wind zonal component in p_tot_aux vector
29	***ind_WS_V***	ind_WS_V	Index of wind meridian component in p_tot_aux vector
30	***ind_PP1D***		Index of the peak period of 1D spectrum
31	***ind_Rain***		Index of the rain rate parameter

N	ind_XXX	Variable	Description
32	***ind_ice_sea_conc***	ind_ice_sea_conc	Index of the sea ice concentration parameter
33	***ind_ZNT***		Index of the roughness length parameter
34	***ind_Acard***	ind_Acard	Index of Acard parameter (from cardioid model)
35	***ind_EWSS***	ind_EWSS	Index of eastward surface stress, accumulated since start of forecast
36	***ind_NSSS***	ind_NSSS	Index of northward surface stress, accumulated since start of forecast
37	***ind_NSLHF***	ind_NSLHF	Index of net downward latent heat flux, accumulated since start of forecast
38	***ind_SSHF***	ind_SSHF	Index of net downward sensible heat flux, accumulated since start of forecast
39	***ind_SSR***	ind_SSR	Index of net downward shortwave flux at surface, accumulated since start of forecast
40	***ind_STR***	ind_STR	Index of net downward thermal radiative flux at surface, accumulated since start of forecast

Table 5-61 List of parameters known by the processor

5.4.14.4 L2OS Auxiliary Configuration Parameters Product (AUX_CNFOSD, AUX_CNFOSF)

There are two separate L2OS Configuratuion Parameters Products: one for dual polarizarion (AUX_CNFOSD) and another for full polarization (AUX_CNFOSF). Both products provide configurable parameters for the L2OS processor.

Both configuration files have the same format. The only difference is that AUX_CNFOSD contains configuration settings for dual polarisation L1c input products, and AUX_CNFOSF is for full polarisation L1c input.

5.4.14.4.1 Specific Product Header

The SPH contains the fields specified in Table 5-3

5.4.14.4.2 Data Block

The Data Block consists on the following data sets, specified in XML ASCII:

- Iterative_Coef Data Set: The iterative scheme module needs coefficients that are included in the iterative_coef data set described below. Some of them are related to Prototype processor configuration. The Iterative Levenberg and Marquard is chosen to be used in the inversion algorithm. Depending on the forward model used for the roughness effect different parameters can be adjusted/ retrieved in the iterative convergence (SSS+up to 5). These parameters that influence the brightness temperature are SSS, SST, WS (or other wind descriptors), and depending on the cases, also significant wave height Hs, wind direction Φ, inverse wave age (Ω), and TEC parameter in case of not using first Stokes….

  Note that Np is the total number of retrieved parameters and Npt the total number of parameters
- Parameter_Index Data Set: each parameter is described by 5 fields:
  - The index field which gives the index number of the considered parameter
  - The name field which gives the acronym of the considered parameter
  - The nameLong field which gives the name of the considered parameter
  - The unit field which gives the unit of the considered parameter
  - The desc field which gives the description of the considered parameter
  - The origin field which gives from what file is the parameter extracted
  - The originID field gives the ID of the origin file.
- Thresholds Data Set: The purpose off the decision tree is to check the conditions of all the grid points and measurements coming from the L1c to decide processing them or not retrieve the salinity. A series of tests, with defined thresholds values, have to be run consecutively before applying the SSS retrieval algorithm to it.
- Physical_Constants Data Set: includes a list of physical constants used at various places in the processor
- Post-Processing Data Set: provide parameters to analize and check the output products

The AUX_CNFOSD/F product's Data Block specification is as follows:

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Data_Block***	Starting Tag				Init of Data Block in the product.	
02	***L2_OS_Configuration_Parameters***	Starting Tag				Init Data Set definition Tag. Start of Data Set XML structure containing the variables described below	
03	***Iterative_Scheme***	Starting Tag				Tag starting the Iterative_Scheme XML structure	
04	***List_of_Iterconf***	Starting Tag				Init of list of iterative scheme configurations, with a "count" as attribute. Tags embedded are repeated from 1 to 8times.	
05	***Iterative_Conf***	Starting Tag				Iterative scheme configuration	
06	***UDP_slot***	Integer	dl	4	%04d	Selects target UDP fields used to contain retrieval results (0 = not in UDP, 1 = SSS1, 2 = SSS2, 3 = SSS3, 4 = Acard).	
07	***DAP_slot***	Integer	dl	4	%04d	Selects target DAP fields used to contain retrieval results (0 = not in DAP, 1 = SSS1, 2 = SSS2, 3 = SSS3, 4 = Acard).	
08	***nRetrievedParam***	Integer	dl	4	%04d	Count of retrieved parameters specified by retrievedParamId (field #08) below	
09	***List_of_retrived_Parameters***	Starting Tag				Init of list of Retrieved_Parameters, with a “count” as attribute indicating the number of retrieved parameters. The tags embedded below are repeated 10 times Note that although there is an spelling error, the tag name is as actually written	
10	***retrievedParamId***	Integer	dl		%s	Acronym of the retrieved parameter in param vector, to be converted into the index on the parameter. “none” if	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						parameter not retrieved.	
11	***List_of_retrived_Parameters***	Ending Tag				End of list of Retrieved_Parameters.	
12	***List_of_First_Data***	Starting Tag				Init of list of first guesses for parameters to be retrieved with a "count" as attribute. Tags repeated 10 times.	
13	***First_guess***	Float	dl		%f	Value for first guess used if Guess_prior=true	
14	***List_of_First_Data***	Ending Tag				End of list of First Data.	
15	***List_of_Sigma_Data***	Starting Tag				Init of list of sigmas for priors for parameters to be retrieved with a "count" as attribute. Tags repeated 10 times.	
16	***Prior_error***	Starting Tag				Tag starting the Prior Error structure	
17	***Prior_error_abs***	Float	dl		%f	Absolute error of prior used if Guess_prior=true	
18	***Prior_error_rel***	Float	dl		%f	Relative error of prior used if Guess_prior=true	
19	***Prior_error***	Ending Tag				Tag ending the Prior Error structure	
20	***List_of_Sigma_Data***	Ending Tag				Tag ending the List of Sigma Data structure	
21	***sig_th_mod***	real	K		%g	TbH model error	
22	***sig_tv_mod***	real	K		%g	TbV model error	
23	***sig_t3_mod***	real	K		%g	Tb3 model error	
24	***sig_t4_mod***	real	K		%g	Tb4 model error	
25	***KappaDia***	real	dl		%g	Factor for multiplying Marquardt's diagonal Amplifier	
26	***lamdaIni***	real	dl		%g	Initial Marquardt's diagonal Amplifier	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
27	***deltasig***	real	dl		%g	Increment to sttd ratio for convergence test	
28	***deltaChi***	real	dl		%g	Chi variance ratio for convergence test	
29	***fCon***	real	dl		%g	Min admissible value for conditioning factor	
30	***List_of_Delta_Parameters***	Starting Tag				Init of list of Delta_Parameters, with a fixed “count” as attribute (=10) indicating the number of retrieved parameters	
31	***deltaP***	real	dl		%g	Small parameter variation in order to compute numerically partial derivative with retrieved parameters.	
32	***List_of_Delta_Parameters***	Ending Tag				End of list of Delta_Parameters, with a “count” as attribute indicating the number of retrieved parameters	
33	***itMax***	real	dl	4	%04d	Maximum number of iterations allowed	
34	***lamdaMax***	real	dl		%g	Max value of Marquardt diagonal Amplifier	
35	***Tg_num_meas_min***	Real	dl	2	%02d	Minimum number of valid measurements to perform retrieval	
36	***Switch_foam***	string	dl		%s	Boolean: “true” or “false” If false, no foam contribution is applied; if true, foam contribution is computed	
37	***RetrievalMode***	integer	dl	4	%04d	If==0, full polarization; if ==1 dual polarization from dual; if==2, dual polarization from full; if==3, Stokes 1 from dual; if ==4, Stokes 1 from full strategy 1; if=5, Stokes 1 from full strategy 2; if ==6, Stokes 1 form full strategy 3.	
38	***Switch_gal***	integer	dl	4	%04d	Switch for galactic noise computation. If = = 0, galactic noise from FOM_11; if = = 1, galactic noise from FOM_5; if = = 2 or -2, galactic noise from FOM_6	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
39	***Switch_roug***	integer	dl	4	%04d	Switch for roughness computation. If = = 1, roughness model n°1with linear interpolation; If = = -1, roughness model n°1with Hermit interpolation; If = = 2, roughness model n°2; If == 3, roughness model n°3	
40	***Switch_rough3***	integer	dl	4	%04d	Index of the roughness 3 model used by the processor	
41	***Switch_rough_harmonics***	string	dl		%s	Boolean: "true" or "false". Switch for roughness model 2. If = = false, 2nd order harmonics are not processed; if = = true, 2nd order harmonics are processed	
42	***Switch_err_mode***	string	dl		%s	Boolean: "true" or "false". If true, model error is taken into consideration in cost function computation and outlier detection.	
43	***Switch_store_gal***	string	dl		%s	Boolean: "true" or "false". If true, galactic noise computation from this model is written to the DAP fields Tb_gal_H/V	
44	***Switch_card***	integer	dl		%s	Boolean: "true" or "false" Switch for cardioid computation. If = = false, direct model begins with FOM_1; if = = true, direct model begins with FOM_10	
45	***Switch_ott***	Integer	dl	4	%04d	Index of the OTT used by the processor. 0 = no OTT, 1 = AUX_OTT1x_, 2 = AUX_OTT2x_, 3 = AUX_OTT3x_	
46	***Switch_ms***	Integer	dl	4	%04d	Switch to apply mixed scene (land-sea) correction to measurements before retrieval (0 = no mixed scene correction, 1 = apply mixed scene correction).	
47	***Switch_sunglint***	Integer	dl	4	%04d	Switch to compute sun glint as part of forward model (0 = no sun glint contribution, 1 = compute sun glint contribution).	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
48	***Delta_sn***	real	dl		%g	Maximum admissible time between two successive snapshot in order to compute Stokes 1	
49	***Tg_WS_roughness***	float	$m*s^{-1}$		%g	Min. WS to apply roughness correction	
50	***Tg_WS_foam***	float	$m*s^{-1}$		%g	Foam effect vanishes if WS<Tg_WS_foam	
51	***List_of_Guess_Datas***	Starting Tag				Init of list of Guess_Datas, with a fixed "count" as attribute (=10) indicating the number of retrieved parameters	
52	***Guess_prior***	string	dl		%s	Boolean: "true" or "false" If guess_prior(ip)=true, first guess of ip parameter is taken equal to the prior. If false, processor uses first guess LUTs for initialisation	
53	***List_of_Guess_Datas***	Ending Tag				End of list of Guess_Datas.	
54	***Iterative_Conf***	Ending Tag				End of Iterative_Configuration XML structure.	
55	***List_of_Iterconf***	Ending Tag				End of list of iterative scheme configurations.	
56	***Iterative_Scheme***	Ending Tag				Tag ending the Iterative_Scheme XML structure	
57	***Parameter_Index***	Starting Tag				Initial Data Set definition tag. Start of Data Set XML structure containing the variables described below	
58	***List_of_definitions***	Starting Tag				Tag starting a list of definitions for each parameter. It contains an attribute "count.	
59	***Geophy_Param***	Starting Tag				Tag starting Geophy_param structure. For each XXX param (see the table attached after this one), the following record structure.	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
60	***Ind_XXX***	Integer	dl	2	%02d	Index of XXX in p_tot aux vector. Each time this tag is repeated, the tag name changes with XXX taking the values listed in the table attached after this one.	
61	***Name***	string	dl	200	%s	Acronym of parameter	
62	***NameLong***	string	dl	200	%s	Name of the parameter	
63	***unit***	string	dl	200	%s	Unit of parameter	
64	***desc***	string	dl	200	%s	Parameter description	
65	***origin***	string	dl	200	%s	Origin of the parameter	
66	***originID***	string	dl	200	%s	Origin ID of the parameter	
67	***Geophy_Param***	Ending Tag				Tag ending the Geophy_param structure.	
68	***List_of_definitions***	Ending Tag				Tag ending a list of definitions for each parameter.	
69	***Parameter_Index***	Ending Tag				Tag ending the Parameter_Index structure.	
70	***Flags***	Starting Tag				Tag for flag definitions	
71	***List_of_L1c_measurement_flags***	Starting Tag				List of L1c measurement flag definitions. Tags embedded are repeated “count” times	
72	***Flag***	Starting Tag				For each flag the following record structure	
73	***Name***	string	dl	200	%s	Acronym of flag used in filters	
74	***Mask***	string	dl	10	%s	Hex bitmask for extracting the flag	
75	***Test***	string	dl	10	%s	Hex bitmask for testing the flag	
76	***Flag***	Ending Tag				Ending tag	
77	***List_of_L1c_measurement_flags***	Ending Tag				Ending tag	
78	***List_of_L2OS_measurement_flags***	Starting Tag				List of L2OS measurement flag definitions. Tags embedded are repeated “count” times (min 0, max 32).	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
79	***Flag***	Starting Tag				For each flag the following record structure	
80	***Name***	string	dl	200	%s	Acronym of flag used in filters	
81	***Mask***	string	dl	10	%s	Hex bitmask for extracting the flag	
82	***Test***	string	dl	10	%s	Hex bitmask for testing the flag	
83	***Flag***	Ending Tag				Ending tag	
84	***List_of_L2OS_measurement_flags***	Ending Tag				Ending tag	
85	***List_of_L2OS_control_flags***	Starting Tag				List of L2OS control flag definitions. Tags embedded are repeated “count” times (min 0, max 32).	
86	***Flag***	Starting Tag				For each flag the following record structure	
87	***Name***	string	dl	200	%s	Acronym of flag used in filters	
88	***Mask***	string	dl	10	%s	Hex bitmask for extracting the flag	
89	***Test***	string	dl	10	%s	Hex bitmask for testing the flag	
90	***Flag***	Ending Tag				Ending tag	
91	***List_of_L2OS_control_flags***	Ending Tag				Ending tag	
92	***List_of_L2OS_science_flags***	Starting Tag				List of L2OS science flag definitions. Tags embedded are repeated “count” times	
93	***Flag***	Starting Tag				For each flag the following record structure	
94	***Name***	string	dl	200	%s	Acronym of flag used in filters	
95	***Mask***	string	dl	10	%s	Hex bitmask for extracting the flag	
96	***Test***	string	dl	10	%s	Hex bitmask for testing the flag	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
97	***Flag***	Ending Tag				Ending tag	
98	***List_of_L2OS_science_flags***	Ending Tag				Ending tag	
99	***List_of_L2OS_out_of_range_flags***	Starting Tag				List of L2OS out-of-range flag definitions. Tags embedded are repeated "count" times	
100	***Flag***	Starting Tag				For each flag the following record structure	
101	***Name***	string	dl	200	%s	Acronym of flag used in filters	
102	***Mask***	string	dl	10	%s	Hex bitmask for extracting the flag	
103	***Test***	string	dl	10	%s	Hex bitmask for testing the flag	
104	***Flag***	Ending tag				Tag ending the Flag structure	
105	***List_of_L2OS_out_of_range_flags***	Ending Tag				Tag ending the List_of_L2OS_out_of_range_Flags	
106	***Flags***	Ending Tag				Tag ending the Flags structure	
107	***Filters***	Starting Tag				Tag starting the Filters structure	
108	***List_of_filters***	Starting Tag				Tag starting the List_of_filters	
109	***Filter***	Starting Tag				Tag starting the Filter structure	
110	***Name***	string	dl	200	%s	Filter name	
111	***Description***	string	dl	200	%s	Description of filter	
112	***List_of_tests***	Starting Tag				List of filter tests. Tags embedded are repeated "count" times	
113	***Reject***	string	dl		%s	Acronym of flag to test & filter (reject) if true	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
114	***List_of_tests***	Ending Tag				Tag ending the List_of_tests	
115	***Filter***	Ending Tag				Tag ending the Filter structure	
116	***List_of_filters***	Ending Tag				Tag ending the List_of_Filters	
117	***Filters***	Ending Tag				Tag ending the Filters structure	
118	***OTTPP***	Starting Tag				OTTPP settings	
119	***Switch_write_ott***	string	dl		%s	If 'true' AUX_DTBXY_ containing OTT deltaTBs will be generated, if 'false' no AUX_DTBXY_	
120	***SSS_ref***	integer	dl		%02d	Source of SSS reference for computing deltaTBs: 0 = climatology (AUX_SSS___), 1 = retrieved SSS1	
121	***Max_OTT_orbits***	integer	dl		%04d	Maximum number of orbits used by OSCOTT to compute OTTs per orbit direction	
122	***Min_Snapshots***	integer	dl		%04d	Minimum number of valid snapshots below which deltaTBs from AUX_DTBXY_ are ignored	
123	***L1_Software_Errors_Max_Percent***	float	dl		%g	Maximum % of valid snapshots flagged by L1 with software errors above which deltaTBs from AUX_DTBXY_ are ignored	
124	***L1_Instrument_Errors_Max_Percent***	float	dl		%g	Maximum % of valid snapshots flagged by L1 with instrument errors above which deltaTBs from AUX_DTBXY_ are ignored	
125	***L1_ADF_Errors_Max_Percent***	float	dl		%g	Maximum % of valid snapshots flagged by L1 with ADF errors above which deltaTBs from AUX_DTBXY_ are ignored	
126	***L1_Calibration_Errors_Max_Percent***	float	dl		%g	Maximum % of valid snapshots flagged by L1 with calibration errors above which deltaTBs from	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						AUX_DTBXY_ are ignored	
127	***TBs_Out_Of_Range_Max_Percent***	float	dl		%g	Maximum % of valid snapshots flagged by L2 with TBs out-of-range above which deltaTBs from AUX_DTBXY_ are ignored	
128	***High_Std_Max_Percent***	float	dl		%g	Maximum % of valid snapshots flagged by L2 as high std above which deltaTBs from AUX_DTBXY_ are ignored	
129	***High_Std_Stokes3_Max_Percent***	float	dl		%g	Maximum % of valid snapshots flagged by L2 as high std Stokes 3 above which deltaTBs from AUX_DTBXY_ are ignored	
130	***High_Std_Stokes4_Max_Percent***	float	dl		%g	Maximum % of valid snapshots flagged by L2 as high std Stokes 4 above which deltaTBs from AUX_DTBXY_ are ignored	
131	***Min_Measurements***	integer	dl		%04d	Minimum number of valid measurements below which deltaTBs from AUX_DTBXY_ are ignored	
132	***L1_Sun_Tails_Max_Percent***	float	dl		%g	Maximum % of valid measurements flagged by L1 as sun tails above which deltaTBs from AUX_DTBXY_ are ignored	
133	***Sun_Glint_Max_Percent***	float	dl		%g	Maximum % of valid measurements flagged by L1 or L2 as sun glint above which deltaTBs from AUX_DTBXY_ are ignored	
134	***Moon_Glint_Max_Percent***	float	dl		%g	Maximum % of valid measurements flagged by L2 as moon glint above which deltaTBs from AUX_DTBXY_ are ignored	
135	***L2_Gal_Noise_Max_Percent***	float	dl		%g	Maximum % of valid measurements flagged by L2 as galactic noise above which deltaTBs from AUX_DTBXY_	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						are ignored	
136	***L1_RFI_Max_Percent***	float	dl		%g	Maximum % of valid measurements flagged by L1 as RFI above which deltaTBs from AUX_DTBXY_ are ignored	
137	***L2_RFI_Max_Percent***	float	dl		%g	Maximum % of valid measurements flagged by L2 as RFI above which deltaTBs from AUX_DTBXY_ are ignored	
138	***Max_XX_AFFOV_StdRa***	float	K		%g	Maximum std/ra in AFFOV XX pol above which deltaTBs from AUX_DTBXY_ are ignored	
139	***Max_XX_EAFFOV_StdRa***	float	K		%g	Maximum std/ra in EAFFOV XX pol above which deltaTBs from AUX_DTBXY_ are ignored	
140	***Max_YY_AFFOV_StdRa***	float	K		%g	Maximum std/ra in AFFOV YY pol above which deltaTBs from AUX_DTBXY_ are ignored	
141	***Max_YY_EAFFOV_StdRa***	float	K		%g	Maximum std/ra in EAFFOV YY pol above which deltaTBs from AUX_DTBXY_ are ignored	
142	***Max_Stokes3_AFFOV_StdRa***	float	K		%g	Maximum std/ra in AFFOV Stokes3 above which deltaTBs from AUX_DTBXY_ are ignored	
143	***Max_Stokes3_EAFFOV_StdRa***	float	K		%g	Maximum std/ra in EAFFOV Stokes3 above which deltaTBs from AUX_DTBXY_ are ignored	
144	***Max_Stokes4_AFFOV_StdRa***	float	K		%g	Maximum std/ra in AFFOV Stokes4 above which deltaTBs from AUX_DTBXY_ are ignored	
145	***Max_Stokes4_EAFFOV_StdRa***	float	K		%g	Maximum std/ra in EAFFOV Stokes4 above which deltaTBs from AUX_DTBXY_ are ignored	
146	***OTT_Strategy***	integer	dl		%02d	Strategy used by OSCOTT to compute OTTs: 1 = mean, 2= gaussian mean (nominally 1)	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
147	***OTT_Merge_FP***	integer	dl		%02d	OTT full polarisation merging: 0=no merging, 1=merge long & short XX/YY OTTs, 2=merge cross-pol Stokes 3 & 4 OTTs, 3 = both 1 & 2 (long/short & Stokes3/4)	
148	***Merge_weight***	float	dl		%g	Weight to use when merging short XX/YY with long integration time XX/YY OTTs	
149	***OTT_Validity_Start***	integer	dl		%02d	Strategy for computing OTT & DTBCUR validity start time: 1 = first snapshot, 2 = mean (last-first snapshot), 3 = last snapshot, 4 = validity start of first snapshot orbit	
150	***OTT_Interpolation***	integer	dl		%02d	OTT interpolation option (0=nearest neighbour, 1=bilinear interpolation)	
151	***List_of_regions***	Starting tag				Start of list of regions. Tags embedded are repeated “count” times.	
152	***Name***	string	dl		%s	User name for region	
153	***ID***	Integer	dl		%04d	Unique region ID (9001 = OTT ascending diamond region, 9002 = OTT descending diamond region)	
154	***Type***	string	dl		%s	Type of region: ‘OTT’ = apply OTT filters, ‘REG’ = general purpose region of interest	
155	***Orbit_Dir***	char	dl		%c	Select region only if matching orbit direction: ‘A’, ‘D’, or ‘?’ (= don’t care).	
156	***Start_Lat***	float	deg		%g	Region start latitude	
157	***End_Lat***	float	deg		%g	Region end latitude (> Start_Lat)	
158	***Centre_Long_At_Start_Lat***	float	deg		%g	Central longitude at start latitude	
159	***Centre_Long_At_End_Lat***	float	deg		%g	Central longitude at end latitude	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
160	***Long_Width***	float	deg		%g	Width of longitude	
161	***Min_Snapshots***	float	dl		%g	Minimum number of snapshots to trigger writing region to AUX_DTBXY_	
162	***Min_Percent_Snapshot_Measurements***	float	dl		%g	Minimum percentage of measurements in a snapshots to trigger writing region to AUX_DTBXY_	
163	***Min_Percent_Valid_Snapshots***	float	dl		%g	Minimum percentage of valid snapshots to trigger writing region to AUX_DTBXY_	
164	***Min_Grid_Points***	float	dl		%g	Minimum number of grid points to trigger writing region to AUX_DTBXY_	
165	***Min_Percent_Valid_Grid_Points***	float	dl		%g	Minimum percentage of valid grid points to trigger writing region to AUX_DTBXY_	
166	***List_of_regions***	Ending tag				Ending tag	
167	***OTTPP***	Ending tag				Ending tag	
168	***A3TEC***	Starting tag				Start of A3TEC list	
169	***TEC_OTT_Strategy***	integer	dl		%02d	Strategy for extracting TEC for OTT/DTBXY generation: 0 = use L1c TEC, 1 = extract from Stokes3 for descending orbits only, 2 = extract from Stokes3 for both ascending & descending orbits	
170	***TEC_Retrieval_Strategy***	integer	dl		%02d	Strategy for extracting TEC for salinity retrievals: 0 = use L1c TEC, 1 = extract from Stokes3 for descending orbits only, 2 = extract from Stokes3 for both ascending & descending orbits	
171	***Earth_Radius***	float	km		%g	Radius of the earth (nominally 6371.0)	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
172	***SMOS_altitude***	float	km		%g	Altitude of SMOS (nominally 796.0)	
173	***TEC_altitude***	float	km		%g	Assumed altitude of TEC (nominally 400.0)	
174	***xiMin***	float	dl		%g	Lower xi limit for selecting measurements in the A3 FOV for TEC estimation	
175	***xiMax***	float	dl		%g	Upper xi limit for selecting measurements in the A3 FOV for TEC estimation	
176	***etaMin***	float	dl		%g	Lower eta limit for selecting measurements in the A3 FOV for TEC estimation	
177	***etaMax***	float	dl		%g	Upper eta limit for selecting measurements in the A3 FOV for TEC estimation	
178	***maxdA3***	float	K		%g	Upper limit for A3TEC measurement selection	
179	***xiTEC***	float	deg		%g	Correlation length for TEC estimation (by latitude)	
180	***latWinSize***	float	deg		%g	Size of the latitude window for computing A3TEC error	
181	***sigOTT***	float	K		%g	Sigma prior for A3TEC OTT estimation	
182	***sigTEC0***	float	tecu		%g	Sigma prior for A3TEC TEC estimation	
183	***sigTEC1***	float	dl		%g	A3 retrieved TEC smoothing factor	
184	***Snapshot_Window_Min***	integer	dl		%02d	Minimum number of snapshots for computing A3TEC std(TB) in the latitudinal window, below which Default_A3Sig is used	
185	***Default_A3Sig***	float	dl		%g	Default A3 sigma used if too few snapshots	
186	***Switch_A3msOTT***	integer	dl		%04d	Switch for applying mixed scene (land-sea) correction to Stokes 3 measurements when computing A3TEC for extracting OTT/DTBXY deltaTBs (0 = no correction, 1 =	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						apply correction).	
187	***Switch_A3ms***	integer	dl		%04d	Switch for applying mixed scene (land-sea) correction L1c TBs before computing A3TEC for salinity retrievals (0 = no correction, 1 = apply correction).	
188	***A3TEC***	Ending tag				Ending tag	
189	***Thresholds***	Starting Tag				Init of Data Set containing the Thresholds elements.	
190	***Switch_iterative_scheme***	string	dl		%s	Boolean: "true" or "false". Switch for skipping iterative scheme (eg when running L2OS just to extract AUX_DTBXY_): true = execute, false = skip	
191	***Switch_OTT_AscDes***	Boolean	dl		%s	Boolean: "true" or "false". If true, OTT with double sections (ascending & descending) are expected in the job order.	
192	***Switch_GN2_AscDes***	Boolean	dl		%s	Boolean: "true" or "false". If true, AUX_GAL2OS with double sections (ascending & descending) are expected in the job order.	
193	***nsig***	Real	dl		%g	Sigma value from which measurement becomes an outlier	
194	***RFI_std***	Real	dl		%g	Standard deviation value above which measurements are considered at risk of RFI contamination	
195	***RFI_nsig***	Real	dl		%g	Sigma value from which measurement becomes suspected of RFI contamination	
196	***RFI_c1***	Real	dl		%g	Cooefficient used to adjust measurement radiometric accuracy from the current RFI LUT AUX_DGGRFI	
197	***RFI_c2***	Real	dl		%g	Cooefficient used to adjust measurement radiometric	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						accuracy from the current RFI LUT AUX_DGGRFI	
198	***Tg_gal_noise_max***	integer	dl	2	%02d	Minimum % of measurements flagged for galactic noise to flag a grid point.	
199	***Tg_WS_gal***	Real	m.s-1		%g	WS below this threshold lead to the discarding of measurements contaminated by erroneous galactic noise	
200	***Tg_high_SSS***	real	psu		%g	Boundary between “medium SSS” and “high SSS”	
201	***Tg_high_SST***	real	K		%g	Boundary between “medium SST” and “high SST”	
202	***Tg_high_wind***	real	m.s-1		%g	Boundary between “medium wind” and “high wind”	
203	***Tg_ice_concentration***	real	dl		%g	Maximum % of ice concentration for retrieval execution	
204	***Tg_low_SSS***	real	psu		%g	Upper limit for very low SSS	
205	***Tg_low_SST***	real	K		%g	Upper limit for very low SST	
206	***Tg_low_SST_ice***	real	K		%g	Temperature under which ice could be present (Kelvin)	
207	***Tg_low_wind***	real	m.s-1		%g	Upper limit for low wind speed	
208	***Tg_medium_SSS***	real	psu		%g	Boundary between “low SSS” and “medium SSS”	
209	***Tg_medium_SST***	real	K		%g	Boundary between “low SST” and “medium SST”	
210	***Tg_medium_wind***	real	m.s-1		%g	Boundary between“low wind” and “medium wind”	
211	***Tg_moonglint_max***	integer	dl	2	%02d	Percentage of measurements flagged for moonglint above which Fg_ctrl_moonglint is set	
212	***Tg_num_meas_valid***	integer	dl	2	%02d	Threshold of number of valid measurements	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
213	***Tg_num_meas_outliers_min***	integer	dl	2	%02d	Minimum number of measurements per polarisation for applying the measurement outlier test	
214	***Tg_num_meas_RFI_outliers_min***	integer	dl	2	%02d	Minimum number of measurements per polarisation for applying the RFI measurement outlier test	
215	***Tg_num_outliers_max***	integer	dl	2	%02d	Percentage of measurements flagged for outliers above which Fg_ctrl_many_outliers is set	
216	***Tg_num_RFI_max***	integer	dl	2	%02d	Percentage of measurements flagged for RFI contamination above which Fg_ctrl_suspect_RFI is set	
217	***Tg_num_RFI_outlier_max***	integer	dl	2	%02d	Percentage of measurements flagged for possible by RFI outlier detection above which Fm_L2_RFI_outlier is set	
218	***Tg_current_RFI_max_X***	integer	dl	2	%02d	Minimum percentage for a grid point in the current RFI LUT AUX_DGGRFI, used to set Fg_ctrl_rfi_prone_X to indicate likely contamination by X polarisation RFI	
219	***Tg_current_RFI_max_Y***	integer	dl	2	%02d	Minimum percentage for a grid point in the current RFI LUT AUX_DGGRFI, used to set Fg_ctrl_rfi_prone_Y to indicate likely contamination by Y polarisation RFI	
220	***Tg_suspect_ice***	real	dl		%g	Percentage of measurements above which presence of ice is suspected.	
221	***Tg_Sunglint_max***	integer	dl		%g	Minimum % of measurements flagged for sunglint to flag a grid point.	
222	***Tg_max_rainfall***	real	m.s-1		%g	Limit of acceptable rain.	
223	***Tg_TEC_gradient***	real	tecu		%g	Threshold for TEC gradient.	
224	***Tg_lat_ice_Acard***	Real	º		%g	Latitude min for ice detection from Acard model.	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
225	***Tg_SST_ice_Acard***	Real	K		%g	SST threshold for ice detection from Acard model.	
226	***Tg_Acard_ice***	Real	dl		%g	Acard threshold for ice detection	
227	***Tg_fara_meas_min***	string	dl		%s	Threshold for % of non-interpolated measurements extracted from AUX_FARA_x: above this threshold TEC for valid measurements on this grid point are obtained from AUX_FARA_x; otherwise from L1c.	
228	***Tg_swell***	integer	dl		%2d	Threshold % above which sea state is classified as swell dominated; otherwise sea state is wind waves dominated	
229	***Tg_old_sea***	Real	dl		%g	Threshold fraction for old waves: if omega is below this threshold waves are old	
230	***Tg_young_sea***	Real	dl		%g	Threshold fraction for young waves: if omega is above this threshold waves are young	
231	***Tm_angle_moon***	real	°		%g	Limit of acceptable angle between the specular direction and the moon direction.	
232	***Tm_DT_ice***	Real	K		%g	Threshold of difference between actual and flat sea model brightness temperatures above which ice contamination is suspected (fm_suspect_ice = =true)	
233	***Tm_high_gal_noise***	real	K		%g	High galactic noise boundary	
234	***Tm_high_sun_glint***	real	K		%g	Boundary between “mediun sunglint” and “high sunglint”	
235	***Tm_low_sun_glint***	real	K		%g	Upper limit for no sunglint.	
236	***Tm_max_GN_error***	real	K		%g	Limit of acceptable galactic background error.	
237	***Tm_medium_sun_glint***	real	K		%g	Boundary between “low sun glint” and “medium sun glint”	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
238	***Tm_out_of_range_affov***	real	K		%g	Limit for delta TB out of range detection for XX and YY polarisation measurements in AFFOV	
239	***Tm_out_of_range_eaffov***	real	K		%g	Limit for delta TB out of range detection for XX and YY polarisation measurements in EAFFOV	
240	***Tm_out_of_range_stokes3_affov***	real	K		%g	Limit for delta TB Stokes 3 out of range detection in AFFOV	
241	***Tm_out_of_range_stokes3_eaffov***	real	K		%g	Limit for delta TB Stokes 3 out of range detection in EAFFOV	
242	***Tm_out_of_range_stokes4_affov***	real	K		%g	Limit for delta TB Stokes 4 out of range detection in AFFOV	
243	***Tm_out_of_range_stokes4_eaffov***	real	K		%g	Limit for delta TB Stokes 4 out of range detection in EAFFOV	
244	***Tm_sun_limit***	real	K		%g	Limit of acceptable sunglint contamination	
245	***Tm_fara_delta_angle_max***	real	º		%g	Limit of error between targ2SatZenithAngle & AUX_FARA_x faraday rotation angle before needing interpolation	
246	***Ts_snapshot_out_of_range***	real	dl		%g	Maximum proportion of land/ice within a snapshot, below which all measurements are discarded (fm_l2_rfi_snapshot_out_of_range set) if any have fm_out_of_range set.	
247	***Ts_meas_min***	real	%		%g	Minimum % of measurements in a snapshot for computing snapshot standard deviations.	
248	***Ts_std***	real	K		%g	Limit for snapshot XX/YY standard deviation of deltaTB/radiometric accuracy, above which all	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						measurements in snapshot are discarded (fm_l2_rfi_high_snapshot_std set).	
249	***Ts_std_stokes3***	real	K		%g	Limit for snapshot Stokes 3 standard deviation of deltaTB/radiometric accuracy, above which all measurements in snapshot are discarded (fm_l2_rfi_high_snapshot_std_stokes3 set).	
250	***Ts_std_stokes4***	real	K		%g	Limit for snapshot Stokes 4 standard deviation of deltaTB/radiometric accuracy, above which all measurements in snapshot are discarded (fm_l2_rfi_high_snapshot_std_stokes4 set).	
251	***Ts_scene_std1_XX***	real	K		%g	Limit for delta standard deviation of 1 epoch scene in XX, above which scene is discarded (fm_l2_rfi_scene_contamination set).	
252	***Ts_scene_std1_YY***	real	K		%g	Limit for delta standard deviation of 1 epoch scene in YY, above which scene is discarded (fm_l2_rfi_scene_contamination set).	
253	***Ts_scene_std1_eaf_XX***	real	K		%g	Limit for delta standard deviation of 1 epoch EAF part of scene in XX, above which EAF part of scene is discarded (fm_l2_rfi_scene_contamination set).	
254	***Ts_scene_std1_eaf_YY***	real	K		%g	Limit for delta standard deviation of 1 epoch EAF part of scene in YY, above which EAF part of scene is discarded (fm_l2_rfi_scene_contamination set).	
255	***Ts_scene_std3_XX***	real	K		%g	Limit for delta standard deviation of 3 epoch scene in XX, above which scene is discarded (fm_l2_rfi_scene_contamination set).	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
256	***Ts_scene_std3_YY***	real	K		%g	Limit for delta standard deviation of 3 epoch scene in YY, above which scene is discarded (fm_l2_rfi_scene_contamination set).	
257	***Ts_scene_std3_eaf_XX***	real	K		%g	Limit for delta standard deviation of 3 epoch EAF part of scene in XX, above which EAF part of scene is discarded (fm_l2_rfi_scene_contamination set).	
258	***Ts_scene_std3_eaf_YY***	real	K		%g	Limit for delta standard deviation of 3 epoch EAF part of scene in YY, above which EAF part of scene is discarded (fm_l2_rfi_scene_contamination set).	
259	***Ts_scene_high_TB***	real	K		%g	Limit for TBs in any part of a scene, above which scene is discarded (fm_l2_rfi_scene_contamination set).	
260	***Thresholds***	Ending Tag				Tag ending Thresholds structure	
261	***Physical_constants***	Starting Tag				Tag starting Physical constants structure	
262	***Freq_smos***	Real	GHz		%g	High frequency limit value of relative dielectric constant	
263	***T0***	real	K		%g	Temperature at 0 Celsius degrees.	
264	***epsilonInf***	real	dl		%g	High frequency limits value of relative dielectric constant.	
265	***Epsilon0***	Real	Fm^{-1}		%g	Permitivity of free space	
266	***Fac_omega***	real	dl		%g	Ω factor	
267	***g***	real	Ms^{-2}		%g	Acceleracion of free fall	
268	***Orbit_duration***	real	s		%g	Orbit duration	
269	***Omega_sun***	real	strad		%g	Apparent solid angle of the sun seen from the Earth	
270	***Cst_far***	real	dl		%g	Faraday constant (=6950)	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
271	***Ucard***	real	º		%g	Ucard parameter	
272	***Bcard***	real	dl		%g	Bcard paramenter	
273	***TB_gal_mean***	real	K		%g	Value of the constant incident galactic noise.	
274	***TB_sun***	real	K		%g	Default sun brightness temperature	
275	***Physical_constants***	Ending Tag				End of Data Set containing the Physical_Constants	
276	***Post_processing***	Starting Tag				Init of Data Set containing the constants post processing elements.	
277	***Tg_Chi2_P_max***	real	dl		%g	Maximum admissible value for Dg_chi2_P. Note that Dg_chi2_P in the UDP is scaled by multiplying by 1000. Tg_Chi2_P_max is not scaled.	
278	***Tg_Chi2_P_min***	real	dl		%g	Minimum admissible value for Dg_chi2_P. Note that Dg_chi2_P in the UDP is scaled by multiplying by 1000. Tg_chi2_P min is not scaled.	
279	***Tg_chi2***	real	dl		%g	Threshold to set the quality flag of the retrieval process	
280	***Tg_sigma_max***	real	psu		%g	Maximum SSS retrieved sigma acceptable	
281	***Tg_SSS_max***	real	psu		%g	Maximum salinity acceptable	
282	***Tg_SSS_min***	real	psu		%g	Minimum salinity acceptable	
283	***dT_dS_0***	real	psu.K-1		%g	Zero order of sensitivity dS_dT	
284	***dT_dS_1***	real	psu.K-1.C-1		%g	Fist order of sensitivity dS_dT with respect to SST	
285	***Tg_Acard_max***	Real	dl		%g	Maximum value of valid retrieved Acard.	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
286	*Tg_Acard_min*	Real	dl		%g	Minimum value of valid retrieved Acard.	
287	*Tg_sigma_Acard_max*	Real	dl		%g	Maximum value of sigma of valid retrieved Acrd	
288	*Tg_coast*	Real	dl		%g	Limit for coast quality computation	
289	*Tg_near_land*	Real	dl		%g	Limit for near to land quality computation	
290	*Generate_DAP*	string	dl		%s	Boolean: if true, OSDAP2 is generated; if false, not OSDAP2 is written	
291	*SC11*	real	dl		%g	Scale factor for C(1) global quality index computation	
292	*SC21*	real	K		%g	Scale factor for C(2) global quality index computation	
293	*SC22*	real	$K.k.m^{-1}$		%g	Scale factor for C(3) global quality index computation	
294	*SC23*	real	K		%g	Scale factor for C(4) global quality index computation	
295	*SC24*	real	K		%g	Scale factor for C(5) global quality index computation	
296	*SC25*	real	dl		%g	Scale factor for C(6) global quality index computation	
297	*SC26*	real	K		%g	Scale factor for C(7) global quality index computation	
298	*SC27*	real	K		%g	Scale factor for C(8) global quality index computation	
299	*SC28*	real	dl		%g	Scale factor for C(9) global quality index computation	
300	*SC31*	real	dl		%g	Scale factor for C(10) global quality index computation	
301	*SC32*	real	dl		%g	Scale factor for C(11) global quality index computation	
302	*SC33*	real	dl		%g	Scale factor for C(14) global quality index computation	
303	*SC34*	real	dl		%g	Scale factor for C(15) global quality index computation	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
304	***SC35***	real	dl		%g	Scale factor for C(16) global quality index computation	
305	***SC36***	real	dl		%g	Scale factor for C(17) global quality index computation	
306	***SC41***	real	dl		%g	Scale factor for C(19) global quality index computation	
307	***SC42***	real	dl		%g	Scale factor for C(20) global quality index computation	
308	***SC43***	real	dl		%g	Scale factor for C(21) global quality index computation	
309	***SC44***	real	dl		%g	Scale factor for C(22) global quality index computation	
310	***SC45***	real	dl		%g	Scale factor for C(23) global quality index computation	
311	***SC46***	real	dl		%g	Scale factor for C(24) global quality index computation	
312	***SC47***	real	dl		%g	Scale factor for C(25) global quality index computation	
313	***SC48***	real	dl		%g	Scale factor for C(26) global quality index computation	
314	***SC49***	real	dl		%g	Scale factor for C(27) global quality index computation	
315	***SC50***	real	dl		%g	Scale factor for C(28) global quality index computation	
316	***SC51***	real	dl		%g	Scale factor for C(29) global quality index computation	
317	***SC52***	real	dl		%g	Scale factor for C(30) global quality index computation	
318	***SC53***	real	dl		%g	Scale factor for C(31) global quality index computation	
319	***SC54***	real	dl		%g	Scale factor for C(32) global quality index computation	
320	***SC55***	real	dl		%g	Scale factor for C(33) global quality index computation	
321	***SC56***	real	dl		%g	Scale factor for C(34) global quality index computation	
322	***SC57***	real	psu		%g	Threshold for setting Fg_ctrl_contaminated	
323	***Anomaly_SSS***	integer	dl		%02d	Selects retrieval configuration (1-5) used to compute	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						salinity anomaly (SSS_anom)	
324	***Anomaly_Ref***	integer	dl		%02d	Selects reference salinity from AUX_SSS___, used to compute salinity anomaly (0 = 35 psu, 1 = SSSa, 2 = SSSb)	
325	***SSS_Climatology***	integer	dl		%02d	Selects reference salinity from AUX_SSS___, used as initial salinity geophysical value, & written into UDP field SSS_Climatology (0 = 35 psu, 1 = SSSa, 2 = SSSb)	
326	***Post_ processing***	Ending Tag				End of Data Set containing the constants post processing elements.	
327	***Quality_Thresholds***	Starting Tag				Tag starting the Quality_Thresholds structure containing the information detailed below	
328	***Tg_Qual_Low_SSS***	Real	psu		%g	Below this threshold grid points are classified as low SSS	
329	***Tg_Qual_High_SSS***	Real	psu		%g	Above this threshold grid points are classified as low SSS	
330	***Tg_Qual_Low_SSS***	Real	K		%g	Below this threshold grid points are classified as low SST	
331	***Tg_Qual_High_SSS***	Real	K		%g	Above this threshold grid points are classified as low SSS	
332	***Tg_Qual_Low_WS***	Real	$m.s^{-1}$		%g	Below this threshold grid points are classified as low WS	
333	***Tg_Qual_High_WS***	Real	$m.s^{-1}$		%g	Above this threshold grid points are classified as low WS	
334	***Quality_Thresholds***	Ending Tag				Tag ending the Overall_Quality_Thresholds structure.	
335	***L2_OS_Configuration_Parameters***	Ending Tag				Tag Ending L2_OS Configuration_Parameters structure	
336	***Data_Block***	Ending Tag				End of Data Block in the product.	

Table 5-62 L2OS Configuration Constants

5.4.14.5 Ocean Target Transformation for Dual Polarization (AUX_OTT1D_, AUX_OTT2D_, AUX_OTT3D_)

Ocean Target Transformation LUTs are derived by ESL using each of the forward models to correct L1c TBs by integrating the difference between a forward model and measured TBs for a number of selected orbits. It is likely this approach will need to be refined, especially near land.

5.4.14.5.1 Specific Product Header

The SPH follows the format described in section 5.1.2

5.4.14.5.2 Data Block

The following table shows the binary data record format for the data defined to process the dual polarization mode:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of binary Data Set containing the Max_Valid elements.	
01	***MaxValid***	real array		Float (4 bytes)	2 elements	Maximum valid LUT values	INT
	Max_Valid					End of binary Data Set containing the Max_Valid elements.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Min_Valid					Init of binary Data Set containing the Min_Valid elements.	
02	***MinValid***	real array		Float (4 bytes)	2 elements	Minimum valid LUT values	INT
	Min_Valid					End of binary Data Set	
	Data_Set_Sampling_dim1					Init of binary Data Set containing the Data_Set_Sampling_dim1 elements.	
03	***Sampling_dim1***	real array	dl	Float (4 bytes)	129 elements	xi values of sampling	INT
	Data_Set_Sampling_dim1					End of binary Data Set containing the Data_Set_Sampling_dim1 elements.	
	Data_Set_Sampling_dim2					Init of binary Data Set containing the Data_Set_Sampling_dim2 elements.	
04	***Sampling_dim2***	real array	dl	Float (4 bytes)	129 elements	eta values of sampling	INT
	Data_Set_Sampling_dim2					End of binary Data Set containing the Data_Set_Sampling_dim2 elements.	
	Data_Set_LUT_offset_HH_A					Init of binary Data Set containing the LUT_Offset_HH elements.	
05	***LUT_offset_HH_A***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for HH polarization measurements (ascending orbits)	INT
	Data_Set_LUT_offset_HH_A					End of binary Data Set containing the LUT_Offset_HH elements.	
	Data_Set_LUT_offset_VV_A					Init of binary Data Set containing the LUT_Offset_VV elements.	
06	***LUT_offset_VV_A***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for VV polarization measurements (ascending orbits)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_offset_VV_A					End of binary Data Set containing the LUT_Offset_VV elements.	
	Data_Set_LUT_offset_HH_D					Init of binary Data Set containing the LUT_Offset_HH elements.	
07	***LUT_offset_HH_D***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for HH polarization measurements (descending orbits)	INT
	Data_Set_LUT_offset_HH_D					End of binary Data Set containing the LUT_Offset_HH elements.	
	Data_Set_LUT_offset_VV_D					Init of binary Data Set containing the LUT_Offset_VV elements.	
08	***LUT_offset_VV_D***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for VV polarization measurements (descending orbits)	INT
	Data_Set_LUT_offset_VV_D					End of binary Data Set containing the LUT_Offset_VV elements.	
	Data_Block					End of binary Data Block in the product.	

Table 5-63 Ocean Target Transformation for Dual pol

5.4.14.6 Ocean Target Transformation for Full Polarization (AUX_OTT1F_, AUX_OTT2F_, AUX_OTT3F_)

Ocean Target Transformation LUTs are derived by ESL using each of the forward models to correct L1c TBs by integrating the difference between a forward model and measured TBs for a number of selected orbits. It is likely this approach will need to be refined, especially near land.

5.4.14.6.1 Specific Product Header

The SPH follows the format described in section 5.1.2

5.4.14.6.2 Data Block

The following table shows the binary data record format for the data defined to process the full polarization mode:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of binary Data Set containing the Max_Valid elements.	
01	***MaxValid***	real array	dl	Float (4 bytes)	2 elements	Highest values below which the LUT is valid	INT
	Max_Valid					End of binary Data Set containing the Max_Valid elements.	
	Min_Valid					Init of binary Data Set containing the Min_Valid elements.	
02	***MinValid***	real array	dl	Float (4 bytes)	2 elements	Lowest values above which the LUT is valid	INT
	Min_Valid					End of binary Data Set	
	Data_Set_Sampling_dim1					Init of binary Data Set containing the Data_Set_Sampling_dim1 elements.	
03	***Sampling_dim1***	real array	dl	Float (4 bytes)	129 elements	xi values of sampling	INT
	Data_Set_Sampling_dim1					End of binary Data Set containing the Data_Set_Sampling_dim1 elements.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_Sampling_dim2					Init of binary Data Set containing the Data_Set_Sampling_dim2 elements.	
04	***Sampling_dim2***	real array	dl	Float (4 bytes)	129 elements	eta values of sampling	INT
	Data_Set_Sampling_dim2					End of binary Data Set containing the Data_Set_Sampling_dim2 elements.	
	Data_Set_LUT_offset_HH_A					Init of binary Data Set containing the LUT_Offset_HH elements.	
05	***LUT_offset_HH_A***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for HH polarization measurements (ascending orbits)	INT
	Data_Set_LUT_offset_HH_A					End of binary Data Set containing the LUT_Offset_HH elements.	
	Data_Set_LUT_offset_VV_A					Init of binary Data Set containing the LUT_Offset_VV elements.	
06	***LUT_offset_VV_A***	real array		Float (4 bytes)	129*129	OTT LUT offsets for VV polarization measurements (ascending orbits)	INT
	Data_Set_LUT_offset_VV_A					End of binary Data Set containing the LUT_Offset_VV elements.	
	Data_Set_LUT_offset_HHV_real_A					Init of binary Data Set containing the LUT_offset_HHV_real elements.	
07	***LUT_offset_HHV_real_A***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for real part of HHV polarization measurements (ascending orbits)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_offset_HHV_real_A					End of binary Data Set containing the LUT_offset_HHV_real elements.	
	Data_Set_LUT_offset_HHV_imag_A					Init of binary Data Set containing the LUT_offset_HHV_imag elements.	
08	***LUT_offset_HHV_imag_A***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for imaginary part of HHV polarization measurements (ascending orbits)	INT
	Data_Set_LUT_offset_HHV_imag_A					End of binary Data Set containing the LUT_offset_HHV_imag elements.	
	Data_Set_ LUT_offset_VVH_real_A					Init of binary Data Set containing the LUT_offset_VVH_real elements	
09	***LUT_offset_VVH_real_A***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for real part of VVH polarization measurements (ascending orbits)	INT
	Data_Set_ LUT_offset_VVH_real_A					End of binary Data Set containing the LUT_offset_VVH_real elements	
	Data_Set_LUT_offset_VVH_imag_A					Init of binary Data Set containing the LUT_offset_VVH_imag elements	
10	***LUT_offset_VVH_imag_A***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for imaginary part of VVH polarization measurements (ascending orbits)	INT
	Data_Set_LUT_offset_VVH_imag_A					End of binary Data Set containing the LUT_offset_VVH_imag elements	
	Data_Set_LUT_offset_HH_short_A					Init of binary Data Set containing the Data_Set_LUT_offset_HH_short elements	
11	***LUT_offset_HH_short_A***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for short part of HH polarization	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						measurements (ascending orbits)	
	Data_Set_LUT_offset_HH_short_A					End of binary Data Set containing the Data_Set_LUT_offset_HH_short elements	
	Data_Set_LUT_offset_VV_short_A					Init of binary Data Set containing the Data_Set_ LUT_offset_VV_short elements (ascending orbits)	
12	***LUT_offset_VV_short_A***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for short part of VV polarization measurements	INT
	Data_Set_LUT_offset_VV_short_A					End of binary Data Set containing the Data_Set_ LUT_offset_VV_short elements	
	Data_Set_LUT_offset_HH_D					Init of binary Data Set containing the LUT_Offset_HH elements.	
13	***LUT_offset_HH_D***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for HH polarization measurements (descending orbits)	INT
	Data_Set_LUT_offset_HH_D					End of binary Data Set containing the LUT_Offset_HH elements.	
	Data_Set_LUT_offset_VV_D					Init of binary Data Set containing the LUT_Offset_VV elements.	
14	***LUT_offset_VV_D***	real array		Float (4 bytes)	129*129	OTT LUT offsets for VV polarization measurements (descending orbits)	INT
	Data_Set_LUT_offset_VV_D					End of binary Data Set containing the LUT_Offset_VV elements.	
	Data_Set_LUT_offset_HHV_real_D					Init of binary Data Set containing the LUT_offset_HHV_real elements.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
15	***LUT_offset_HHV_real_D***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for real part of HHV polarization measurements (descending orbits)	INT
	Data_Set_LUT_offset_HHV_real_D					End of binary Data Set containing the LUT_offset_HHV_real elements.	
	Data_Set_LUT_offset_HHV_imag_D					Init of binary Data Set containing the LUT_offset_HHV_imag elements.	
16	***LUT_offset_HHV_imag_D***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for imaginary part of HHV polarization measurements (descending orbits)	INT
	Data_Set_LUT_offset_HHV_imag_D					End of binary Data Set containing the LUT_offset_HHV_imag elements.	
	Data_Set_ LUT_offset_VVH_real_D					Init of binary Data Set containing the LUT_offset_VVH_real elements	
17	***LUT_offset_VVH_real_D***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for real part of VVH polarization measurements (descending orbits)	INT
	Data_Set_ LUT_offset_VVH_real_D					End of binary Data Set containing the LUT_offset_VVH_real elements	
	Data_Set_LUT_offset_VVH_imag_D					Init of binary Data Set containing the LUT_offset_VVH_imag elements	
18	***LUT_offset_VVH_imag_D***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for imaginary part of VVH polarization measurements (descending orbits)	INT
	Data_Set_LUT_offset_VVH_imag_D					End of binary Data Set containing the LUT_offset_VVH_imag elements	
	Data_Set_LUT_offset_HH_short_D					Init of binary Data Set containing the	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						Data_Set_LUT_offset_HH_short elements	
19	***LUT_offset_HH_short_D***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for short part of HH polarization measurements (descending orbits)	INT
	Data_Set_LUT_offset_HH_short_D					End of binary Data Set containing the Data_Set_LUT_offset_HH_short elements	
	Data_Set_LUT_offset_VV_short_D					Init of binary Data Set containing the Data_Set_ LUT_offset_VV_short elements (descending orbits)	
20	***LUT_offset_VV_short_D***	real array	K	Float (4 bytes)	129*129	OTT LUT offsets for short part of VV polarization measurements	INT
	Data_Set_LUT_offset_VV_short_D					End of binary Data Set containing the Data_Set_ LUT_offset_VV_short elements	
	Data_Block					End of binary Data Block in the product.	

Table 5-64 Ocean Target Transformation for Full pol

5.4.14.7 Mixed scene (land-sea) correction OTT (AUX_MSOTT_)

Mixed scene land-sea correction OTT LUTs are derived by ESL using several years of data to compute a correction for the mean error near land (< 1000 km) between forward model and L1c TBs in 4D lat/long/xi/eta bins.

5.4.14.7.1 Specific Product Header

The SPH follows the format described in section 5.1.2

5.4.14.7.2 Data Block

The 4D mixed scene LUTs are large sparse arrays, one for ascending orbits and another for descending orbits. Total LUT size varies but can be around 2G – reading a complete LUT is unnecessary, since for each half-orbit only a small number of grid points match the LUT. Each LUT is designed as a sorted list containing a Bias_index, dTx, dTy, dT3 & dT4 for each available data entry in each of the 4D mixed-scene correction LUTs. For optimized reading efficiency, each item of LUT_bias data is saved in AUX_MSOTT_ data blocks as a set of 6 x 2 bytes (unsigned short-16): each item (Bias_Index, dTx, dTy, dT3, dT4) is written as 6 x 2 bytes.

In the L2OS processor, after reading the L1C product, multiple (nominally 120) 64k blocks of AUX_MSOTT_ data are read, decrypted into the LUT_Bias structure (12 bytes at a time), searched for matching lat/long/xi/eta land-sea correction data, and then discarded. Binary searching is performed using the Bias_Index for each measurement lat/long/xi/eta, computed as:

Bias_Index = (dim3 * dim2 * dim 1) * iEta + (dim2 * dim1) * iXi + dim1 * iLat + iLon

where

iLon = meas.longitude / Step(Longitude) – Min_Valid(Longitude)

iLat = meas.latitude / Step(Latitude) – Min_Valid(Latitude)

iXi = meas.xi / Step(xi) – Min_Valid(xi)

iEta = meas.eta / Step(eta) – Min_Valid(eta)

and

dim1 = 1 + (Max_Valid(Longitude) – Min_Valid(Longitude)) / Step(Longitude)

dim2 = 1 + (Max_Valid(Latitude) – Min_Valid(Latitude)) / Step(Latitude)

dim3 = 1 + (Max_Valid(xi) – Min_Valid(xi)) / Step(xi)

Note that AUX_MSOTT_ longitudes are 0..360, increasing to the east (0 & 360 = Greenwich meridian), whereas L1c longitudes are -180 (180W) to +180 (180E). Therefore negative L1c longitudes are converted by adding 360 before computing iLon. Matching dTx, dTy, dT3 & dT4 are stored with each measurement, and applied as a land-sea correction during retrievals.

The Size field (#04) is used to select between ascending mixed scene LUT data (in the first set of 32k blocks), and descending data, which follow the ascending data blocks.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of binary Data Set containing the Max_Valid elements.	
01	***MaxValid***	real array	dl	Float (4 bytes)	4 elements	Maximum valid LUT values	INT
	Max_Valid					End of binary Data Set containing the Max_Valid elements.	
	Min_Valid					Init of binary Data Set containing the Min_Valid elements.	
02	***MinValid***	real array	dl	Float (4 bytes)	4 elements	Minimum valid LUT values	INT
	Min_Valid					End of binary Data Set	
	Step					Init of binary Data Set containing the Step elements.	
03	***Step***	real array	dl	Float (4 bytes)	4 elements	LUT step intervals	INT
	Step					End of binary Data Set containing the Step elements.	
	Size					Init of binary Data Set containing the Size elements	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
04	***Size***	int array	dl	Unsigned integer (4 bytes)	2 elements	LUT sizes	INT
	Size					End of binary Data Set containing the Size elements	
05	***Count***	Counter	dl	Unsigned integer (4 bytes)	1 element	Number of LUT_bias data blocks	INT
	Bias					Init of of ***Bias*** binary Data Set repeated Count Times	
	LUT_bias					Record Start.	
06	***LUT_bias***		dl	Unsigned integer (2 bytes)	Count* 32768 elements	See the description of a LUT_bias data item in the next table	INT
	LUT_bias					Record End.	
	Bias					End of of ***Bias*** binary Data Set	
	Data_Block					End of binary Data Block in the product.	

Table 5-65 Mixed Scene Correction LUT data record

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	LUT_bias					Record start	
01	***Bias_Index***	integer value	dl	Unsigned integer (4	1 element	Mixed scene bias LUT index	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
				bytes)			
02	***dTx***	Real value	K	Signed integer (2 bytes)	1 element	XX polarisation mixed scene bias (scaled by 1000)	INT
03	***dTy***	Real value	K	Signed integer (2 bytes)	1 element	YY polarisation mixed scene bias (scaled by 1000)	INT
04	***dT3***	Real value	K	Signed integer (2 bytes)	1 element	Stokes 3 mixed scene bias (scaled by 1000)	INT
05	***dT4***	Real value	K	Signed integer (2 bytes)	1 element	Stokes 4 mixed scene bias (scaled by 1000)	INT
	LUT_bias					Record end	

Table 5-66 Description of a LUT_bias data item, written as 6 LUT_bias items in AUX_MSOTT

5.4.15 Delta TBs for the L2OS post-processor (AUX_DTBXY_)

The SMOS L2 SSS processor may optionally generate AUX_DTBXY_ products for use by the L2OS OTT post-processor.

The format and the content of AUX_DTBXY_ products are described in the following subsections

5.4.15.1 Specific Product Header

The SPH follows the format described in section 5.1.2 and it includes, in addition, the fields listed below:

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
02	***Specific_Product_Header***	Tag				Tag starting the Specific Product Header structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2	
14	***Quality_Information***	Starting tag				Start tag of quality information structure	
15	***List_of_Regions***	Starting tag				Record start. Tag repeated nRegions	
16	***Region_Quality_Description***	Starting tag				Tag start for region quality information	
17	***Region ID***	integer	dl		%04d		
18	***Snapshot_Quality***	Starting tag				Start of grid point quality information	
19	***Available_Snapshots***	integer	dl		%04d	Total number of snapshots in region	INT
20	***Snapshots_Used***	integer	dl		%04d	Number of snapshots used after filtering	INT
21	***XX***	integer	dl		%04d	Number of XX polarisation snapshots in region	INT
22	***YY***	integer	dl		%04d	Number of YY polarisation snapshots in region	INT
23	***XY***	integer	dl		%04d	Number of XY polarisation snapshots in region	INT
24	***YX***	integer	dl		%04d	Number of YX polarisation snapshots in region	INT
25	***L1_Software_Errors***	integer	dl		%04d	Number of snapshots in region with L1_Software_Errors.true	INT
26	***L1_Instrument_Errors***	integer	dl		%04d	Number of snapshots in region with L1_Instrument_Errors.true	INT
27	***L1_ADF_Errors***	integer	dl		%04d	Number of snapshots in region with L1_ADF_Errors.true	INT
28	***L1_Calibration_Errors***	integer	dl		%04d	Number of snapshots in region with L1_Calibration_Errors.true	INT

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
29	***TBs_Out_Of_Range***	integer	dl		%04d	Number of snapshots in region with TBs_Out_Of_Range (Fs_out_of_range.true)	INT
30	***High_Std***	integer	dl		%04d	Number of snapshots in region with High_Std (Fs_high_std.true)	INT
31	***High_Std_Stokes3***	integer	dl		%04d	Number of snapshots in region with High_Std_Stokes3 (Fs_high_std_stokes3.true)	INT
32	***High_Std_Stokes4***	integer	dl		%04d	Number of snapshots in region with High_Std_Stokes4 (Fs_high_std_stokes4.true)	INT
33	***Snapshot_Quality***					Tag end	
34	***Grid_Point_Quality***	Starting tag				Start of grid point quality information	
35	***Available_Grid_Points***	integer	dl		%04d	Total number of grid points in region	INT
36	***Grid_Points_Used***	integer	dl		%04d	Number of grid points used after filtering	INT
37	***Ocean***	integer	dl		%04d	Number of grid points classified as open ocean (Fg_sc_land_sea_coast1.true & Fg_sc_land_sea_coast2.false)	INT
38	***Ice***	integer	dl		%04d	Number of grid points classified as ice according to climatology (Fg_sc_ice.true)	INT
39	***Missing_ECMWF***	integer	dl		%04d	Number of grid points rejected because of missing ECMWF data	INT
40	***Rain***	integer	dl		%04d	Number of grid points classified by ECMWF as having a high rain rate (Fg_sc_rain.true)	INT
41	***Low_Wind_Speed***	integer	dl		%04d	Number of grid points classified by ECMWF as low wind speed (Fg_sc_low_wind.true)	INT

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
42	***High_Wind_Speed***	integer	dl		%04d	Number of grid points classified by ECMWF as high wind speed (Fg_sc_high_wind.true)	INT
43	***Grid_Point_Quality***					Tag end	
44	***Measurement_Quality***					Start of measurement quality information	
45	***Available_Measurements***	integer	dl		%04d	Total number of avaialble measurements in the region	INT
46	***Measurements_Used***	integer	dl		%04d	Number of measurements used after filtering	INT
47	***Sun_Point_L1***	integer	dl		%04d	Number of measurements flagged as sun point (Fm_l1c_sun_point.true)	INT
48	***Sun_Tails_L1***	integer	dl		%04d	Number of measurements flagged as sun tails (Fm_l1c_sun_tails.true)	INT
49	***Sun_Glint***	integer	dl		%04d	Number of measurements flagged as sun glint (Fm_l1c_sun_glint_area.true or Fm_high_sun_ glint.true)	INT
50	***Moon_Glint***	integer	dl		%04d	Number of measurements flagged as moon glint (Fm_l1c_moon_point.true or Fm_moon_specDir.true)	INT
51	***Gal_Noise***	integer	dl		%04d	Number of measurements flagged as galactic noise (Fm_gal_noise_error.true or Fm_high_gal_noise.true)	INT
52	***RFI_L1***	integer	dl		%04d	Number of measurements flagged by L1 as RFI contaminated (Fm_l1c_rfi_tails.true or Fm_l1c_rfi_XX.true or Fm_l1c_rfi_YY.true or Fm_l1c_rfi_point.true)	INT
53	***RFI_L2***	integer	dl		%04d	Number of measurements flagged by L2 as RFI contaminated (Fm_rfi_outlier.true or Fm_rfi_snapshot_out_of_range.true or Fm_rfi_high_snapshot_std or Fm_rfi_high_snapshot_std_stokes3 or Fm_rfi_high_snapshot_std_stokes4	INT

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
54	***Spare***	integer	dl		%04d	Not used	
55	***Measurement_Quality***	Ending tag				Tag end	
56	***Region_Quality_Description***	Ending tag				Tag end	
57	***Quality_Information***	Ending tag				Tag end	
58	***Product_Information***	Starting tag					
59	***Ascending_Flag***	string	dl		%s	A for Ascending, D for Descending	INT
60	***Polarisation_Flag***	string	dl		%s	D for dual, F for full	INT
61	***Product_Information***	Ending tag					
62-73	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
74	***Specific_Product_Header***	Tag				Tag ending the Specific Product Header structure	

Table 5-67 AUX_DTBXY_SPH

5.4.15.2 Data Block

The delta TB specific product header (AUX_DTBXY_ DBL) contains a set of delta TBs on a xi/eta grid for each region, together with associated statistics. The deltaTBs are used by the OTT post-processor to construct OTTs.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of binary Data Set containing the Max_Valid elements.	
01	***MaxValid***	real array	dl	Float (4 bytes)	2 elements	Highest values below which the LUT is valid	INT
	Max_Valid					End of binary Data Set containing the Max_Valid elements.	
	Min_Valid					Init of binary Data Set containing the Min_Valid elements.	
02	***MinValid***	real array	dl	Float (4 bytes)	2 elements	Lowest values above which the LUT is valid	INT
	Min_Valid					End of binary Data Set	
03	***Count***	counter	dl	unsigned integer (4 bytes)	1 element	Number of Regions counter	INT
	List_of_Regions					Init of List_of_Regions Data Set, repeated Count times, containing the list of Regions Data Set Records.	
	Region					Init of Region DSR	
04	***Region_ID***	identifier	dl	Unsigned integer (4 bytes)	1 element	Region identifier (from AUX_CNFOSF/D)	INT
05	***Snapshot_Start_Time***	Date	UTC	Vector array of 3 elements. First element(days) is signed integer,	3 elements	UTC time of first snapshot in region	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
				remaining two (seconds and microseconds) are unsigned			
06	***Snapshot_Stop_Time***	Date	UTC	Vector array of 3 elements. First element(days) is signed integer, remaining two (seconds and microseconds) are unsigned	3 elements	UTC time of last snapshot in region	INT
07	***Start_Snapshot_ID***	Identifier	dl	Unsigned integer (4 bytes)	1 element	ID of first snapshot in region	INT
08	***Stop_Snapshot_ID***	Identifier	dl	Unsigned integer (4 bytes)	1 element	ID of last snapshot in region	INT
	List_of_Models					List_of_Models Record start. Tag repeated 3 times for forward models 1, 2 & 3	
	List_of_Polarisations					List_of_Polarisations record start Tag repeated 8 times for each polarisation: XX, YY, XXY Stokes 3, XXY Stokes 4, YYX Stokes 3, YYX Stokes 4, XXshort, YYshort	
	List_of_Stats					List_of_Stats record start. Tag repeated 12 times	
09	***mean***	Real value	K	Float (4 bytes)	3*8*12 elements	Mean of deltaTB for each of 3 models, 8 polarisations, & 12 FOV sub-zones	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
10	***median***	Real value	K	Float (4 bytes)	3*8*12 elements	Median of deltaTB for each of 3 models, 8 polarisations, & 12 FOV sub- zones	INT
11	***min***	Real value	K	Float (4 bytes)	3*8*12 elements	Minimum deltaTB for each of 3 models, 8 polarisations, & 12 FOV sub- zones	INT
12	***max***	Real value	K	Float (4 bytes)	3*8*12 elements	Maximum deltaTB for each of 3 models, 8 polarisations, & 12 FOV sub- zones	INT
13	***std***	Real value	K	Float (4 bytes)	3*8*12 elements	Std(deltaTB)/ra for each of 3 models, 8 polarisations, & 12 FOV sub- zones	INT
	List_of_Stats					List_of_Stats record end	
	deltaTBs					List_of_delta_TBs record start. Tag repeated 129 * 129 times (xi * eta cells)	
14	***count_deltaTB***	Real array	dl	unsigned integer (4 bytes)	3*8*129*129 elements	Count of deltaTB measurements in each xi/eta cell, for each of 3 models & 8 polarisations	INT
15	***deltaTB***	Real array	K	Float (4 bytes)	3*8*129*129 elements	Median deltaTB for each xi/eta cell, for each of 3 models & 8 polarisations.	INT
16	***std_deltaTB***	Real array	K	Float (4 bytes)	3*8*129*129 elements	Std(deltaTB/ra) for each xi/eta cell, for each of 3 models & 8 polarisations.	INT
17	***flags***	Flags	dl	Unsigned integer (2 bytes)	3*8*129*129 elements	OTT flags for each xi/eta cell, for each of 3 models & 8 polarisations (see table attached below).	INT
	deltaTBs					Record end	
	List_of_Polarisations					Record end	
	List_of_Models					Record end	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
18	***snaps_count***	Counter	dl	Unsigned integer (4 bytes)	1 element	Count of snapshots	
	List_of_Snapshots					List_of_Snapshots record start. Tag repeated snaps_count times	
19	***Snapshot_ID***	Identifier	dl	Unsigned integer (4 bytes)	1 element	Snapshot ID from L1c	INT
20	***Snap_OBET_secs***	Real value	s	Float (4 bytes)	1 element	Snapshot OBET time extracted from L1c field (Snapshot_OBET)	INT
21	***Latitude***	Real value	deg	Float (4 bytes)	1 element	Snapshot boresight latitude (-999 if not computed)	INT
22	***Longitude***	Real value	deg	Float (4 bytes)	1 element	Snapshot boresight longitude (-999 if not computed)	INT
23	***Snap_Flags***	Flags	dl	Unsigned short (2 bytes)	1 element	Content described in table 5-67	INT
	List_of_FOV_stats					List_of_FOV_stats start Tag repeated 12 times for each FOV sub-zone	
	List_of_pol_types					List_of_pol_types start Tag repeated 3 times for each snapshot polarization type (XX/YY = 0, Stokes 3 = 1, Stokes 4 = 2)	
	List_of_models					List_of_models start Tag repeated 3 times for each forward model	
24	***modelTB***	Real array	K	Float (4 bytes)	3*3*12 elements	Mean forward model TB for all measurements in each snapshot FOV sub-zone.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
25	***ottTB***	Real array	K	Float (4 bytes)	3*3*12 elements	Mean forward model OTT TB for all measurements in each snapshot FOV sub-zone	INT
26	***deltaTB***	Real array	K	Float (4 bytes)	3*3*12 elements	Mean deltaTB (= L1c TB minus forward model TB) for all measurements in each snapshot FOV sub-zone.	INT
27	***meas_count***	Integer array	dl	unsigned short (2 bytes)	3*3*12 elements	Count of measurements in each snapshot FOV sub-zone used to compute stats in the 3 fields above.	INT
	List_of_models					End of binary Data Set containing List_of_models	
	List_of_pol_types					End of binary Data Set containing List_of_types	
	List_of_FOV_stats					End of binary Data Set containing List_of_FOV_stats	
	A3TEC_stats					Init of A3TEC_stats binary Data Set containing A3TEC_stats data	
28	***fovLatitude***	Real value	deg	Float (4 bytes)	1 element	Median of filtered latitude measurements used in A3TEC computation with (xi,eta) = (0 ± 0.05, 0.225 ± 0.025)	INT
29	***fovLongitude***	Real value	deg	Float (4 bytes)	1 element	Median of filtered longitude measurements used in A3TEC computation with (xi,eta) = (0 ± 0.05, 0.225 ± 0.025)	INT
30	***geoLatitude***	Real value	deg	Float (4 bytes)	1 element	Geocentric latitude (sub-satellite latitude) of snapshot measurement nearest to (xi,eta) = (0,0)	INT
31	***geoLongitude***	Real value	deg	Float (4 bytes)	1 element	Geocentric longitude (sub-satellite latitude) of snapshot measurement nearest to (xi,eta) = (0,0)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
32	***latTEC***	Real value	deg	Float (4 bytes)	1 element	Latitude of corrected TEC	INT
33	***l1cTEC***	Real Value	tecu	Float (4 bytes)	1 element	TEC at boresight provided by L1c input product (TEC field)	INT
34	***tecres***	Real Value	tecu	Float (4 bytes)	1 element	TEC estimated using A3TEC computation	INT
35	***signpost***	Real Value	tecu	Float (4 bytes)	1 element	Error on TEC estimated using A3TEC computation	INT
	List_of_Snapshots					End of binary Data Set containing the List_of_Snapshots.	
	List_of_Regions					Init of binary Data Set containing the List_of_Regions.	
	Data_Block					End of binary Data Block in the product.	

Table 5-68 Delta TBs Data Block

5.4.15.2.1.1 OTT Flags

The following table lists the structure of the OTT Flags in the DSR. Note that Bit #01 is the Least Significant Bit (LSB).

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
17.01	***fm_ott_l1c_rfi***	Set if xi/eta sampling contains RFI detected by L1C processor (fm_l1_rfi = 1). Least Significant bit.	1
17.02	***fm_ott_l2_rfi***	Set if xi/eta sampling contains RFI detected by L2OS processor (fm_l2_rfi = 1)	1
17.03	***fm_ott_sun_glint***	Set if xi/eta sampling is contaminated by sun glint as detected by the L2OS processor (fm_low_sun glint = 0	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
		and fm_high_sun_glint = 1)	
17.04	***fm_ott_gal_noise***	Set if xi/eta sampling is contaminated by galactic noise as detected by L2OS processor (fm_gal_noise_error = 1 or fm_high_gal_noise = 1)	1
17.05	***fm_ott_valid***	Set if xi/eta sampling contains valid measurements	1
17.06	***fm_ott_moon_glint***	Set if xi/eta sampling is contaminated by moon glint as detected by L2OS processor (fm_moon_specDir = 1)	1
17.07	***fm_ott_missing_data***	Set if xi/eta sampling BT or Radiometric_Accuracy is zero	1
17.08	***fm_ott_sun_point***	Set if xi/eta sampling contains sun alias reconstructions (after Sun removal, measurement may be degraded)	1
17.09	***fm_ott_sun_glint_area***	Set if xi/eta sampling is contaminated by sun reflection	1
17.10	***fm_ott_moon_point***	Set if xi/eta sampling contains moon alias reconstructions (after Moon removal, measurement may be degraded)	1
17.11	***fm_ott_af_fov***	Set if xi/eta sampling is inside the alias free zone	1
17.12	***fm_ott_spare1***	Not used	1
17.13	***fm_ott_border_fov***	Set if xi/eta sampling is close to the border or near to the unit circle replicas (aka belt & suspenders)	1
17.14	***fm_ott_sun_tails***	Set if xi/eta sampling is contaminated by sun tail aliases	1
17.15	***fm_ott_spare2***	Not used	1
17.16	***fm_ott_spare3***	Not used	1

Table 5-69 Structure of the OTT Flags in the DSR

5.4.15.2.1.2 Snap_Flags

The following table lists the structure of the Snap_Flags in the DSR. Note that Bit #01 is the Least Significant Bit (LSB).

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
23.01	***fs_vert_pol***	Snapshot polarisation (2 bits, fs_cross_pol:fs_vert_pol, 00 = XX, 01 = YY, 10 = XXY, 11 = YYX)	1
23.02	***fs_cross_pol***		1
23.03	***fs_out_of_range***	Set if any measurement in snapshot has fm_out_of_range set	1
23.04	***fs_high_std***	Set if snapshot std(delta TB XX/YY)/ra is above valid threshold (Ts_std)	1
23.05	***fs_high_std_stokes3***	Set if snapshot std(delta Stokes3 measured – model)/ra is above valid threshold (Ts_std_stokes3)	1
23.06	***fs_high_std_stokes4***	Set if snapshot std(delta Stokes4 measured – model)/ra is above valid threshold (Ts_std_stokes4)	1
23.07	***fs_valid_a3tec***	Set if snapshot selected for a3tec computation	1
23.08	***fs_LO_calibration***	Set if interval between this and previous snapshot > 1.2 seconds (usually due to an LO calibration)	1
23.09	***fs_scene_contamination***	Set if snapshot is part of a contaminated scene	1
23.10	***fs_eaf_scene_contamination***	Set if snapshot is part of a scene contaminated in the EAF aliased limb region	1
23.11	***fs_max_scene_contamination***	Set if snapshot is part of a scene contaminated by un-geophysically high TBs	1

Table 5-70 Structure of the Snap_Flags in the DSR

5.4.16 Current Delta TB Product (AUX_DTBCUR)

The current delta TB contains a set of delta TBs (for OTTs regions) on a xi/eta grid together with associated statistics.

The format and the content of AUX_DTBCUR products are described in the following subsections

5.4.16.1 Specific Product Header

The SPH follows the format described in section 5.1.2 and it includes, in addition, the fields listed below:

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Tag				Tag starting the Specific Product Header structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2	
14	***Quality_Information***	Starting tag				Start tag of quality information structure	
15	***Ascending_OTT_Quality***	Starting tag					
16	***Orbits***	Integer	dl		%04d	Number of orbits used to make ascending OTTs	INT
17	***Snapshot_Start_Time***	String	dl	24	%s	Start time of first snapshot used to make ascending OTTs	INT
18	***Snapshot_Stop_Time***	String	dl	24	%s	Stop time of last snapshot used to make ascending OTTs	INT
19	***OTT1_stats***					Statistics for ascending OTT1	
20	***OTT2_stats***					Statistics for ascending OTT2	
21	***OTT3_stats***					Statistics for ascending OTT3	
22	***Ascending_OTT_Quality***	Ending Tag				Tag end	
23	***Descending_OTT_Quality***	Starting Tag				Tag start for descending orbit OTT quality information	
24	***Orbits***	Integer	dl		%04d	Number of orbits used to make descending OTTs	INT
25	***Snapshot_Start_Time***	String	dl	24	%s	Start time of first snapshot used to make descending OTTs	INT
26	***Snapshot_Stop_Time***	String	dl	24	%s	Stop time of last snapshot used to make descending OTTs	INT

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
27	***OTT1_stats***					Statistics for descending OTT1	INT
28	***OTT2_stats***					Statistics for descending OTT2	INT
29	***OTT3_stats***					Statistics for descending OTT3	INT
30	***Descending_OTT_Quality***	Ending Tag				Tag end	
31	***Quality_Information***	Ending Tag				Tag end	
32-43	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
44	***Specific_Product_Header***	Tag				Tag ending the Specific Product Header structure	

Table 5-71 AUX_DTBCUR SPH

5.4.16.2 Data Block

The current delta TB Data block contains a set of delta TBs (for the OTTs regions) on a xi/eta grid together with associated statistics.

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Max_Valid					Init of binary Data Set containing the Max_Valid elements.	
01	***MaxValid***	real array	dl	Float (4 bytes)	2 elements	Highest values below which the LUT is valid	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Max_Valid					End of binary Data Set containing the Max_Valid elements.	
	Min_Valid					Init of binary Data Set containing the Min_Valid elements.	
02	***MinValid***	real array	dl	Float (4 bytes)	2 elements	Lowest values above which the LUT is valid	INT
	Min_Valid					End of binary Data Set	
03	***Count***	Counter	dl	Unsigned integer (4 bytes)	1 element	Number of Orbits counter	INT
	List_of_Orbits					Init of List_of_Orbits Data Set containing the list of Orbit Data Set Records. Repeated Count times	
	Orbit					Init of Orbit DSR	
04	***OTT_Type***	integer	dl	Unsigned integer (4 bytes)	1 element	Type of OTT: 0 = from L1c, 1 = computed for OTT generation	
05	***Region_ID***	identifier	dl	Unsigned integer (4 bytes)	1 element	Region identifier (from AUX_CNFOSF/D)	INT
06	***Orbit_Direction***	character	dl	Unsigned char (1 byte)	1 element	‘A’ (ascending) or ‘D’ (descending)	
07	***Orbit Polarization***	character	dl	Unsigned char (1 byte)	1 element	‘F’ (full polarisation) or ‘D’ (dual polarisation)	
08	***Snapshot_Start_Time***	Date	UTC	Vector array of 3 elements. First element (days) is signed integer, remaining	3 elements	UTC time of first snapshot in region	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
				two (seconds and microseconds) are unsigned			
09	***Snapshot_Stop_Time***	Date	UTC	Vector array of 3 elements. First element (days) is signed integer, remaining two (seconds and microseconds) are unsigned	3 elements	UTC time of last snapshot in region	INT
10	***Start_Snapshot_ID***	Identifier	dl	Unsigned integer (4 bytes)	1 element	ID of first snapshot in region	INT
11	***Stop_Snapshot_ID***	Identifier	dl	Unsigned integer (4 bytes)	1 element	ID of last snapshot in region	INT
12	***Orbit_Filename***	String		String (60 bytes)	1 element	L1c filename	
	List_of_Models					List_of_Models Record start. Tag repeated 3 times for forward models 1, 2 & 3	
	List_of_Polarisations					List_of_Polarisations record start Tag repeated 8 times for each polarisation: XX, YY, XXY Stokes 3, XXY Stokes 4, YYX Stokes 3, YYX Stokes 4, XXshort, YYshort	
	List_of_Stats					List_of_Stats record start. Tag repeated 12 times	
13	***mean***	Real value	K	Float (4 bytes)	3*8*12 elements	Mean of deltaTB for each of 3 models, 8 polarisations, & 12 FOV sub-zones	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
14	***median***	Real value	K	Float (4 bytes)	3*8*12 elements	Median of deltaTB for each of 3 models, 8 polarisations, & 12 FOV sub- zones	INT
15	***min***	Real value	K	Float (4 bytes)	3*8*12 elements	Minimum deltaTB for each of 3 models, 8 polarisations, & 12 FOV sub- zones	INT
16	***max***	Real value	K	Float (4 bytes)	3*8*12 elements	Maximum deltaTB for each of 3 models, 8 polarisations, & 12 FOV sub- zones	INT
17	***std***	Real value	K	Float (4 bytes)	3*8*12 elements	Std(deltaTB/ra) for each of 3 models, 8 polarisations, & 12 FOV sub- zones	INT
	List_of_Stats					List_of_Stats record end	
	List_of_deltaTB					List_of_delta_TB record start. Tag repeated 129 * 129 times (xi * eta cells)	
18	***count_deltaTB***	Real array	dl	Unsigned integer (4 bytes)	3*8*129*129 elements	Count of deltaTB measurements in each xi/eta cell, for each of 3 models & 8 polarisations.	INT
19	***deltaTB***	Real array	K	Float (4 bytes)	3*8*129*129 elements	Median deltaTB for each xi/eta cell, for each of 3 models & 8 polarisations.	INT
20	***std_deltaTB***	Real array	K	Float (4 bytes)	3*8*129*129 elements	Std(deltaTB/ra) for each xi/eta cell, for each of 3 models & 8 polarisations.	INT
21	***flags***	Flags	dl	Unsigned integer (2 bytes)	3*8*129*129 elements	OTT flags for each xi/eta cell, for each of 3 models & 8 polarisations (see flags table incuded in AUX_DTBXY_ Data block section).	INT
	List_of_deltaTB					Record end	
	List_of_Polarisations					Record end	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	List_of_Models					Record end	
	List_of_Orbits					Init of binary Data Set containing the List_of_Orbits.	
	Data_Block					End of binary Data Block in the product.	

Table 5-72 Current Delta TBs Data Block

5.5 L2 AUXILIARY DATA PRODUCTS USED BY L2 PRE-PROCESSORS

5.5.1 ECOCLIMAP LAI FILES (AUX_ECOLAI)

The SMOS AUX_ECOLAI is a product used as backup by the LAI Pre-processor when no input MODIS Files are available or when generating the initial AUX_DFFLAI.

The following files are needed to create the AUX_ECOLAI ADF:

-36 ECOCLIMAP files, each of them containing a global map for a 10 days period of the year.

-The SMOS AUX_DFFFRA file.

5.5.1.1 Specific Product Header

The SPH for this ADF follows the format described below:

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
01	***Specific_Product_Header***	Starting Tag				Tag starting the Specific Product Header structure	
02-13	***Main_SPH***	structure				Main SPH structure's fields as definedin Table 5-2	
14	***Num_ Polar_Zones***	integer	N/A	3	%03d	Number of polar zones contained in the datablock. The total number of Polar Zones is 2.	Hard Coded
15	***Num_Equator_Zones***	integer	N/A	3	%03d	Number of equator zones contained in the datablock. The total number of Equator Zones is 72.	Hard Coded
16	***Digits_To_Shift***	integer	N/A	2	%02d	Index to be used to compute the unique global index of each cell c according the equation: g = z × 10^k + n where n is the absolute DFFG Index of the DFFG Cell c in Zone #z	From MODIS LAI
17	***Offset***	real	m^2 m^{-2}	10	%10.6f	Offset for LAI.	From MODIS LAI
18	***Scaling_Factor***	real	N/A	10	%10.8f	Scaling factor for LAI	From MODIS LAI
19-31	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
32	***Specific_Product_Header***	Ending Tag				Tag ending the Specific Product Header structure	

Table 5-73 AUX_ECOLAI Specific Product Header

Concernig the List_of_Data_Sets, these are following Data Set Names that should be specified in each Data_Set structure for the AUX_ECOLAI products:

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
ECOLIMAP_FILE	lai.XX.001.intg.gz (being XX from 01 to 36)
DFFG_FRACTIONS_FILE	AUX_DFFFRA

Table 5-74 AUX_ECOLAI Reference Data Set Name

5.5.1.2 Data Block

The AUX_ECOLAI auxiliary data product consists of 1 data set DFFG_ECOLAI containing the Leaf Area Index for each DFFG cell and for each decade (36 values).

The following table describes the XML schema structure used to decode the binary contents of a DSR in this product:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	DFFG_ECOLAI					Init of binary Data Set containing the ***DFFG_ECOLAI*** parameters.	
	List_of_Zone_Datas					Init of list of ***Zone_Data*** data set record structure. The number of DSR is fixed to 74.	
	Zone_Data					Init of ***Zone_Data*** data set record structure	
01	***Zone_ID***	identifier	N/A	unsigned integer (4 bytes)	1 element	EEAP5deg Zone number of this DFFG	INT
02	***Delta***	Real value	km	float (4 bytes)	1 element	Desired length of a region. See [RD.6], section 4.1.3.1, for more information.	INT
03	***Lat_a***	Real value	deg	float (4 bytes)	1 element	Latitude comprising southern edge of	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
04	***Lat_b***	Real value	deg	float (4 bytes)	1 element	designated boundary in DFFG definition (Lat a < Lat b)	INT
05	***Lon_a***	Real value	deg	float (4 bytes)	1 element	Longitude comprising western edge of designated boundary in DFFG definition (Lon a < Lon b)	INT
06	***Lon_b***	Real value	deg	float (4 bytes)	1 element		INT
07	***R***	Real value	km	float (4 bytes)	1 element	Earth ellipsoid model semi-major radius. See [RD.6], section 4.1.3.1, for more information.	INT
08	***l***	Real value	N/A	float (4 bytes)	1 element	Inverse of Earth ellipsoid model flattening coefficient.. See [RD.6], section 4.1.3.1, for more information.	INT
09	***Delta_Lat***	Real value	deg	float (4 bytes)	1 element	Latitude degree covered by latitude row	INT
10	***Delta_Lat_km***	Real value	km	float (4 bytes)	1 element	Distance on Earth covered by Delta_Lat	INT
11	***N_Lat***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of latitude rows in DFFG Area	INT
	List_of_Row_Struct_Datas					Start of list of ***Row_Struct_Data*** structures.	
	Row_Struct_Data					Start of ***Row_Struct_Data*** structures.	
12	***N_Lon***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total number of regions at current latitude row	INT
13	***Long_Step_Size_Ang***	Real value	deg	float (4 bytes)	1 element	Longitude degree covered by region at current latitude row	INT
14	***Long_Step_Size_Km***	Real value	km	float (4 bytes)	1 element	Distance on Earth covered by Long_Step_Size	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
15	***Cumulated_N_Lon***	Integer value	N/A	unsigned integer (4 bytes)	1 element	The total number of DFFG Regions from latitude 1st row to latitude (N – 1)th row, where N is the index of the current latitude row.	INT
	Row_Struct_Data					End of ***Row_Struct_Data*** structure.	
	List_of_Row_Struct_Datas					End of list of ***Row_Struct_Data*** structures.	
16	***Num_Points***	Counter	N/A	unsigned integer (4 bytes)	1 element	Total Number of cells in specified zone	INT
	List_of_DFFG_LAI_Point_Datas					Start of list of ***DFFG_LAI_Points_Data*** structures, repeated Num_Points times	
	DFFG_LAI_Point_Data					Start of ***DFFG_ LAI_Points_Data*** structure	
17	***ECOLAI***	integer value	m^2 m^{-2}	unsigned char (1 byte)	36 element	Index used in computing vegetation cover optical opacity and contributions to the upwelling brightness temperature from ECOCLIMAP. One value for each 10-days period. The actual value is obtained using: Offset + Scaling_Factor × LAI	INT
18	***Total_Water_Fraction***	Integer value	0.5%	Unsigned char (1 byte)	1 element	Percentage of open fresh water fraction (from AUX_DFFFRA.FWP) + Percentage of open saline water fraction (from AUX_DFFFRA.FWS).	INT
	DFFG_LAI_Point_Data					End of ***DFFG_ LAI_Point_Data*** structure.	
	List_of_DFFG_LAI_Point_Datas					End of list of ***DFFG_LAI_Point_Data*** structures.	
	Zone_Data					End of ***Zone_Data*** data set record structure	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	List_of_Zone_Datas					End of list of ***Zone_Data*** data set record structure	
	DFFG_ECOLAI					End of binary Data Set containing the ***DFFG_ECOLAI*** parameters.	
	Data_Block					End of binary Data Block in the product.	

Table 5-75 Binary Content of a DSR in Both MDSs of the ECOLAI Product

5.5.2 BINDING LIST FILE (AUX_BNDLST)

The SMOS AUX_BNDLST auxiliary data product is a product used as input to the ECMWF pre-processor. It stores the binding lists used to propagate some ECMWF parameters over coastal pixels (and isolated land pixels and isolated water pixels).

This ADF is created from the binding cell lists and the binding parameter lists provided (and updated) by the ESLs (CESBIO) as ASCII files.

5.5.2.1 Specific Product Header

The content of the Specific Product Header is specified in Table 5-3

Concernig the List_of_Data_Sets, these are following Data Set Names that should be specified in each Data_Set structure for the AUX_BNDLST products:

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
BINDING_LIST_FILE	`iw2sl.txt, il2sw.txt, cw2cl.txt, cl2cw.txt`

Table 5-76 AUX_BNDLST Reference Data Set Name

5.5.2.2 Data Block

The AUX_BNDLST auxiliary data product consists of 1 data set containing 4 dataset records, one for each binding list. The order and the contents of each binding list are as follow:

-CL2CW: Binding list for ground parameters from coastal land NR400 cells to ground parameters of adjacent coastal water NR400 cells.

-CW2CL: Binding list for water parameters from coastal water NR400 cells to water parameters of adjacent coastal ground NR400 cells.

-IL2SW: ground parameters from in-land NR400 cells to water parameters of same in-land NR400 cells (small isolated lake)

-IW2SL: water parameters from in-water NR400 cells to ground parameters of same in-water cell (small isolated island)

The following table describes the XML schema structure used to decode the binary contents of a DSR in this product:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	Binding_List					Init of binary Data Set containing the ***Binding_List*** parameters.	
	List_of_Pair_Codes					Init of list of pairs GRIB codes. This list contains pairs of GRIB codes (source GRIB code, target GRIB code). The source codes will be propagated to the target cells to replace their target GRIB codes. The length of this list is fixed to 100 elements.	
01	***Source_GRIB_code***	identifier	N/A	Unsigned integer (4 bytes)	1 element	Parameter code in GRIB tables	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
02	***Target_GRIB_code***	identifier	N/A	unsigned integer (4 bytes)	1 element	Parameter code in GRIB tables	INT
	List_of_Pair_Codes					End of list of pairs GRIB codes	
03	***Number_of_Pair Indexes***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of pair of Indexes provided in the binding list	INT
04	***Number_of_Items***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of pair of Items provided in the following list.	INT
	List_of_Items					Init of list of items. The length of this list is specified by Number_of_Items	
05	***Item***	Identifier	N/A	unsigned integer (4 bytes)	1 element	Item in the binding list.	INT
	List_of_Items					End of list of Items.	
	Binding_List					End of **Binding_List** data set record structure.	
	Data_Block					End of binary Data Block in the product.	

Table 5-77 Binary Content of a DSR of the AUX_BNDLST Product

5.5.3 ECMCDF FILE (AUX_ECMCDF)

As it is indicated in [RD.21], L2 Soil moisture retrieval algorithms and processor requires a prior knowledge of soil moisture which comes from the SWVL1 value contained in the ECMWF forecast. However SWVL1 is a parameter defined for the top 7 cm while SMOS is expected to be rather sensitive to the top 2.5 cm for which the SM retrieved parameter is given.

To cope with the mixed scene problem due to the intrinsic differences between SWVL1 and SMOS SM, a rescaling of SWVL1 toward the equivalent top 2.5 cm soil moisture will be used. The aim of the AUX_ECMCDF file is to allow correcting the biases and improve the quality of the retrieved soil moisture on mixed surfaces where SWVL1 plays a role for the default fixed contributions.

The AUX_ECMCDF file provides global maps of scaling coefficients that are initially defined on the NR400 grid system and stored in GRIB format. The AUX_ECMCDF will be used as input to generate the AUX_ECMWF file with format defined in section 5.2.2.1.2

5.5.3.1 Specific Product Header

The content of the Specific Product Header is specified in Table 5-3

5.5.3.2 Data Block

The AUX_ECMCDF file is composed of three data sets: ECMCDF_Alpha, ECMCDF_Beta and ECMCDF_Sat, each one including 1689422 DSRs. Each data set represents a global map.

The ECMCDF is in GRIB (GRIdded Binary) format in reduced Gaussian Lat/Lon NR400. It therefore requires GRIB API for its decoding.

The table included below describes the AUX_ECMCDF data block content:

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Block					Init of binary Data Block in the product.	
	ECMCDF_Alpha					Init of binary Data Set containing the ***ECMCDF_Alpha*** parameters.	
	List_of_ECMCDF_Alpha					Init of list of ***ECMCDF_Alpha*** data. The length of this list is fixed to integer value elements.	
01	***ECMCDF_Alpha***	integer value	N/A	unsigned char (1 byte)	1689422 elements	SWVL1 scaling	CEC

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	List_of_ECMCDF_Alpha					End of list of ***ECMCDF_Alpha*** data.	
	ECMCDF_Alpha					Endof binary Data Set containing the ***ECMCDF_Alpha*** parameters.	
	ECMCDF_Beta					Init of binary Data Set containing the ***ECMCDF_Beta*** parameters.	
	List_of_ECMCDF_Beta					Init of list of ***ECMCDF_Beta*** data. The length of this list is fixed to 1689422 elements.	
02	***ECMCDF_Beta***	integer value	$m^3 * m^{-3}$	unsigned char (1 byte)	1689422 elements	SWL1 offset. RSWVL1=max(min(SWVL1*alpha+beta,max),0)	CEC
	List_of_ECMCDF_Beta					Init of list of ***ECMCDF_Beta*** data.	
	ECMCDF_Beta					End of binary Data Set containing the ***ECMCDF_Beta*** parameters.	
	ECMCDF_Sat					Init of binary Data Set containing the ***ECMCDF_Sat*** parameters.	
	List_of_ ECMCDF_Sat					Init of list of ***ECMCDF_Sat*** data. The length of this list is fixed to 1689422 elements.	
03	***ECMCDF_Sat***	integer value	$m^3 * m^{-3}$	unsigned char (1 byte)	1689422 elements	max saturation	CEC
	List_of_ ECMCDF_Sat					End of list of ***ECMCDF_Sat*** data. The length of this list is fixed to 1689422 elements.	
	ECMCDF_Sat					End of binary Data Set containing the ***ECMCDF_Sat*** parameters.	
	Data_Block					End of binary Data Block in the product.	

Table 5-78 Binary Content of a DSR of the AUX_ECMCDF Product

6. PRODUCTS SIZES ESTIMATIONS

The following is a list of the size of each of the products specified in this document.

- The binary products are obtained after counting the size of each DataSet Record and assuming a certain typical number of data set records.
- We assume that the the products Headers in XML ASCII format are of 5 Kbytes size, similarly to L1 products Headers.

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	Data Set			
L2 Soil Moisture User Data Product	SM_SWATH	223	115212	**25692280**
L2 Soil Moisture Data Analysis Product	SM_SWATH_ANALYSIS	variable	115212	**200923164**
L2 Ocean Salinity User Data Product	SSS_SWATH	192	40000	**7680004**
L2 Ocean Salinity Data Analysis Product	SSS_SWATH_ANALYSIS	variable	40000 (94 measurements per Grid Point)	**80080004**
DFFG Fractions Product	DFFG_Area	variable	74	**671710892**
DFFG XYZ Product	DFFG_XYZ	variable	74	**449536328**

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
DFFG LAI Product	DFFG_LAI	variable	74	**227361764**
DFFG LAI_Max Product	DFFG_LAI_MAX	variable	74	**42216294**
DFFG Soil Properties Product	DFFG_Soil_Properties	variable	74	**449536328**
DFFG Snow Product	DFFG_Snow	variable	74	**42216294**
DGG XYZ Product	Grid_Point_Data ata	4194332	10	**41943320**
DGG Current Tau Nadir LV	Current_Tau_Nadir_LV_Data	variable	8	**62914832**
DGG Current Tau Nadir FO	Current_Tau_Nadir_FO_Data	variable	8	**62914832**
DGG Current Roughness H Product	Current_Roughness_H_Data	variable	8	**62914832**
DGG Current RFI Product	Current_RFI_Data	variable	8	**94372232**
Current Flood Product	Flood_Data	variable	8	**36700332**
WEF Product	WEF_Data	17150	1	**17150**
Mean WEF product	Mean_WEF_Data	17150	1	**17150**
SM Galaxy Map Product	Galaxy_Map	8311688	1	**8311688**

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
Roughness 1	Max_Valid	4	4	**1123476**
	Min_Valid	4	4	
	Data_Set_Sampling_dim1	4	9	
	Data_Set_Sampling_dim2	4	6	
	Data_Set_Sampling_dim3	4	26	
	Data_Set_Sampling_dim4	4	20	
	Data_Set_Th0	4	28080	
	Data_Set_Tv0	4	28080	
	Data_Set_Th1	4	28080	
	Data_Set_Tv1	4	28080	
	Data_Set_Th2	4	28080	
	Data_Set_Tv2	4	28080	
	Data_Set_U1	4	28080	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
	Data_Set_V1	4	28080	
	Data_Set_U2	4	28080	
	Data_Set_V2	4	28080	
Roughness 2	Max_Valid	4	5	**74807496**
	Min_Valid	4	5	
	Data_Set_Sampling_dim1	4	23	
	Data_Set_Sampling_dim2	4	11	
	Data_Set_Sampling_dim3	4	28	
	Data_Set_Sampling_dim4	4	22	
	Data_Set_Sampling_dim5	4	20	
	Data_Set_ dT_h_0	4	3116960	
	Data_Set_ dT_h_2	4	3116960	
	Data_Set_ dT_v_0	4	3116960	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
	Data_Set_ dT_v_2	4	3116960	
	Data_Set_ dT_U2	4	3116960	
	Data_Set_ dT_V2	4	3116960	
Roughness 3	Max_Valid	4	4	**19262124**
	Min_Valid	4	4	
	Data_Set_Sampling_dim1	4	76	
	Data_Set_Sampling_dim2	4	11	
	Data_Set_Sampling_dim3	4	36	
	Data_Set_Sampling_dim4	4	40	
	Data_Set_ Th	4	1203840	
	Data_Set_ Tv	4	1203840	
	Data_Set_ U	4	1203840	
	Data_Set_ V	4	1203840	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
Foam	Max_Valid	4	5	**88609596**
	Min_Valid	4	5	
	Data_Set_Sampling_dim1	4	31	
	Data_Set_Sampling_dim2	4	29	
	Data_Set_Sampling_dim3	4	22	
	Data_Set_Sampling_dim4	4	20	
	Data_Set_Sampling_dim5	4	28	
	Data_Set_Foam_Fraction	4	899	
	Data_Set_ Foam_tb_h	4	11075680	
	Data_Set_ Foam_tb_v	4	11075680	
Sunglint contamination	Max_Valid	4	4	**334679128**
	Min_Valid	4	4	
	Data_Set_Sampling_dim1	4	7	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
	Data_Set_Sampling_dim2	4	107	
	Data_Set_Sampling_dim3	4	261	
	Data_Set_Sampling_dim4	4	107	
	Data_Set_ Sigma_HH	4	20917323	
	Data_Set_ Sigma_HV	4	20917323	
	Data_Set_ Sigma_VH	4	20917323	
	Data_Set_ Sigma_VV	4	20917323	
Sun Brightness	Brightness_Temperature_List	12	Varies (assuming 1826)	**21916**
OS Galaxy Map	Max_Valid	4	2	**29099572**
	Min_Valid	4	2	
	Data_Set_Sampling_dim1	4	721	
	Data_Set_Sampling_dim2	4	1441	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
	I_CSWeF	4	721*1441	
	Q_CSWeF	4	721*1441	
	U_CSWeF	4	721*1441	
	Error_I_CSWeF	4	721*1441	
	Error_Q_CSWeF	4	721*1441	
	Error_U_CSWeF	4	721*1441	
	delta_I	4	721*1441	
OS Galaxy Map 2	Max_Valid	4	5	**552563368**
	Min_Valid	4	5	
	Data_Set_Sampling_dim1	4	8	
	Data_Set_Sampling_dim2	4	15	
	Data_Set_Sampling_dim3	4	19	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
	Data_Set_Sampling_dim4	4	51	
	Data_Set_Sampling_dim5	4	99	
	LUT_th_symm_A	4	8*15*19*51*99	
	LUT_tv_symm_A	4	8*15*19*51*99	
	LUT_th_hc_A	4	8*15*19*51*99	
	LUT_tv_hc_A	4	8*15*19*51*99	
	LUT_th_hs_A	4	8*15*19*51*99	
	LUT_tv_hs_A	4	8*15*19*51*99	
	LUT_th_symm_D	4	8*15*19*51*99	
	LUT_tv_symm_D	4	8*15*19*51*99	
	LUT_th_hc_D	4	8*15*19*51*99	
	LUT_tv_hc_D	4	8*15*19*51*99	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
	LUT_th_hs_D	4	8*15*19*51*99	
	LUT_tv_hs_D	4	8*15*19*51*99	
Constants and LUTs used by the Aux. Processor	Max_Valid	4	4	**250911764**
	Min_valid	4	4	
	Data_Set_Sampling_dim1	4	4	
	Data_Set_Sampling_dim2	4	181	
	Data_Set_Sampling_dim3	4	361	
	Data_Set_Sampling_dim4	4	12	
	Data_Set_LUT_bias1	4	181*361*12*16	
	Data_Set_LUT_bias2	4	181*361*12*16	
	Data_Set_LUT_sigabs	4	181*361*12*16	
	Data_Set_LUT_sigrel	4	181*361*12*16	
	Data_Set_LUT_first	4	181*361*12*16	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
Distance to the Coast	Distan_data	15	2621442	**39321630**
SSS Climatologic Data	Data_Set_Climatology_LUT_A	72	2621442	**377487656**
	Data_Set_Climatology_LUT_D	72	2621442	
ECMWF File	ECMWF_Parameters	229	100000	**22900004**
ECMCDF File	ECMCDF_Alpha	1	1689422	**5068266**
	ECMCDF_Beta	1	1689422	
	ECMCDF_Sat	1	1689422	
ECOLAI File	DFFG_ECOLAI	variable	74	**1374189238**
Binding List File	Binding_List	variable	4	**13664120**
Ocean Target Transformation Product Dual Pol	Max_Valid	4	2	**267304**
	Min_Valid	4	2	
	Data_Set_Sampling_dim1	4	129	
	Data_Set_Sampling_dim2	4	129	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
	Data_Set_LUT_offset_HH_A	4	129*129	
	Data_Set_LUT_offset_VV_A	4	129*129	
	Data_Set_LUT_offset_HH_D	4	129*129	
	Data_Set_LUT_offset_VV_D	4	129*129	
Ocean Target Transformation Product Full Pol	Max_Valid	4	2	**1066072**
	Min_Valid	4	2	
	Data_Set_Sampling_dim1	4	129	
	Data_Set_Sampling_dim2	4	129	
	Data_Set_LUT_offset_HH_A	4	129*129	
	Data_Set_LUT_offset_VV_A	4	129*129	
	Data_Set_LUT_offset_HHV_real_A	4	129*129	
	Data_Set_LUT_offset_HHV_imag_A	4	129*129	
	Data_Set_ LUT_offset_VVH_real_A	4	129*129	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
	Data_Set_ LUT_offset_VVH_imag_A	4	129*129	
	Data_Set_LUT_offset_HH_short_A	4	129*129	
	Data_Set_LUT_offset_VV_short_A	4	129*129	
	Data_Set_LUT_offset_HH_D	4	129*129	
	Data_Set_LUT_offset_VV_D	4	129*129	
	Data_Set_LUT_offset_HHV_real_D	4	129*129	
	Data_Set_LUT_offset_HHV_imag_D	4	129*129	
	Data_Set_ LUT_offset_VVH_real_D	4	129*129	
	Data_Set_ LUT_offset_VVH_imag_D	4	129*129	
	Data_Set_LUT_offset_HH_short_D	4	129*129	
	Data_Set_LUT_offset_VV_short_D	4	129*129	
Mixed Scene (land-sea) correction OTT	Max_Valid	4	2	
	Min_Valid	4	2	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
	Step	4	4	**354184252**
	Size	4	2	
	LUT_bias	2	Count * 32768	
Delta TB Product	Max_Valid	4	2	**5603100**
	Min_Valid	4	2	
	List_of_Regions	variable	Variable (1 is assumed for the analysis)	
Current Delta TB Product	Max_Valid	4	2	**33583454**
	Min_Valid	4	2	
	List_of_Orbits	Variable	Variable (4 DSR is assumed for the analysis)	

Table 6-1 Products sizes