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SMOS DPGS

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
		2.2.1	Added a File class for Reprocessing REPR, as per L1OP-CDR RID NW-92 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

Iss./Rev.	Date	Section / Page	Change Description
		3.2	Further clarification that Reference Data Sets are not included in the product
			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
		4.1.2.1	Endianness for L1 products is fixed to little-endian. 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
		4.2.1.1.2	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.
			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

Iss./Rev.	Date	Section / Page	Change Description
		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
		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 harmonizate 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

Iss./Rev.	Date	Section / Page	Change Description
		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
		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

Iss./Rev.	Date	Section / Page	Change Description
		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.
		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

Iss./Rev.	Date	Section / Page	Change Description
		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 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.

Iss./Rev.	Date	Section / Page	Change Description
		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.
		4.2.1.1.2	A Clarification about how to fill the fields included in the .DBL has been added. “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.
		4.2.1.2.3.1	X_Swath (Field #40) corrected to signed integer (2 bytes). Specified X_Swath value in km = integer value * 1050 / (215-1). 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.
		4.2.2.1.3 & 4.2.2.2.3	Scaling factor removed from Latitude and Longitude units.

Iss./Rev.	Date	Section / Page	Change Description
		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.
		4.2.1.2.3	"Confidence_Flags" and "Processing_Flags" type changed from unsigned short to unsigned byte. "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".

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		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.
		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.

Iss./Rev.	Date	Section / Page	Change Description
		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 "Tm_angle_sun" field has been removed. "Ind_Acard" field has been added.
		5.4.10.4	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. "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,
		5.4.10.4.2	"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.
3/1	19-Oct-2007	All	AUX_BIGWBF Auxiliary Data Product removed. It is no longer used in L2 SM processing.

Iss./Rev.	Date	Section / Page	Change Description
		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.
			“Dg_quality_Acard” field added.
		4.2.2.1.3	“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”

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		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.

Iss./Rev.	Date	Section / Page	Change Description
			"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 %.
		5.3.16.2	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"

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			“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
		5.4.10.4.2	“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.
			“Chi_2” (field #44) and “Chi_2_P” (field #45) types changed from Real Value to Integer Value.
		4.2.1.1.3	
			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.
			The “Grid_Point_ID” origin has been corrected to MIR
		4.2.1.2.3	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

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		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)

Iss./Rev.	Date	Section / Page	Change Description
		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

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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	3.0	24-Nov-06

Table 1.3-1 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	1.8	22-Dec-06
[RD.4]	SMOS DPGS Acronyms	SO-TN-IDR-GS-0010	1.10	21-Sep-07
[RD.5]	SMOS XML Read-Write API Software User Manual	SO-ID-IDR-GS-0009	1.13	19-Jun-07
[RD.6]	Input/Output Data Definition Document for the SMOS Level 2 Soil Moisture Prototype Processor Development	SO-ID-ARR-GS-4406	1.0	12-Oct-07
[RD.7]	Table Generation Requirement Document for the SMOS Level 2 Soil Moisture Prototype Processor Development	SO-TN-ARR-L2PP-0005	1.0	31-Aug-06
[RD.8]	Algorithm Theoretical Basis Document for the SMOS Level 2 Soil Moisture Prototype Processor Development	SO-TN-ARR-L2PP-0037	0.4	25-Jan-06
[RD.9]	SMOS L2 SSS Processor Input /Output Data Definition	SO-L2-SSS-ACR-005	2.2	12-Oct-07
[RD.10]	SMOS SSS L2 Table Generation Requirements Document	SO-L2-SSS-ACR-011	2.0	29-Jun-07
[RD.11]	SMOS SSS L2 Architecture Design Document	SO-L2-SSS-ACR-007	3.0	29-Jun-07
[RD.12]	SMOS SSS L2 Algorithm Theoretical Baseline Document	SO-L2-SSS-ACR-001	2.0	29-Jun-07
[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	2.0	19-Feb-07
[RD.16]	DPGS Master Interface Control Document	SO-ID-IDR-GS-0016	1.16	02-Jul-07
[RD.17]	Level 2 Processor ICD and Operational Constraints	SO-ID-IDR-GS-0003	2.0	02-Jul-07
[RD.18]	SMOS ECMWF Pre-processing	SO-TN-GMV-GS-4405	1.0	04-Sep-07

Table 1.4-1 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:

- o 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.
- o 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.)
- o Adaptation of tables to XML standards for clarification purposes. That is, tables follow the hierarchical tagging based in the format of an XML file.
- o 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.
- o 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.
- o 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.

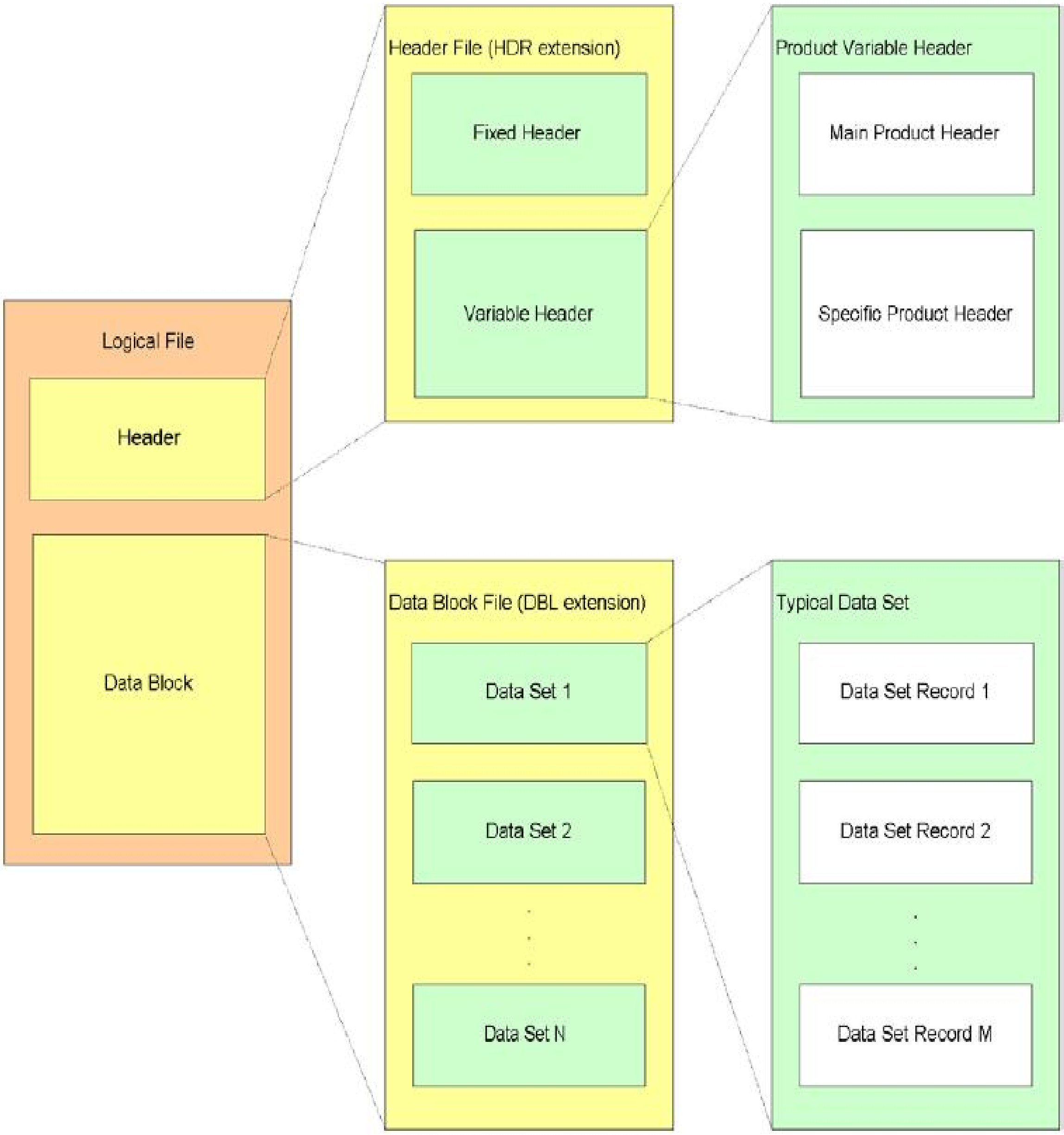

Figure 2-1. Level 2 Product Structure (taken from Deimos Eng. for L1PP Product format)

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 the SMOS operational ground segment (e.g. test data)
  - `1`: SMOS DPGS Fast Processing Centre
  - `2`: SMOS DPGS Reprocessing Centre
  - `3`: SMOS DPGS Reference Processing Centre
  - **`4:`** SMOS Near Real Time Processing Centre

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:

http://213.170.46.150/SMOS/schemas

The XML Rear/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:

http://213.170.46.150/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

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
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
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.	INT
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	INT

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						file.	
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)
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	INT from

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						time reference, as defined in Mission Conventions Document [AD.2]. "UTC=yyyy-mmddThh:mm:ss"	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
Auxiliary Data products	
AUX_DGG___	ISEA4-9 Discrete Global Grid used in geolocation
AUX_TIME__	Time Correlation used to initialise ESA EARTH EXPLORER CFI functions

Product Type	File_Description
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_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.
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_SOIL_P	Percentage of sand and clay, soil bulk density and two interpolating temperature coefficients over FAO grid (5'x5') used to computer soil parameters
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_CNFSM2	Processor Configuration parameters for L2 Soil Moisture
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

Product Type	File_Description
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_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_CNFOS2	Processor Configuration Parameters for L2 Ocean Salinity
AUX_AGDPT_	Look Up Tables used by processor to initialise Geophysical Parameters

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

3.1.2 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: • " VFR": acquisition station for SMOS at ESAC • " SGS": acquisition station for SMOS at Svalbard • Others TBD 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 are: {FPC}: SMOS DPGS Fast Processing Centre @ ESAC; {LTA}: SMOS DPGS LTA @ Kiruna; {CEC}: SMOS DPGS Calibration &	ICNF

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						Expertise Centre @ESAC; {IDR}: Indra ; {GMV}: GMV; {INS}: INSA	
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
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	MIR

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						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	
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
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	INT + Job Order''s State tag

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						DEGRADED: SPH Overall_Quality_Flag set to >1	
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

Accepted Name	Description
MIR_OSDAP2_SPH	SPH for L2 OS Data Analysis 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***					Tag starting a Main_Info structure	

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
		Starting Tag					
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

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
11	***UTC_at_ANX***	string	N/A	30 bytes	%30s	UTC time of the ascending node of the orbit containing the Precise_Validity_Start UTC=yyyy-mm-ddThh:mm:ss.uuuuuu	MIR
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	***Time_Info***	Closing Tag				Tag closing Time_Info structure	
15	***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
16	***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
17	***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
18	***Header_Size***	Integer	bytes	6 bytes	%06d	Size of the Header of the product	INT
19	***Datablock_Size***	Integer	Bytes	11 bytes	%011d	Size of the product Datablock	INT
20	***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

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
21	***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 starting a ***Data_Set*** structure	

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
		Tag					
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
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___
TIME_CORRELATION_FILE	AUX_TIME__
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
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___

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
MEAN_WEIGHTING_FUNCTION_FILE	AUX_MN_WEF
SOIL_PROPERTIES_FILE	AUX_SOIL_P
GALAXY_SM_FILE	AUX_GAL_SM
LAND_COVER_CLASSES_FILE	AUX_LANDCL
SOIL_MOISTURE_CONFIG_FILE	AUX_CNFSM2
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_OS_FILE_2	AUX_GAL2OS
FOAM_FILE	AUX_FOAM__
SUNGLINT_FILE	AUX_SGLINT
ATMOS_FILE	AUX_ATMOS_
DISTAN_FILE	AUX_DISTAN
CLIMATOLOGY_SSS_FILE	AUX_SSS___
OCEAN_SALINITY_CONFIG_FILE	AUX_CNFOS2
OS_GEOPHYSICAL_PARAMETERS_FILE	AUX_AGDPT_

Table 4-5. L2 Data Set Reference List

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	
02-19	***Main_Info***	structure				Main Product Info structure's fields as defined in fields 01 to 18 in Table 4-3	
20	***Quality_Information***	Starting Tag				Init of XML Structure containing variables described below	
21	***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)	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
22	***Overall_Quality_Threshold_Low***	integer	$(10^{-2}$ %)	5 bytes	%05d	Low Threshold to set the SPH Overal_Quality field	AUX_CNFSM2
23	***Overall_Quality_Threshold_High***	integer	$(10^{-2}$ %)	5 bytes	%05d	High Threshold to set the SPH Overal_Quality field	AUX_CNFSM2
24	***Flag_Measure***	integer	$(10^{-2}$ %)	5 bytes	%05d	Percentage of "good" flagged TBs over all TBs = 100*(totalFlaggedTBs / totalTBs) Total TBs: total number of TBs processed. This includes TBs that do not qualify for retrieval. totalFlaggedTBs: total number of TBs used in a successful retrieval with "Sun Glint FOV Flag" set.	INT
25	***Reject_Measure***	integer	$(10^{-2}$ %)	5 bytes	%05d	Percentage of total rejected TBs = 100*(totalRejectedTBs / totalTBs) totalRejectedTBs: total number of TBs rejected in the process.	INT
26	***Flag_Retrieval***	integer	$(10^{-2}$ %)	5 bytes	%05d	100*(totalFlaggedNodes / totalNodes) totalNodes: total number of nodes originally participated in the processing. This included nodes which are rejected. totalFlaggedNodes: total number of nodes that have al least one of the following conditions true: o FL_RFI_PRONE_H is ON o FL_RFI_PRONE_V is ON o N_AF_FOV > 0	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
						o N_SUN_TAILS > 0 o N_SUN_GLINT_AREA > 0 o N_SUN_FOV > 0 o FL_RANGE is ON o FL_DQX is ON o FL_CHI2_P is ON o N_WILD > 0	
27	***Reject_Retrieval***	integer	(10^{-2} %)	5 bytes	%05d	Percentage of rejected nodes = 100*(totalRejectedNodes / totalNodes) totalRejectedNodes: total number of nodes rejected during processing.	INT
28	***Quality_Information***	Ending Tag				Ending of XML Structure containing quality variables	
29	***L2_Product_Location***	Starting Tag				Init of XML structure containing variables described below	
30	***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
31	***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
32	***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

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
33	***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
34	***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
35	***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
36	***Southernmost_Latitude***	real	deg	11	%+011.6f	Geodetic Latitude of southernmost grid point (WGS84)	INT
37	***Southernmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of southernmost grid point	INT
38	***Northernmost_Latitude***	real	deg	11	%+011.6f	Geodetic Latitude of northernmost grid point (WGS84)	INT
39	***Northernmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of northernmost grid point	INT
40	***Easternmost_Longitude***	real	deg	11	%+011.6f	Geocentric Longitude of easternmost grid point	INT
41	***Easternmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of easternmost grid point	INT
42	***Westernmost_Longitude***	real	deg	11	%+011.6f	Geocentric Longitude of Westernmost grid point	INT
43	***Westernmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of westernmost grid point	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
44	***L2_Product_Location***	Ending Tag				End of XML structure containing variables described below	
45-56	***Data_Sets***	structure				Data Sets structure's fields as defined in Table 4-4	
57	***Specific_Product_Header***	Ending Tag				Tag ending the Specific_Product_Header structure	

Table 4-6. 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_`
DGG_FILE	`AUX_DGG___`
TIME_CORRELATION_FILE	`AUX_TIME__`
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`
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`
SOIL_PROPERTIES_FILE	`AUX_SOIL_P`

Reference Data Set Name	Product Type
GALAXY_SM_FILE	AUX_GAL_SM
LAND_COVER_CLASSES_FILE	AUX_LANDCL
SOIL_MOISTURE_CONFIG_FILE	AUX_CNFSM2

Table 4-7.List of References Data Set Names

4.2.1.1.3 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.

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***	integer value	deg	Signed integer (4 bytes)	1 element	Latitude of DGG point	MIR
04	***Longitude***	integer value	deg	Signed integer (4 bytes)	1 element	Longitude of DGG point	MIR
05	***Altitude***	Integer value	mm	Signed integer (4 bytes)	1 element	Altitude of DGG point	AUX_DGG ——
06	***Mean_Acq_Time***	Date	N/A	signed/unsigned integer (4 bytes)	Vector array of 3 elements. First element(days) is signed integer,	Mean time of acquisition for all valid TB measurements of DGG point. Expressed in EE CFI transport time format (Array of 3 integer elements)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
					remaining two (seconds and microseconds) are unsigned		
07	***Spatial_Resolution***	real value	Km	Float (4 bytes)	1 element	Mean area of Earth surface, centred on Grid Point where SM is retrieved, derived for all valid TB measurements.	INT
08	***Num_InputMsmnt_Valid***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Number of input measurements used for retrieval	INT
09	***Num_InputMsmnt_Invalid***	Integer value	N/A	unsigned integer (2 bytes)	1 element	Number of input measurements rejected before retrieval	INT
	Retrieval_Results_Data					Init of ***Retrieval_Results*** structure	
10	***Soil_Moisture***	real value	m^3m^{-3}	Float (4 bytes)	1 element	Retrieved soil moisture value. See the possible values in the note included after this table.	INT
11	***Soil_Moisture_DQX***	Real value	m^3m^{-3}	Float (4 bytes)	1 element	DQX for SOIL_MOISTURE. See the possible values in the note included after this table.	INT
12	***Optical_Thickness_Nad***	Real value	neper	Float (4 bytes)	1 element	Nadir optical thickness estimate for vegetation layer. It represents the global Tau if the Use_TAU_L_In_Inv flag from the AUX_CNFSM2 is OFF, otherwise it is the vegetation Tau. See the possible filled values in the note included after this table.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
13	***Optical_Thickness_Nad _DQ X***	Real value	neper	Float (4 bytes)	1 element	DQX for OPTICAL_THICKNESS _NAD. See the possible values in the note included after this table.	INT
14	***Surface_Temperature***	Real value	K	Float (4 bytes)	1 element	Surface temperature – may be a retrieved value or from an external source. See the possible values in the note included after this table.	INT
15	***Surface_Temperature_D QX***	Real value	K	Float (4 bytes)	1 element	DQX for SURFACE_TEMPERATURE. See the possible values in the note included after this table.	INT
16	***TTH***	Real value	N/A	Float (4 bytes)	1 element	Optical thickness coefficient for polarisation H. See the possible values in the note included after this table.	INT
17	***TTH_DQX***	Real value	N/A	Float (4 bytes)	1 element	DQX for TTH. See the possible values in the note included after this table.	INT
18	***RTT***	Real value	N/A	Float (4 bytes)	1 element	Ratio of optical thickness coefficients TTH/TTV. See the possible values in the note included after this table.	INT
19	***RTT_DQX***	Real value	N/A	Float (4 bytes)	1 element	DQX for RTT. See the possible values in the note included after this table.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
20	***Scattering_Albedo_H***	Real value	N/A	Float (4 bytes)	1 element	Scattering albedo for horizontal polarisation	INT
21	***Scattering_Albedo_H _DQX***	Real value	N/A	Float (4 bytes)	1 element	DQX for Scattering_ALBEDO_H	INT
22	***DIFF_Albedos***	Real value	N/A	Float (4 bytes)	1 element	Difference of albedos ω_H-ω_V	INT
23	***DIFF_Albedos _DQX***	Real value	N/A	Float (4 bytes)	1 element	DQX for DIFF_ALBEDOS. See the possible values in the note included after this table.	INT
24	***Roughness_Param***	Real value	N/A	Float (4 bytes)	1 element	Roughness parameter estimate. See the possible values in the note included after this table.	INT
25	***Roughness_Param_DQ X***	Real value	N/A	Float (4 bytes)	1 element	DQX for ROUGHNESS_PARAM . See the possible values in the note included after this table.	INT
26	***Dielect_Const_MD_RE***	Real value	Fm^{-1}	Float (4 bytes)	1 element	Real part of the dielectric constant from MD retrieval. See the possible values in the note included after this table.	INT
27	***Dielect_Const_MD_RE_ DQX***	Real value	Fm^{-1}	Float (4 bytes)	1 element	DQX for DIELECT_CONST_ MD_. See the possible values in the note included after this table.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
28	***Dielect_Const_MD_ IM***	Real value	Fm^{-1}	Float (4 bytes)	1 element	Imaginary part of dielectric constant from MD retrieval. See the possible values in the note included after this table.	INT
29	***Dielect_Const_MD_IM_ DQX***	Real value	Fm^{-1}	Float (4 bytes)	1 element	DQX for DIELECT_CONST_ MD_IM . See the possible values in the note included after this table.	INT
30	***Dielect_Const_Non_MD _RE***	Real value	Fm^{-1}	Float (4 bytes)	1 element	Real part of dielectric constant from retrieval models other than MD. See the possible values in the note included after this table.	INT
31	***Dielect_Const_Non_MD _RE_DQ X***	Real value	Fm^{-1}	Float (4 bytes)	1 element	DQX for DIELECT_CONST_NON_MD_RE. See the possible values in the note included after this table.	INT
32	***Dielect_Const_Non_MD _IM***	Real value	Fm^{-1}	Float (4 bytes)	1 element	Imaginary part of dielectric constant from retrieval models other than MD. See the possible values in the note included after this table.	INT
33	***Dielect_Const_Non_MD _IM_ DQX***	Real value	Fm^{-1}	Float (4 bytes)	1 element	DQX for DIELECT_CONST_NON_MD_IM. See the possible values in the note included after this table.	INT
34	***TB_ASL_Theta_B_H***	Real value	K	Float (4 bytes)	1 element	Surface level TB (corrected from sky/atmosphere contribution) computed from forward model with a	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						specific incidence angle θ_B (42.5 °), and for H polarisation. See the possible values in the note included after this table.	
35	***TB_ASL_Theta_B_H_DQX***	Real value	K	Float (4 bytes)	1 element	DQX for TB_ASL_THETA_B_H. See the possible values in the note included after this table.	INT
36	***TB_ASL_Theta_B_V***	Real value	K	Float (4 bytes)	1 element	Surface level TB (corrected from sky/atmosphere contribution) computed from forward model a specific incidence angle θ_B (42.5 °), and for V polarisation. See the possible values in the note included after this table.	INT
37	***TB_ASL_Theta_B_V_DQX***	Real value	K	Float (4 bytes)	1 element	DQX for TB_ASL_THETA_B_V . See the possible filled values in the note included after this table.	INT
38	***TB_TOA_Theta_B_H***	Real value	K	Float (4 bytes)	1 element	Top of the atmosphere TB computed from forward model at specific incidence angle θ_B (42.5º), for H polarisation. See the possible values in the note included after this table.	INT
39	***TB_TOA_Theta_B_H_DQX***	Real value	K	Float (4 bytes)	1 element	DQX for TB_TOA_Theta_BH. See the possible values in the note included after	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						this table.	
40	***TB_TOA_Theta_B_V***	Real value	K	Float (4 bytes)	1 element	Top of the atmosphere TB computed from forward model at specific incidence angle θ_B (42.5º), for V polarisation. See the possible values in the note included after this table.	INT
41	***TB_TOA_Theta_B_V_DQX***	Real value	K	Float (4 bytes)	1 element	DQX for TB_TOA_Theta_BV. 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.	
42	***Confidence_Flags***	flags	N/A	unsigned integer (2 bytes)	1 element	See Table 4-9	INT
43	***GQX***	Integer value	N/A	Unsigned byte	1 element	Global Quality Index	INT
44	***Chi_2***	Integer value	N/A	Unsigned byte	1 element	Retrieval fit quality index	INT
45	***Chi_2_P***	Integer value	N/A	Unsigned byte	1 element	$\chi 2$ high value acceptability probability	INT
46	***N_Wild***	Integer value	N/A	Unsigned byte	1 element	Counter – number of times that wild data occurred	INT
47	***M_AVA0***	Integer value	N/A	Unsigned byte	1 element	Initial number of TB measurements available in	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						L1c	
48	*M_AVA*	Integer value	N/A	Unsigned byte	1 element	Pre-processing – number of TB measurements available for retrieval	INT
49	*AFP*	Real value	Km	Float (4 bytes)	1 element	Mean Surface of the antenna Footprint ellipses on Earth	INT
50	*N_AF_FOV*	Integer value	N/A	Unsigned byte	1 element	Counter view – number of views that flag is set off to AF_FOV_flag	INT
51	*N_Sun_Tails*	Integer value	N/A	Unsigned byte	1 element	Counter view – number of views that flag is set on to Sun_Tails flag	INT
52	*N_Sun_Glint_Area*	Integer value	N/A	Unsigned byte	1 element	Counter view – number of views that flag is set on to Sun_Glint_Area flag	INT
53	*N_Sun_FOV*	Integer value	N/A	Unsigned byte	1 element	Counter view – number of views that flag is set on Sun_FOV flag	INT
	Confidence_Descriptors_Data					End of ***Confidence_Descriptors_Data*** structure.	
	Science_Descriptors_Data					Init of ***Science_Descriptors_Data*** structure	
54	*Science_Flags*	Flags		Unsigned integer 32 (4 bytes)	1 element	See Table 4-10	INT
55	*N_Sky*	Integer value	N/A	Unsigned byte	1 element	Strong Galactic Source	INT
	Science_Descriptors_Da					End of ***Science_Descriptors*** structure	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	ta						
	Processing_Descriptors _Data					Init of ***Processing_Descriptors*** structure.	
56	***Processing_Flags***	Flags	N/A	unsigned integer(2 bytes)	1 element	See Table 4-11	INT
57	***S_Tree_1***	Integer value	N/A	Unsigned byte	1 element	Branches of decision tree stage 1.	INT
58	***S_Tree_2***	Integer value	N/A	Unsigned byte	1 element	Retrieval R2, R3 or R4. See the possible values in the note included below.	INT
	Processing_Descriptors _Data					End of ***Processing_Descriptors*** structure.	
	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 4-8. SM_SWATH Data Set Record

Here are detailed the rules to fill the fields included in table 4-8:

- Fields from #10 to #25
  - If no retrieval is attempted, then set the parameter value and its DQX both to -999.
  - If the parameter is fixed, then set the parameter value to the reference value computed using the WEF of the median measured TB for the retrieval fraction. Set the DQX to -999 in this case.
  - 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 set the parameter value to the value from the last iteration in the retrieval loop and the DQX to the RSTD for that parameter value.
- Fields from #26 to #33
  - 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 Field #34 to Field #41, if there is no retrieval attempt or the retrieval failed, then output -999.

- Field #58, 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

4.2.1.1.3.1 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 UPF
- **FL_DQX**: raised as soon as any retrieval parameter exceeds its allowed range set in UPF
- **FL_Chi_2**: raised if Chi_2_P is greater than the threshold TH_Chi_2. Values considered for TH_Chi_2 are circa 0.002

The following table lists the structure of all the Retrieval 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)
42.01	***Spare bit***		1
42.02	***FL_RFI_Prone_H***	DGG Current RFI for H pol above threshold	1
42.03	***FL_RFI_Prone_V***	DGG Current RFI for V pol above threshold	1
42.04	***Spare bit***		1
42.05	***FL_NO_PROD***	No products are generated	1
42.06	***FL_RANGE***	Retrieval values outside range	1
42.07	***FL_DQX***	High retrieval DQX	1
42.08	***FL_ChI2_P***	Poor fit quality	1
42.09-42.16	***Spare Bits***	8 spare bits for future use.	8

Table 4-9. Structure of the Retrieval Flags in the DSR

4.2.1.1.3.2 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)
54.01	***FL_Non_Nom***	Presence of other than nominal soil	1
54.02	***FL_Scene_T***	True (1) if any of scene flags is set (1).	1
54.03	***FL_Barren***	Scene flag indicating presence of rocks	1
54.04	***FL_Topo_S***	Scene flag indicating presence of strong topography	1
54.05	***FL_Topo_M***	Scene flag indicating presence of moderate topography	1
54.06	***FL_OW***	Scene flag indicating presence of open water	1
54.07	***FL_Snow_Mix***	Scene flag indicating presence of mixed snow	1
54.08	***FL_Snow_Wet***	Scene flag indicating presence of wet snow	1
54.09	***FL_Snow_Dry***	Scene flag indicating presence of significant dry snow	1
54.10	***FL_Forest***	Scene flag indicating presence of forest	1
54.11	***FL_Nominal***	Scene flag indicating presence of nominal soil	1
54.12	***FL_Frost***	Scene flag indicating presence of frost	1
54.13	***FL_Ice***	Scene flag indicating presence of permanent ice/snow	1
54.14	***FL_Wetlands***	Scene flag indicating presence of wetlands	1
54.15	***FL_Flood_Prob***	Scene flag indicating probable flooding risk	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
54.16	*FL_Urban_Low*	Scene flag indicating presence of limited urban area	1
54.17	*FL_Urban_High*	Scene flag indicating presence of large urban area	1
54.18	*FL_Sand*	Scene flag indicating presence of high sand fraction	1
54.19	*FL_Sea_Ice*	Scene flag indicating presence of sea ice	1
54.20	*FL_Coast*	Scene flag indicating presence of large tidal flag	1
54.21	*FL_Occur_T*	True (1) if any of occur flags is set (1).	1
54.22	*FL_Litter*	Occur flag indicating litter suspected	1
54.23	*FL_PR*	Occur flag indicating interception suspected (Pol ratio)	1
54.24	*FL_Intercep*	Occur flag – ECMWF indicates interception	1
54.25	*FL_External*	Any of the external flags on, or N_SKY counter not equal to zero	1
54.26	*FL_Rain*	External flag indicating heavy rain suspected	1
54.27	*FL_TEC*	External flag indicating high ionospheric contributions	1
54.28	*FL_TAU_FO*	Scene flag indicating presence of thick forest	1
54.29	*FL_WINTER_FOREST*	Flag indicating that the winter forest case has been selected by the decision tree.	1
54.30	*FL_DUAL_RETR_FNO_FFO*	Flag indicating dual retrieval is performed on the FNO and FFO fractions.	1
54.31 - 54.32	*Spare_SFL*	Two spare bits	2

Table 4-10. Structure of the Science Flags in the DSR

4.2.1.1.3.3 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 4 spare fields exit for future use.

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
56.01	***FL_R4***	It will be set to True if attempted regardless of success.	1
56.02	***FL_R3***	It will be set to True if attempted regardless of success.	1
56.03	***FL_R2***	It will be set to True if attempted regardless of success.	1
56.04	***FL_MD_A***	True if MDa failed	1
56.05-56.16	***Spare_bits***	12 spare fields for future use	12

Table 4-11. Structure of the Processing 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

Same as the UDP's SPH (see section 4.2.1.1.2).

See the Reference Data Set names in Table 4-7.

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.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	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***	integer value	deg	Signed integer (4 bytes)	1 element	Latitude of DGG point	MIR
04	***Longitude***	integer value	deg	Signed integer (4 bytes)	1 element	Longitude of DGG point	MIR
05	***Altitude***	Integer value	mm	Signed integer (4 bytes)	1 element	Altitude of DGG point	MIR
06	***M_AVA***	Counter	N/A	Unsigned byte	1 element	Pre-processing – number of TB measurements available for retrieval	INT
	List_of_Residual_Datas					Init of list of ***Residual_Data*** structure.	
	Residual_Data					Init of ***Residual_Data*** structure, repeated M_AVA times..	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
07	***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.	
08	***Num_Incidence _Angles***	Counter	N/A	Unsigned byte	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	
09	***Cover_Frac_FM_ FNO***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Vegetated Soil+ Sand	INT
10	***Cover_Frac_FM_ FFO***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Forest	INT
11	***Cover_Frac_FM_ FWL***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Wetlands	INT
12	***Cover_Frac_FM_ FWP***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Open Fresh Water	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
13	***Cover_Frac_FM_FWS***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Open Saline Water	INT
14	***Cover_Frac_FM_FEB***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Barren	INT
15	***Cover_Frac_FM_FTI***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for permanent ice/ snow	INT
16	***Cover_Frac_FM_FRZ***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Frozen	INT
17	***Cover_Frac_FM_FSN***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Snow	INT
18	***Cover_Frac_FM_FEU***	integer value	%	unsigned integer (2 bytes)	1 element	Cover fractions for Urban	INT
	Cover_Fractions_Data					End of ***Cover_Fractions_Data*** structure.	
	List_of_Cover_Fractions_Datas					End of list of Cover_Fractions_Datas.	
	Mean_Cover_Fractions_Data					Init of ***Mean_Cover_Fractions_Data*** structure.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
19	***Mean_FM0_FNO***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FNO	INT
20	***Mean_FM0_FFO***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FFO	INT
21	***Mean_FM0_FWL***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FWL	INT
22	***Mean_FM0_FWO***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FWO	INT
23	***Mean_FM0_FEB***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FEB	INT
24	***Mean_FM0_FTI***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FTI	INT
25	***Mean_FM0_FEU***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FEU	INT
26	***Mean_FM0_FTS***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FTS	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
27	***Mean_FM0_FTM***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FTM	INT
28	***Mean_FM0_FRZ***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FRZ	INT
29	***Mean_FM0_FSM***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FSM	INT
30	***Mean_FM0_FSW***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FSW	INT
31	***Mean_FM_FNO***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FNO	INT
32	***Mean_FM_FFO***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FFO	INT
33	***Mean_FM_FWL***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FWL	INT
34	***Mean_FM_FWP***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FWP	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
35	***Mean_FM_FWS***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FWS	INT
36	***Mean_FM_FEB***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FEB	INT
37	***Mean_FM_FTI***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FTI	INT
38	***Mean_FM_FRZ***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FRZ	INT
39	***Mean_FM_FSN***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FSN	INT
40	***Mean_FM_FEU***	integer value	%	unsigned integer (2 bytes)	1 element	Mean cover fraction for FEU	INT
	Mean_Cover_Fractions					End of ***Mean_Cover_Fractions_Data*** structure.	
	Other_Data					Init of ***Other_Data*** structure.	
41	***X_Swath***	real value (code as integer)	km	signed integer (2 bytes)	1 element	Abscissa of dwell line (km). Coded in 2's complement. LSB = 500km/216.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						X_Swath value in km = integer value * 1050 / (2^{15}-1).	
42	***N_TB_Range***	Integer value	N/A	unsigned byte	1 element	L2 testing TB against range – count of deleted TB measurements.	INT
43	***N_RFI_H***	Integer value	N/A	unsigned byte	1 element	RFI detected in L2 test – count of deleted TB measurements.	INT
44	***N_RFI_V***	Integer value	N/A	unsigned byte	1 element	RFI detected in L2 test – count of deleted TB measurements	INT
45	***RATIO_AVA***	Integer value	N/A	unsigned byte	1 element	Ratio of useful views Coded in 2's complement. LSB =1/(2^8-1). This means value = (unsigned char) *1/(2^8-1)	INT
46	***N_Retries***	Integer value	N/A	unsigned byte	1 element	Number of retries	INT
47	***N_Cleaned***	Integer value	N/A	unsigned byte	1 element	Wild data removed (count)	INT
48	***N_Iterations***	Integer value	N/A	unsigned byte	1 element	Number of iterations to convergence	INT
49	***PR_Index***	Integer value	N/A	unsigned byte	1 element	Polarisation ratio Index	INT
50	***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

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
51	***A_Card_Init_Val***	real value	F/M	float (4 bytes)	1 element	Initial value for free parameters	INT
52	***SM_Init_Val***	real value	%	float (4 bytes)	1 element	Initial value for free parameters	INT
53	***Tau_Init_Val***	real value	neper	float (4 bytes)	1 element	Initial value for free parameters	INT
54	***TTH_Init_Val***	real value	N/A	float (4 bytes)	1 element	Initial value for free parameters	INT
55	***RTT_Init_Val***	real value	N/A	float (4 bytes)	1 element	Initial value for free parameters	INT
56	***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
57	***Diff_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
58	***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
59	***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
60	***A_Card _Init_Std***	real value	N/A	float (4 bytes)	1 element	Initial std 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.	
61	***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
62	***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
63	***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
64	***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
65	***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
66	***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	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						table.	
67	***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
68	***TAU_CUR***	real value	neper	float (4 bytes)	1 element	This is the retrieved tau value if Tau is free, zero otherwise. See the possible values in the note included after this table.	INT
69	***TAU_CUR_DQX***	real value	neper	float (4 bytes)	1 element	This is a special tau DQX value computed using a special sigma. See the possible values in the note included after this table.	INT
70	***HR_CUR***	real value	N/A	float (4 bytes)	1 element	This is the retrieved HR value if HR is free, zero otherwise. See the possible values in the note included after this table.	INT
71	***HR_CUR_DQX***	real value	N/A	float (4 bytes)	1 element	This is a special HR DQX value computed using a special sigma. See the possible values in the note included after this table.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
72	***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
73	***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
74	***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
75	***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
76	***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
77	***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
78	***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	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						thevalue of the flag Use_TAU_L_In_Inv in the AUX_CNFSM2	
79	***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.	
80	***DAP_Flags***	Flags	N/A	Unsigned integer (4 bytes)	1 element	See Table 4-13	INT
	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 4-12. 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 #50 to #67
  - 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 #68 to #71,
  - Values are output only when the parameter is free and the rertrieval is successful.
  - If the parameter is fixed, or no retrieval is attempted, or the retrieval failed, -999 is output

- Fields from #72 to #77
  - 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)
80.01	***FL_Data_Miss***	Check fall back options	1
80.02	***FL_MVAL0***	Flag to indicate no more retrieval to be done. True if MVAL0< TH_MMin0	1
80.03	***FL_MVAL***	Flag to indicate no more retrieval to be done. True if MVAL < TH_MMin1	1
80.04	***FL_R4_NITM***	Flag indicating that R4 was attempted, but failed with NITM (R4:Retrieval status for retrieval option 4 – Full retrieval scheme)	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
80.05	***FL_R4_KDIA***	Flag indicating R4 wasattempted, but failed with KDIA (R4:Retrieval status for retrieval option 4 – Full retrieval scheme)	1
80.06	***FL_R4_COND***	Flag to indicate R4 attempted, but failed COND (R4:Retrieval status for retrieval option 4 – Full retrieval scheme)	1
80.07	***FL_R3_NITM***	Flag to indicate R37 attempted, failed NITM (R3: Retrieval status for retrieval option 3 –rich retrieval scheme)	1
80.08	***FL_R3_KDIA***	Flag to indicate Failed KDIA (R3: Retrieval status for retrieval option 3 –rich retrieval scheme)	1
80.09	***FL_R3_COND***	Flag to indicate R3 attempted, but failed COND (R3: Retrieval status for retrieval option 3 –rich retrieval scheme)	1
80.10	***FL_R2_NITM***	Flag to indicate R2 attempted, but failed NITM (R2: Retrieval status for retrieval option 2 –poor retrieval scheme)	1
80.11	***FL_R2_KDIA***	Flag to indicate Failed KDIA	1
80.12	***FL_R2_COND***	Flag to indicate R2 attempted, but failed COND (R2: Retrieval status for retrieval option 2 –poor retrieval scheme)	1
80.13	***FL_MD_NITM***	Flag to indicate aditonal MD retrieval failed NITM	1
80.14	***FL_MD_KDIA***	Flag to indicate Failed KDIA	1
80.15	***FL_MD_COND***	Flag to indicate MDa failed COND	1
80.16	***FL_CE***	Computational exceptions	1
80.17	***FL_Sun_Point_C***	Used to exclude view	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
80.18	*FL_Sun_Glint_FOV_C*	Indicator of possible sun glint effects. Not relevant for SM computations	1
80.19	*FL_Current_Tau_Nadir_LV*	Flags driving request for updating DGG_Current_Tau_Nadir_LV map after processing	1
80.20	*FL_Current_Tau_Nadir_FO*	Flags driving request for updating DGG_Current_Tau_Nadir_FO map after processing	1
80.21	*FL_Current_HR*	Flag driving request for updating HR maps after processing	1
80.22	*FL_Current_RFI*	Flags driving request for updating RFI maps after processing	1
80.23	*FL_Current_Flood*	Flags driving request for updating Flood maps after processing. It is a place holder. No algorithm has been defined yet.	1
80.24-80.32	*Spare*	Spare bits	9

Table 4-13. Structure of the Flags in the DAP

4.2.2 Level 2 Ocean Salinity data types

As is written in [RD.6], 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 oceanographics 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	
02-19	***Main_Info***	structure				Main Product Info structure's fields as defined in fields 01 to 18 in Table 4-3	
20	***Quality_Information***	Starting Tag				Init of XML Structure containing variables described below	
21	***Overall_Quality***	integer	N/A	1 byte	%01d	Good, medium or bad: 0 = good, 1 = medium, 2 = bad The overall quality is set according to the following formula: If Percentage of Good_Retrieval > Overall_Quality_Threshold_High then Overall_Quality = 0 (good) else if Percentage of Good_Retrieval < Overall_Quality_Threshold_Low then Overall_Quality = 2 (bad) else Overall_Quality = 1 (medium)	INT
22	***Percentage_of_Good_Retrieval***	integer	(10^{-2} %)	5 bytes	%05d	Percentage of good retrieval Sum(Fg_chi2_P.false)/Ngp	INT
23	***Overall_Quality_Threshold_Low***	integer	(10^{-2} %)	5 bytes	%05d	Low Threshold to set the SPH Overal_Quality field	AUX_CNFOS2
24	***Overall_Quality_Threshold_High***	integer	(10^{-2} %)	5 bytes	%05d	High Threshold to set the SPH Overal_Quality field	AUX_CNFOS2
25	***GP_Average_Measurement_percentage***	real	N/A	11 bytes	%+011.6f	Average number of measurements (any polarization direction) per grid point	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
26	***GP_Average_Valid_Measurement_percentage***	real	N/A	11 bytes	%+011.6f	Average number of valid measurements (any polarization) per grid point	INT
27	***Quality_Information***	Ending Tag				End of XML Structure containing variables described above	
28	***L2_Product_Location***	Starting Tag				Init of XML structure containing variables described below	
29	***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
30	***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
31	***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
32	***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
33	***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
34	***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

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
35	***Southernmost_Latitude***	real	deg	11 bytes	%+011.6f	Geodetic Latitude of southernmost grid point (WGS84)	INT
36	***Southernmost _Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of southernmost grid point	INT
37	***Northernmost_Latitude***	real	deg	11 bytes	%+011.6f	Geodetic Latitude of northernmost grid point (WGS84)	INT
38	***Northernmost_Gridpoint _ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of northernmost grid point	INT
39	***Easternmost_Longitude***	real	deg	11 bytes	%+011.6f	Geocentric Longitude of easternmost grid point	INT
40	***Easternmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of easternmost grid point	INT
41	***Westernmost_Longitude***	real	deg	11 bytes	%+011.6f	Geocentric Longitude of Westernmost grid point	INT
42	***Westernmost_Gridpoint_ID***	Unsigned Integer	N/A	7	%07d	Unique identifier of westernmost grid point	INT
43	***L2_Product_Location***	Ending Tag				End of XML structure containing variables described above	
44	***L2_Product_Description***	Starting Tag				Tag starting the init of L2_Product_description structure	
45	***List_of_models***	Starting Tag				Tag starting the List of models structure. This structure is repeated 4 times.	

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
46	*model*	Starting Tag				Tag starting the model structure.	
47	*List_of_Retrieved_Parameters*	Starting Tag				Tag starting the List of Retrieved Parameters structure. This structure is repeated 10 times.	
48	*Retrieved_Parameter*	Starting Tag				Tag starting the Retrieved_Parameter structure.	
49	*Name*					Name of the retrieved parameter	
50	*Unit*					Unit of the retrieved parameter.	
51	*description*					Short definition/ description of the retrieved parameter.	
52	*Retrieved_Parameter*	Ending Tag				Tag ending the the Retrieved Parameter sqtructure.	
53	*List_of_Retrieved_Parameters*	Ending Tag				Tag ending the List of Retrieved Parameters structure.	
54	*model*	Ending Tag				Tag ending the model structure.	
55	*List_of_models*	Ending Tag				Tag ending the List of models structure	
56	*L2_Product_Description*					Tag ending the L2 Product Description structure	
51-63	*Data_Sets*	structure				Data Sets structure's fields as defined in fields 14 to 26 in Table 4-4	

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
64	***Specific_Product_Header***	Ending Tag				Tag ending the Specific_Product_Header	

Table 4-14. 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___
TIME_CORRELATION_FILE	AUX_TIME__
ECMWF_FILE	AUX_ECMWF_
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_OS_FILE_2	AUX_GAL2OS
FOAM_FILE	AUX_FOAM__
SUNGLINT_FILE	AUX_SGLINT

Reference Data Set Name	File Type (File Category + Semantic Descriptor)
ATMOS_FILE	AUX_ATMOS_
DISTAN_FILE	AUX_DISTAN
CLIMATOLOGY_SSS_FILE	AUX_SSS___
OCEAN_SALINITY_CONFIG_FILE	AUX_CNFOS2
OS_GEOPHYSICAL_PARAMETERS_FILE	AUX_AGDPT_

Table 4-15. 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

- Science descriptors

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.	
05	***Equiv_ftprt_diam***	real value	m	float (4 bytes)	1 element	Equivalent Footprint diameter	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 acquisition time	INT
07	***SSS1***	real value	psu	float (4 bytes)	1 element	Sea surface salinity using roughness model 1	INT
08	***Sigma_SSS1***	real value	psu	float (4 bytes)	1 element	Theoretical uncertainty computed for SSS1	INT
09	***SSS2***	real value	psu	float (4 bytes)	1 element	Sea surface salinity using roughness model 2	INT
10	***Sigma_SSS2***	real value	psu	float (4 bytes)	1 element	Theoretical uncertainty computed for SSS2	INT
11	***SSS3***	real value	psu	float (4 bytes)	1 element	Sea surface salinity using roughness model 3	INT
12	***Sigma_SSS3***	real value	psu	float (4 bytes)	1 element	Theoretical uncertainty computed for SSS3	INT
13	***A_card***	Real value	dl	float (4 bytes)	1 element	Effective_Acard retrieved with minimalist model	INT
14	***Sigma_Acard***	real value	dl	float (4 bytes)	1 element	Theoretical uncertainty computed for Acard.	INT
15	***WS***	real value	$m.s^{-1}$	float (4 bytes)	1 element	Equivalent neutral wind speed as derived from ECMWF	INT
16	***Sigma_WS***	real value	$m.s^{-1}$	float (4 bytes)	1 element	Theoretical uncertainty associated with WS	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
17	***SST***	real value	K	float (4 bytes)	1 element	Sea Surface Temperature as derived from ECMWF	INT
18	***Sigma_SST***	real value	K	float (4 bytes)	1 element	Theoretical uncertainty associated with SST	INT
19	***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 polarisation direction.	INT
20	***Sigma_Tb_42.5H***	real value	K	float (4 bytes)	1 element	Theoretical uncertainty computed for Tb42.5H	INT
21	***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 polarisation direction.	INT
22	***Sigma_Tb_42.5V***	real value	K	float (4 bytes)	1 element	Theoretical uncertainty computed for Tb42.5V	INT
23	***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 polarisation direction.	INT
24	***Sigma_Tb_42.5X***	Real value	K	float (4 bytes)	1 element	Theoretical uncertainty computed for Tb42.5X	INT
25	***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 polarisation direction.	INT
26	***Sigma_Tb_42.5Y***	Real value	K	float (4 bytes)	1 element	Theoretical uncertainty computed for Tb42.5Y	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Geophysical_Parameters_Data					End of ***Geophysical_Parameters_Data*** structure	
27	***Control_ Flags_1***	Flags		unsigned integer (4 bytes)	1 element	Control Flags for SSS retrieval with forward model 1. See Table 4-17 for details. Least significant bit is field #01. Most significant bit is field #32	INT
28	***Control_ Flags_2***	Flags		unsigned integer (4 bytes)	1 element	Control Flags for SSS retrieval with forward model 2. See Table 4-17 for details. Least significant bit is field #01. Most significant bit is field #32	INT
29	***Control_ Flags_3***	Flags		unsigned integer (4 bytes)	1 element	Control Flags for SSS retrieval with forward model 3. See Table 4-17 for details. Least significant bit is field #01. Most significant bit is field #32	INT
30	***Control_ Flags_4***	Flags		unsigned integer (4 bytes)	1 element	Control Flags for SSS retrieval with forward model 4. See Table 4-17 for details. Least significant bit is field #01. Most significant bit is field #32	INT
	Product_Confidence_Descriptor					Init of ***Product_Confidence_Descriptor*** structure	
31	***Dg_chi2_1***	Integer value	dl	unsigned integer (2 bytes)	1 element	Retrieval fit quality index with forward model 1	INT
32	***Dg_chi2_2***	Integer	dl	unsigned	1 element	Retrieval fit quality index with forward model 2	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
		value		integer (2 bytes)			
33	***Dg_chi2_3***	Integer value	dl	unsigned integer (2 bytes)	1 element	Retrieval fit quality index with forward model 3	INT
34	***Dg_chi2_Acard***	Integer value	dl	unsigned integer (2 bytes)	1 element	Retrieval fit quality index with cardioid model	INT
35	***Dg_chi2_P_1***	Integer value	dl	unsigned integer (2 bytes)	1 element	chi2 high value acceptability probability with forward model 1	INT
36	***Dg_chi2_P_2***	Integer value	dl	unsigned integer (2 bytes)	1 element	chi2 high value acceptability probability with forward model 2	INT
37	***Dg_chi2_P_3***	Integer value	dl	unsigned integer (2 bytes)	1 element	chi2 high value acceptability probability with forward model 3	INT
38	***Dg_chi2_P_Acard***	Integer value	dl	unsigned integer (2 bytes)	1 element	chi2 high value acceptability probability with Cardioid model.	INT
39	***Dg_quality_SSS_1***	Integer value	dl	unsigned integer	1 element	Quality index for SSS1	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
				(2 bytes)			
40	***Dg_quality_SSS_2***	Integer value	dl	unsigned integer (2 bytes)	1 element	Quality index for SSS2	INT
41	***Dg_quality_SSS_3***	Integer value	dl	unsigned integer (2 bytes)	1 element	Quality index for SSS3	INT
42	***Dg_quality_Acard***	Integer value	dl	unsigned integer (2 bytes)	1 element	Quality Index for Acard	INT
43	***Dg_num_iter_1***	Integer value	dl	Unsigned Byte	1 element	Number of iterations for the retrieval of SSS with forward model 1.	INT
44	***Dg_num_iter_2***	Integer value	dl	Unsigned Byte	1 element	Number of iterations for the retrieval of SSS with forward model 2.	INT
45	***Dg_num_iter_3***	Integer value	dl	Unsigned Byte	1 element	Number of iterations for the retrieval of SSS with forward model 3.	INT
46	***Dg_num_iter_4***	Integer value	dl	Unsigned Byte	1 element	Number of iterations for the retrieval of SSS with cardioid model.	INT
47	***Dg_num_meas_l1c***	Integer value	dl	Unsigned Byte	1 element	Number of measurements available in L1c product	INT
48	***Dg_num_meas_valid***	Integer value	dl	Unsigned Byte	1 element	Number of valid measurement available for SSS retrieval	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
49	*Dg_border_fov*	Integer value	dl	Unsigned Byte	1 element	Number of valid measurements with BORDER_FOV flag raised.	INT
50	*Dg_eaf_fov*	Integer value	dl	Unsigned Byte	1 element	Number of valid measurements with EAF_FOV flag raised.	INT
51	*Dg_af_fov*	Integer value	dl	Unsigned Byte	1 element	Number of valid measurements with AF_FOV flag raised.	INT
52	*Dg_sun_tails*	Integer value	dl	Unsigned Byte	1 element	Number of measurements with SUN_TAILS flag raised.	INT
53	*Dg_sun_glint_area*	Integer value	dl	Unsigned Byte	1 element	Number of measurements withSUN_GLINT_AREA flag raised.	INT
54	*Dg_sun_glint_fov*	Integer value	dl	Unsigned Byte	1 element	Number of measurements with SUN_GLINT_FOV flag raised.	INT
55	*Dg_sun_fov*	Integer value	dl	Unsigned Byte	1 element	Number of measurements with SUN_FOV flag raised.	INT
56	*Dg_sun_glint_L2*	Integer value	dl	Unsigned Byte	1 element	Number of measurements with L2 sunglint flag raised	INT
57	*Dg_Suspect_ice*	Integer value	dl	Unsigned Byte	1 element	Number of suspected ice contaminated measurements	INT
58	*Dg_galactic_Noise_Error*	Integer value	dl	Unsigned Byte	1 element	Number of measurements discarded due to errors in galactic noise.	INT
59	*Dg_moonglint*	Integer value	dl	Unsigned Byte	1 element	Number of measurements with L2 moonglint raised.	INT
	*Product_Confidence_*					End of ***Product_Confidence_Descriptor*** structure	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Descriptor						
60	***Science_Flags_1***	Flags		Unsigned integer (4 bytes)	1 element	Science flags for SSS retrieval with forward model 1. See Table 4-18 for details. Least significant bit is field #01. Most significant bit is field #32.	INT
61	***Science_Flags_2***	Flags		Unsigned integer (4 bytes)	1 element	Science flags for SSS retrieval with forward model 2. See Table 4-18 for details. Least significant bit is field #01. Most significant bit is field #32.	INT
62	***Science_Flags_3***	Flags		Unsigned integer (4 bytes)	1 element	Science flags for SSS retrieval with forward model 3. See Table 4-18 for details. Least significant bit is field #01. Most significant bit is field #32.	INT
63	***Science_Flags_4***	Flags		Unsigned integer (4 bytes)	1 element	Science flags for SSS retrieval with cardioid model. See Table 4-18 for details. Least significant bit is field #01. Most significant bit is field #32.	INT
	Science_Descriptors					Init of ***Science_Descriptors*** structure	
64	***Dg_sky***	Integer value	dl	unsigned byte	1 element	Count measurements with specular direction toward a strong galactic source	INT
	Science_Descriptors					End of ***Science_Descriptors*** structure.	
	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.	

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

Table 4-16. 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	Type	Size (bits)
27.01	***Fg_ctrl_range***	Retrieved values outside range using Forward model1. Least significant Bit.	1
27.02	***Fg_ctrl_sigma***	High retrieval sigma using forward model 1	1
27.03	***Fg_ctrl_chi2***	Poor fit quality using forward model 1	1
27.04	***Fg_ctrl_chi2_P***	Poor fit quality using forward model 1	1
27.05	***Fg_ctrl_quality_SSS***	At least one critical flag was raised during SSS1 retrieval.	1
27.06	***Fg_ctrl_sunglint***	Grid point with number of measurements flagged for sunglint above threshold.	1
27.07	***Fg_ctrl_moonglint***	Grid point with number of measurements flagged for moonglint above threshold.	1
27.08	***Fg_ctrl_gal_noise***	Grid point with number of measurements flagged for galactic noise above threshold.	1
27.09	***Fg_ctrl_reach_Maxiter***	Maximum number of iteration reached before convergence using forward model1	1
27.10	***Fg_ctrl_num_meas_min***	Not processed due to too few valid measurements.	1
27.11	***Fg_ctrl_num_meas_low***	Number of valid measurements used for retrieval is less than Tg_num_meas_valid.	1
27.12	***Fg_ctrl_many_outliers***	Itf number of outliers Dg_num_outliers > Tg_num_outliers_max	1
27.13	***Fg_ctrl_marq***	Iterative loop ends because Marquardt increment is greather than lambdaMax.	1
27.14	***Fg_ctrl_roughness***	Roughness correction applied	1
27.15	***Fg_ctrl_foam***	Wind speed is less than Tg_WS_foam and foam contribution and foam fraction are set to zero.	1
27.16	***Fg_ctrl_num_meas_min***	Not processed due to too few valid measurements.	1
27.17	***Fg_ctrl_ECMWF***	Flag raised if one or more ECMWF data is missing for the different models. Most significant Bit.	1
27.18-27.32	***Spare Bits***	15 Spare bits	15

Table 4-17. 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	Type	Size (bits)
60.01	*Fg_sc_land_sea_coast1*	Distance from coast to gridpoint is less than threshold Max1 in file AUX_DISTAN	1
60.02	*Fg_sc_land_sea_coast2*	Distance from coast to gridpoint is less than threshold Max2 in file AUX_DISTAN	1
60.03	*Fg_sc_TEC_gradient*	High TEC gradient along dwell for a grid point	1
60.04	*Fg_sc_in_clim_ice*	Gridpoint with maximum extend of sea ice accordy to monthly climatology.	1
60.05	*Fg_sc_ice*	Ice concentration at gridpoint is above threshold Tg_ice_concentration	1
60.06	*Fg_sc_suspect_ice*	Suspect ice on gridpoint	1
60.07	*Fg_sc_rain*	Heavy rain suspected on gridpoint. Rain rate is above threshold Tg_max_rainfall.	1
60.08	*Fg_sc_high_wind*	Fg_high_wind : Fg_low_wind take the following values:	1
60.09	*Fg_sc_low_wind*	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
60.10	*Fg_sc_high_SST*	Fg_high_sst : Fg_low_sst take the following values	1
60.11	*Fg_sc_low_SST*	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
60.12	*Fg_sc_high_SSS*	Fg_high_sss : Fg_low_sss take the following values	1
60.13	*Fg_sc_low_SSS*	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
60.14	*Fg_sc_sea_state_1*	Sea state class 1	1
60.15	*Fg_sc_sea_state_2*	Sea state class 2	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
60.16	***Fg_sc_sea_state_3***	Sea state class 3	1
60.17	***Fg_sc_sea_state_4***	Sea state class 4	1
60.18	***Fg_sc_sea_state_5***	Sea state class 5	1
60.19	***Fg_sc_sea_state_6***	Sea state class 6	1
60.20	***Fg_sc_sst_front***	Not implemented yet	1
60.21	***Fg_sc_sss_front***	Not implemented yet	1
60.22	***Fg_sc_ice_Acard***	Ice flag from cardioid (If Effective temperature < 273 K and Acard < 40 raise flag and abs (latitude) > 45º)	1
60.23-60.32	***Spare Bits***	10 Spare bits	10

Table 4-18. 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 4-15

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

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Grid_Point_Descriptors					Init of ***Grid_Point_Descriptors*** structure.	
05	***Out_of_LUT_flags_1***	Flag		Unsigned integer (4 bytes)	1 element	See table 4-20 for model 1	INT
06	***Out_of_LUT_flags_2***	Flag		Unsigned integer (4 bytes)	1 element	See table 4-20 for model 2	INT
07	***Out_of_LUT_flags_3***	Flag		Unsigned integer (4 bytes)	1 element	See table 4-20 for model 3	INT
08	***Out_of_LUT_flags_4***	Flag		Unsigned integer (4 bytes)	1 element	See table 4-20 for model 4	INT
09	***X_swath***	Real value	Km	float (4 bytes)	1 element	Grid point distances from the satellite tracks.	INT
10	***Dg_num_outliers***	Integer value	dl	unsigned byte	1 element	Number of measurements with Fm_outlier flag raised.	INT
11	***Dg_num_high_resol***	Integer value	dl	unsigned byte	1 element	Number of measurements with Fm_Resol flag raised.	
12	***Dg_RFI_L1***	Integer value	dl	unsigned byte	1 element	Number of measurements being flagged RFI at L1.	INT
13	***Dg_sunglint_L1***	Integer value	dl	unsigned byte	1 element	Number of measurements with Fm_L1c_sun flag raised.	INT
14	***Tau***	Real value (code as integer)	dl	float (4 bytes)	1 element	Atmospheric optical depth at nadir (all Stokes)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
15	***TBatm_emission***	Real value (code as integer)	K	float (4 bytes)	1 element	Atmospheric emission toward sensor (nadir emission). Only first polarization	INT
	Grid_Point_Descriptors					End of list of ***Grid_Point_Descriptors*** structures.	
	Geophysical_Parameters_Prior					Init of ***Geophysical Parameters_Prior*** structure	
16	***Param1_prior_M1***	real value	psu	float (4 bytes)	1 element	Prior and sigma of parameters for retrieval with forward model 1. Seven placeholders.	INT
17	***Param1_sigma_prior_M1***	real value	psu	float (4 bytes)	1 element		INT
18	***Param2_prior_M1***	real value	K	float (4 bytes)	1 element		INT
19	***Param2_sigma_prior_M1***	real value	K	float (4 bytes)	1 element		INT
20	***Param3_prior_ M1***	real value	m.s-1	float (4 bytes)	1 element		INT
21	***Param3_sigma_prior_M1***	real value	m.s-1	float (4 bytes)	1 element		INT
22	***Param4_prior_M1***	real value	m.s-1	float (4 bytes)	1 element		INT
23	***Param4_sigma_prior_M1***	real value	m.s-1	float (4 bytes)	1 element		INT
24	***Param5_prior_M1***	real value	tecu	float (4 bytes)	1 element		INT
25	***Param5_sigma_prior_M1***	real value	tecu	float (4 bytes)	1 element		
26	***Param6_prior_M1***	real value	dl	float (4 bytes)	1 element		
27	***Param6_sigma_prior_M1***	real value	dl	float (4 bytes)	1 element		

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
28	***Param7_prior_M1***	real value	dl	float (4 bytes)	1 element		
29	***Param7_sigma_prior_M1***	real value	dl	float (4 bytes)	1 element		
30	***Param1_prior_M2***	real value	psu	float (4 bytes)	1 element	Prior and sigma of parameters for retrieval with forward model 2. Seven placeholders.	INT
31	***Param1_sigma_prior_M2***	real value	psu	float (4 bytes)	1 element		INT
32	***Param2_prior_M2***	real value	K	float (4 bytes)	1 element		INT
33	***Param2_sigma_prior_M2***	real value	K	float (4 bytes)	1 element		INT
34	***Param3_prior_M2***	real value	tecu	float (4 bytes)	1 element		INT
35	***Param3_sigma_prior_M2***	real value	tecu	float (4 bytes)	1 element		INT
36	***Param4_prior_M2***	real value	m.s-1	float (4 bytes)	1 element		INT
37	***Param4_sigma_prior_M2***	real value	m.s-1	float (4 bytes)	1 element		INT
38	***Param5_prior_M2***	real value	dl	float (4 bytes)	1 element		INT
39	***Param5_sigma_prior_M2***	real value	dl	float (4 bytes)	1 element		INT
40	***Param6_prior_M2***	real value	deg	float (4 bytes)	1 element		INT
41	***Param6_sigma_prior_M2***	real value	deg	float (4 bytes)	1 element		INT
42	***Param7_prior_M2***	real value	dl	float (4 bytes)	1 element		INT
43	***Param7_sigma_prior_M2***	real value	dl	float (4 bytes)	1 element		INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
44	***Param1_prior_M3***	real value	psu	float (4 bytes)	1 element	Prior and sigma of parameters for retrieval with forward model 3. Seven Placeholders	INT
45	***Param1_sigma_prior_M3***	real value	psu	float (4 bytes)	1 element		INT
46	***Param2_prior_M3***	real value	tecu	float (4 bytes)	1 element		INT
47	***Param2_sigma_prior_M3***	real value	tecu	float (4 bytes)	1 element		INT
48	***Param3_prior_M3***	real value	m.s-1	float (4 bytes)	1 element		INT
49	***Param3_sigma_prior_M3***	real value	m.s-1	float (4 bytes)	1 element		INT
50	***Param4_prior_M3***	real value	M	float (4 bytes)	1 element		INT
51	***Param4_sigma_prior_M3***	real value	M	float (4 bytes)	1 element		INT
52	***Param5_prior_M3***	real value	dl	float (4 bytes)	1 element		INT
53	***Param5_sigma_prior_M3***	real value	dl	float (4 bytes)	1 element		INT
54	***Param6_prior_M3***	real value	m.s-1	float (4 bytes)	1 element		INT
55	***Param6_sigma_prior_M3***	real value	m.s-1	float (4 bytes)	1 element		INT
56	***Param7_prior_M3***	real value	dl	float (4 bytes)	1 element		INT
57	***Param7_sigma_prior_M3***	real value	dl	float (4 bytes)	1 element		INT
58	***Param1_prior_M4***	real value	m.s-1	float (4 bytes)	1 element		INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
59	***Param1_sigma_prior_M4***	real value	m.s-1	float (4 bytes)	1 element	Prior and sigma of parameters for retrieval with forward model 4. Seven placeholders.	INT
60	***Param2_prior_M4***	real value	dl	float (4 bytes)	1 element		INT
61	***Param2_sigma_prior_M4***	real value	dl	float (4 bytes)	1 element		INT
62	***Param3_prior_M4***	real value	dl	float (4 bytes)	1 element		INT
63	***Param3_sigma_prior_M4***	real value	dl	float (4 bytes)	1 element		INT
64	***Param4_prior_M4***	real value	dl	float (4 bytes)	1 element		INT
65	***Param4_sigma_prior_M4***	real value	dl	float (4 bytes)	1 element		INT
66	***Param5_prior_M4***	real value	dl	float (4 bytes)	1 element		INT
67	***Param5_sigma_prior_M4***	real value	dl	float (4 bytes)	1 element		INT
68	***Param6_prior_M4***	real value	dl	float (4 bytes)	1 element		INT
69	***Param6_sigma_prior_M4***	real value	dl	float (4 bytes)	1 element		INT
70	***Param7_prior_M4***	real value	dl	float (4 bytes)	1 element		INT
71	***Param7_sigma_prior_M4***	real value	dl	float (4	1 element		INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
				bytes)			
	Geophysical_Parameters_Prior					End of ***Geophysical Parameters_Prior*** structure	
	Geophysical_Parameters_Post					Init of ***Geophysical Parameters_Post*** structure	
72	***Param1_M1***	Real value	psu	float (4 bytes)	1 element	Value and theoretical uncertainty of parameters retrieved with forward model 1. Seven placeholders. Set ParamX_sigma_M1 to a fill value if parameter has not been retrieved	INT
73	***Param1_sigma_M1***	Real value	psu	float (4 bytes)	1 element		INT
74	***Param2_M1***	Real value	K	float (4 bytes)	1 element		INT
75	***Param2_sigmaM1***	Real value	K	float (4 bytes)	1 element		INT
76	***Param3_M1***	Real value	m.s-1	float (4 bytes)	1 element		INT
77	***Param3_sigma_M1***	Real value	m.s-1	float (4 bytes)	1 element		INT
78	***Param4_M1***	Real value	m.s-1	float (4 bytes)	1 element		INT
79	***Param4_sigma_M1***	Real value	m.s-1	float (4 bytes)	1 element		INT
80	***Param5_M1***	Real value	tecu	float (4 bytes)	1 element		INT
81	***Param5_sigma_M1***	Real value	tecu	float (4 bytes)	1 element		INT
82	***Param6_M1***	Real value	dl	float (4 bytes)	1 element		
83	***Param6_sigma_M1***	Real value	dl	float (4 bytes)	1 element		
84	***Param7_M1***	Real value	dl	float (4 bytes)	1 element		

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
85	***Param7_sigma_M1***	Real value	dl	float (4 bytes)	1 element		
86	***Param1_M2***	Real value	psu	float (4 bytes)	1 element		INT
87	***Param1_sigma_M2***	Real value	psu	float (4 bytes)	1 element		INT
88	***Param2_M2***	Real value	K	float (4 bytes)	1 element		INT
89	***Param2_sigma__M2***	Real value	K	float (4 bytes)	1 element		INT
90	***Param3_M2***	Real value	tecu	float (4 bytes)	1 element		INT
91	***Param3_sigma_M2***	Real value	tecu	float (4 bytes)	1 element		INT
92	***Param4_M2***	Real value	m.s-1	float (4 bytes)	1 element	Value and theoretical uncertainty of parameters retrieved with forward model 2. Seven placeholders. Set ParamX_sigma_M1 to a fill value if parameter has not been retrieved	INT
93	***Param4_sigma_M2***	Real value	m.s-1	float (4 bytes)	1 element		INT
94	***Param5_M2***	Real value	dl	float (4 bytes)	1 element		INT
95	***Param5_sigma_M2***	Real value	dl	float (4 bytes)	1 element		INT
96	***Param6_M2***	Real value	deg	float (4 bytes)	1 element		INT
97	***Param6_sigma_M2***	Real value	deg	float (4 bytes)	1 element		INT
98	***Param7_M2***	Real value	dl	float (4 bytes)	1 element		
99	***Param7_sigma_M2***	Real value	dl	float (4 bytes)	1 element		
100	***Param1_M3***	Real value	psu	float (4 bytes)	1 element	Value and theoretical uncertainty of parameters	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
101	***Param1_sigma_M3***	Real value	psu	float (4 bytes)	1 element	retrieved with forward model 3. Seven placeholders. Set ParamX_sigma_M1 to a fill value if parameter has not been retrieved	INT
102	***Param2_3***	Real value	tecu	float (4 bytes)	1 element		INT
103	***Param2_sigma_M3***	Real value	tecu	float (4 bytes)	1 element		INT
104	***Param3_M3***	Real value	m.s-1	float (4 bytes)	1 element		INT
105	***Param3_sigma_M3***	Real value	m.s-1	float (4 bytes)	1 element		INT
106	***Param4_M3***	Real value	m	float (4 bytes)	1 element		INT
107	***Param4_sigma_M3***	Real value	m	float (4 bytes)	1 element		INT
108	***Param5_M3***	Real value	dl	float (4 bytes)	1 element		INT
109	***Param5_sigma_M3***	Real value	dl	float (4 bytes)	1 element		INT
110	***Param6_M3***	Real value	m.s-1	float (4 bytes)	1 element		INT
111	***Param6_sigma_M3***	Real value	m.s-1	float (4 bytes)	1 element		INT
112	***Param7_M3***	Real value	dl	float (4 bytes)	1 element		INT
113	***Param7_sigma_M3***	Real value	dl	float (4 bytes)	1 element		INT
114	***Param1_M4***	Real value	dl	float (4 bytes)	1 element	Value and theoretical uncertainty of parameters retrieved with forward model 4. Seven placeholders. Set ParamX_sigma_M4 to a fill value if parameter has not been retrieved.	INT
115	***Param1_sigma_M4***	Real value	dl	float (4 bytes)	1 element		INT
116	***Param2_4***	Real value	dl	float (4 bytes)	1 element		INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
117	***Param2_sigma_M4***	Real value	dl	float (4 bytes)	1 element		INT
118	***Param3_M4***	Real value	dl	float (4 bytes)	1 element		INT
119	***Param3_sigma_M4***	Real value	dl	float (4 bytes)	1 element		INT
120	***Param4_M4***	Real value	dl	float (4 bytes)	1 element		INT
121	***Param4_sigma_M4***	Real value	dl	float (4 bytes)	1 element		INT
122	***Param5_M4***	Real value	dl	float (4 bytes)	1 element		INT
123	***Param5_sigma_M4***	Real value	dl	float (4 bytes)	1 element		INT
124	***Param6_M4***	Real value	dl	float (4 bytes)	1 element		INT
125	***Param6_sigma_M4***	Real value	dl	float (4 bytes)	1 element		INT
126	***Param7_M4***	Real value	dl	float (4 bytes)	1 element		INT
127	***Param7_sigma_M4***	Real value	dl	float (4 bytes)	1 element		INT
	Geophysical_Parameters_Post					End of ***Geophysical Parameters_Post*** structure	
128	***Dg_num_meas_l1c***	Integer value	dl	unsigned byte	1 element	Number of measurements available in L1c product	INT
	List_of_Available_Datas					Init of list of ***Available_Data*** structure, repeated ***Dg_num_meas_l1c*** times	
	Available_Data					Init of ***Available_Data*** structure.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Measuremet_Data					Init of ***Measurements_Data*** structure	
129	***Meas_Flags***	Flags		unsigned integer (4 bytes)	1 element	See Table 4-21	
	Measuremet_Data					End of ***Measurements_Data*** structure	
	Diff_TBs					Init of ***Diff_TBs*** structure	
130	***Diff_TB_1***	real value (code as integer)	K	integer signed (2 bytes)	1 element	Vector of differences between measurements and results of forward model 1(x100)	INT
131	***Diff_TB_2***	real value (code as integer)	K	integer signed (2 bytes)	1 element	Vector of differences between measurements and results of forward model 2(x100)	INT
132	***Diff_TB_3***	real value (code as integer)	K	integer signed (2 bytes)	1 element	Vector of differences between measurements and results of forward model 3(x100)	INT
133	***Diff_TB_4***	real value (code as integer)	K	integer signed (2 bytes)	1 element	Vector of differences between measurements and results of cardioid model (x100)	INT
134	***Tb_gal_H***	real value (code as integer)	K	integer signed (2 bytes)	1 element	Galactic noise in H polarisation obtained from auxiliary data (x100)	INT
135	***Tb_gal_V***	real value (code as integer)	K	integer signed (2 bytes)	1 element	Galactic noise in V polarisation obtained from auxiliary data (x100)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Diff_TBs					End of ***Diff_TBs*** structure.	
	Available_Data					End of ***Available_Data*** structure	
	List_of_Available_Datas					End of list of **Available_Data** structures	
	Grid_Point_Data					End of ***Grid_Point_Data*** data set record structure	
	List_of_ Grid_ Point_Datas					End of list of ***Grid_Points_Data*** data set record structures.	
	SSS_SWATH_ANALYSIS					End of binary Data Set containing the ***SSS_SWATH_ANALYSIS*** Data Set records	
	Data_Block					End of binary Data Block in the product.	

Table 4-19. 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 4-19 is specified below:

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
05.01.	***Fg_oor_LUTroug1_SST***	Out of range flag raised if SST value falls outside the acceptable interval limits.	1
05.02.	***Fg_oor_LUTroug1_SSS***	Out of range flag raised if SSS value falls outside the acceptable interval limits.	1
05.03.	***Fg_oor_LUTroug1_WS***	Out of range flag raised if WS value falls outside the acceptable interval limits.	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
05.04.	***Fg_oor_LUTroug1_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
05.05.	***Fg_oor_LUTroug2_SST***	Out of range flag raised if SST value falls outside the acceptable interval limits.	1
05.06.	***Fg_oor_LUTroug2_SSS***	Out of range flag raised if SSS value falls outside the acceptable interval limits.	1
05.07.	***Fg_oor_LUTrough2_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
05.08.	***Fg_oor_LUTroug2_Ust***	Out of range flag raised if Ust value falls outside the acceptable interval limits.	1
05.09.	***Fg_oor_LUTroug2_omega***	Out of range flag raised if omega value falls outside the acceptable interval limits.	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_gam2_dec***	Dec went out of LUT range during retrieval.	1
05.13.	***Fg_oor_gam2_psi***	Psi went out of LUT range during retrieval.	1
05.14.	***Fg_oor_gam2_ra***	Ra went out of LUT range during retrieval.	1
05.15.	***Fg_oor_gam2_theta***	Theta went out of LUT range during retrieval.	1
05.16.	***Fg_oor_gam2_WSn***	WSn went out of LUT range during retrieval.	1
05.17.	***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

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
05.18.	***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
05.19.	***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
05.20.	***Fg_oor_LUTsunglint_WS***	Out of range flag raised if WSn value falls outside the acceptable interval limits.	1
05.21.	***Fg_oor_LUTAGDPT_lat***	Out of range flag raised if latitude of the grid point falls outside the acceptable interval limits of LUTs in the AUX_AGDPT_	1
05.22.	***Fg_oor_LUTAGDPT_lon***	Out of range flag raised if longitude of the grid point falls outside the acceptable interval limits of LUTs in the AUX_AGDPT_	1
05.23.	***Fg_oor_LUT_month***	Out of range flag raised if acquisition time of gridpoint falls outside the acceptable interval limits of LUTs in file AUX_AGDPT_	1
05.24.	***spare***		1
05.25.	***Fg_oor_LUTfoam_WS***	Out of range flag raised if WS value falls outside the acceptable interval limits.	1
05.26.	***Fg_oor_LUTfoam_Tseaair***	Out of range flag raised if Tsea_air value falls outside the acceptable interval limits.	1
05.27.	***Fg_oor_LUTfoam_SSS***	Out of range flag raised if SSS value falls outside the acceptable interval limits.	1
05.28.	***Fg_oor_LUTfoam_SST***	Out of range flag raised if SST value fall outside the acceptable interval limits.	1
05.29.	***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
05.30-05.32	***Spare bits***	3 Spare bits	3

Table 4-20. Out of LUT Flags

4.2.2.2.3.2 Measurement Flags

The **Measurement flags** mentioned in table 4-19 are listed below:

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
129.01	*Fm_suspect_ice*	Boolean. Difference between measured brightness temperature and flat sea model is greater than a threshold	1
129.02	*Fm_out_of_range*	Difference between measured brightness temperature and that derived with default forward model is greater than a threshold	1
129.03	*Fm_Resol*	Equivalent size of the footprint ellipse is greater than a threshold.	1
129.04	*Fm_border_fov*	Measurement near the border of the field of view (filtered grid points)	1
129.05	*Fm_eaf_fov*	Measurement in the extended alias free field of view (filtered grid points)	1
129.06	*Fm_af_fov*	Measurement in the alias free field of view (filtered grid points)	1
129.07	*Fm_sun_tails*	Boolean. From L1c flags	1
129.08	*Fm_sun_glint_fov*	Boolean. From L1c flags	1
129.09	*Fm_sun_glint_area*	Boolean. From L1c flags	1
129.10	*Fm_L1c_sun*	Boolean. From Sun glint L1c flags	1
129.11	*Fm_RFI_L1*	Boolean. Measurement contaminated by RFI (filtered grid points)	1

Bit # (01 → LSB)	Tag Name	Type	Size (bits)
129.12	***Fm_outlier***	Boolean. If true, outlier measurement; if false, not outlier measurement	1
129.13	***Fm_high_sun_glint***	Boolean. Sun glint flag. To be combined with Fm_low_sun_glint	1
129.14	***Fm_low_sun_glint***	Boolean. Sun glint flag. To be combined with Fm_high_sun_glint	1
129.15	***Fm_Moon_SpecDir***	Specular direction close to target to Moon direction	1
129.16	***Fm_high_gal_noise***	High galactic noise flag	1
129.17	***Fm_gal_noise_error***	Uncertainty on galactic noise source is large.	1
129.18	***Fm_valid***	Measurement is valid	1
129.19	***Fm_lost_data***	Measurement not used due to lack of companion polarisation	1
129.20-129.32	***Spare bits***	13 Spare bits	13

Table 4-21. Measuremet 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_TIME___SPH	SPH for ADP containing the time correlation definition
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_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
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_SOIL_P_SPH	SPH For ADP containing the Soil Properties Product
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_CNFSM2_SPH	SPH For ADP containing the Configuration Parameters Product
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

Accepted Name	Description
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_ATMOS__SPH	SPH For ADP containing Constants to Estimate Atmospheric Contamination
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_CNFOS2_SPH	SPH For ADP containing the Configuration Parameters Product
AUX_AGDPT__SPH	SPH For ADP containing the Look Up Tables used by processor to Initialise Geophysical Parameters

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
03	***Ref_Doc***	string	N/A	17 bytes	%17s	Name of the document containing the specifications for the current product (this document).	ICNF

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
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”	INT

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
						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.	
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 Discrete Global Grid (AUX_DGG___)

See Applicable Document [AD.5]

5.2.2 Time Correlation Definition (AUX_TIME__)

The auxiliary product contains correlations between UTC time, GPS time, TAI time and UT1 time, and the Leap Second occurrence as well. All fields are needed for Earth Explorer function initialization. For more information see [AD.5]

5.2.3 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.

5.2.3.1 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

5.2.3.2 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 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					Init of list of ECMWF_PARAMS data set record structures, repeated Counter times. There are as	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	_Datas					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. This parameter is defined both over land and sea.	INT
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

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
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/3h	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	***Skin_Reservoir_Content***	Real value	m	Float (4 bytes)	1 element	Skin reservoir content (water). This parameter has meaningful value over land.	INT
17	***Soil_Temperature_L1***	Real value	K	Float (4 bytes)	1 element	Soil Temperature level 1. This parameter is defined both over land and sea.	INT
18	***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
19	***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

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
20	***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
21	***Skin_Temperature***	Real value	K	Float (4 bytes)	1 element	Skin Temperature. This parameter is defined both over land and sea.	INT
22	***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
23	***Ice_Surface_Temperature***	Real value	K	Float (4 bytes)	1 element	Ice surface temperature level 1. This data is defined only over land.	INT
24	***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
25	***Accumutated_Water***	Real value	m	Float (4 bytes)	1 element	Meter of water (accumulated) This parameter is defined both over land and sea.	INT
26	***Snow_Density***	Real value	kg/m^3	Float (4 bytes)	1 element	Snow density. This parameter is defined both over land and sea.	INT
27	***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
28	***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
29	***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
30	***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
31	***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
32	***Dewpoint_2m***	Real value	K	Float (4 bytes)	1 element	2 meter dewpoint temperature. This parameter is defined both over land and sea.	INT
33	***Sea_Level_Pressure***	Real value	Pa	Float (4 bytes)	1 element	Sea level pressure. This parameter is defined both over land and sea.	INT
34	***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
35	***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
36	***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
37	***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

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
38	***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
39	***Surface_Latent_Heat_Flux_Rate***	Real value	W/m^2s	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
40	***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
41	***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
42	***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
43	***Significant_Wave_Height***	Real value	m	Float (4 bytes)	1 element	Significant wave height. This parameter has meaningful value only over sea	INT
44	***Mean_Square_Slope***	Real value		Float (4 bytes)	1 element	Mean square slope (non-dimensional) This parameter has meaningful value only over sea	INT
45	***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
46	***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
47	***10m_Neutral_Equivalent_***	Real value	m/s	Float (4	1	10 metre neutral equivalent wind –zonal component.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Wind _Zonal			bytes)	element	This parameter is defined both over land and sea.	
48	***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
49	***Roughness_Length***	Real value	m	Float (4 bytes)	1 element	Roughness length. This parameter is defined both over land and sea.	INT
50	***Friction_Velocity_from_sur face_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
51	***Friction_Velocity_from_wav e_model***	Real value	m/s	float (4 bytes)	1 element	Friction velocity from wave model This parameter has meaningful value only over sea.	INT
52	***Inverse_Wave_Age***	Real value	N/A	float (4 bytes)	1 element	Inverse wave age This parameter has meaningful value only over sea.	INT
53	***Height_Lowest_Model_Lev el***	Real value	N/A	float (4 bytes)	1 element	Height Lowest level Atmospheric Model This parameter has meaningful value only over sea.	INT
54	***Virtual_Temperature_Lowe st_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
55	***Flags***	Flag	N/A	unsigned long (8 bytes)	1 element	Flags to check the quality of the ECMWF product	INT
	ECMWF_PARAMS_Data					End of ECMWF_Params_Data data set record structures.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	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 5-5. 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)
55.01.	*Sea_Ice_Cover_Flag*	1
55.02.	*Surface_Pressure_Flag*	1
55.03.	*Air_Temperature_2m_Flag*	1
55.04.	*Sea_Surface_Temperature_Flag*	1

Bit # (01 → LSB)	Tag Name	Size (bits)
55.05.	***Total_Coulmn_Water_Vapor_Flag***	1
55.06.	***Large_Scale_Precipitation_Flag***	1
55.07.	***Convective_Precipitation_Flag***	1
55.08.	***Rain_Rate_Flag***	1
55.09.	***Volumetric_Soil_Water_L1_Flag***	1
55.10.	***Volumetric_Soil_Water_L2_Flag***	1
55.11.	***Skin_Reservoir_Content_Flag***	1
55.12.	***Soil_Temperature_L1_Flag***	1
55.13.	***Soil_Temperature_L2_Flag***	1
55.14.	***Soil_Temperature_L3_Flag***	1
55.15.	***Soil_Temperature_L4_Flag***	1
55.16.	***Skin_Temperature_Flag***	1
55.17.	***Temperature_Snow_Layer_Flag***	1
55.18.	***Ice_Surface_Temperature_Flag***	1
55.19.	***Snow_Depth_Flag***	1
55.20.	***Accumutated_Water_Flag***	1
55.21.	***Snow_Density_Flag***	1
55.22.	***Wind_ Zonal_Lowest_Level_Flag***	1
55.23.	***Wind_ Meridional_Lowest_Level_Flag***	1

Bit # (01 → LSB)	Tag Name	Size (bits)
55.24.	***Temperature_Lowest_Level_Flag***	1
55.25.	***Specific_Humidity_Lowest_Level_Flag***	1
55.26.	***Charnock_Parameter_Flag***	1
55.27.	***Dewpoint_2m_Flag***	1
55.28.	***Sea_Level_Pressure_Flag***	1
55.29.	***Northward_Surface_Stress_Rate_Flag***	1
55.30.	***Eastward_Surface_Stress_Rate_Flag***	1
55.31.	***Surface_Shortwave_Radiation_Rate_Flag***	1
55.32.	***Surface_Thermal_Radiative_Flux_Rate_Flag***	1
55.33.	***Surface_Sensible_Heat_Flux_Rate_Flag***	1
55.34.	***Surface_Latent_Heat_Flux_Rate_Flag***	1
55.35.	***Drag_Coefficient_With_Waves_Flag***	1
55.36.	***Wind_10m_Wave_Model_Flag***	1
55.37.	***Peak_Period_1D_Flag***	1
55.38.	***Significant_Wave_Height_Flag***	1
55.39.	***Mean_Square_Slope_Flag***	1
55.40.	***Mean_Period_Wind_Waves_Flag***	1
55.41.	***Significant_Height_Wind_Waves_Flag***	1
55.42.	***10m_Neutral_Equivalent_Wind _Zonal_Flag***	1

Bit # (01 → LSB)	Tag Name	Size (bits)
55.43.	***10m_Neutral_Equivalent_Wind _Meridional_Flag***	1
55.44.	***Roughness_Length_Flag***	1
55.45.	***Friction_Velocity_from_surface_model_Flag***	1
55.46.	***Friction_Velocity_from_wave_model_Flag***	1
55.47.	***Inverse_Wave_Age_Flag***	1
55.48.	***Height_Lowest_Model_Level_Flag***	1
55.49.	***Virtual_Temperature_Lowest_Model_Level_Flag***	1
55.50.	***Land_Sea_Mask_Flag***	1
55.51-55.64	***Spare Bits***	14

Table 5-6. AUX_ECMWF_ Flags

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
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 5-7. 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 −87.5° to 87.5° into 74 zones. Zone#0 is bounded by latitudes 87.5° and 75°, Zone#1 is bounded by latitudes −75° and −87.5°, 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	
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	1 element	Latitude comprising southern edge of	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
				bytes)		designated boundary in DFFG definition	
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_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

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
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 integer)	0.5%	unsigned char (1 byte)	1 element	Percentage of wetlands fraction	INT
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

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
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 integer)	0.5%	unsigned char (1 byte)	1 element	Percentage of strong topography fraction	INT
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.	

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

Table 5-8. Binary Content of a DSR in Both MDSs 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 5-9. 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 (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	***l***	Real	N/A	float (4 bytes)	1 element	Inverse of Earth ellipsoid model flattening coefficient.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
		value				See [RD.6], section 4.1.3.1, for more information.	
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.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
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	
	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 5-10. Binary Content of a DSR in Both MDSs 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 first time missing LAI are filled with "NULL" values.

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

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
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
19-30	***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 5-11. SPH of the DFFG LAI Product

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
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

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
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
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	1 element	Total Number of cells in specified zone	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
				bytes)			
	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	***LAI_QC***	integer value	N/A	unsigned char (1 byte)	1 element	The LAI_QC represent the standard deviation derived from the MODIS_LAI pre-processor	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	
	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 5-12. Binary Content of a DSR in Both MDSs of the DFFG LAI Product

The Fill Value Legend is specified below:

Value	Description
249	Unclassified
250	Urban, built-up class
251	Permanent wetlands, marshes
252	Perennial snow, ice, Tundra
253	Barren, desert or very sparsely vegetated
254	Water (ocean or inland)
255	Standard_Fillvalue, for non-computed pixels or pixels outside projection

Table 5-13. Fill Value Legend

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	Index to be used to compute the unique global index of each cell c according the equation: $g = z \times 10^k + n$ where n is the absolute DFFG Index of the DFFG Cell c in Zone #z	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
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 5-14. 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	
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	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
06	***Lon_b***	Real value	deg	float (4 bytes)	1 element	designated boundary in DFFG definition (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	***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*** 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	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						latitude row.	
	Row_Struct_Data					End of ***Row_Struct_Data*** structure.	
	List_of_Row_Structs_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_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.	
17	***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_Dat					End of ***DFFG_LAI_Max_Point_Data*** structure.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	a						
	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	
	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 5-15. Binary Content of a DSR in Both MDSs 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	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	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
					2.7M pixels)	means that some of them will be dummy.	
	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
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 5-16. 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

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
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
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 5-17. SPH for the DGG Current Tau Nadir LV Product

5.3.6.2 Data Block

This ADF contains only one MDS, and there are 8 DSRs in this MDS. Each DSR contains data for 97748 DGG nodes. The data in the DSRs are indexed by the grid point IDs in ascending order. Each Last_Grid_Point_ID field in Table 5-17 gives the grid point ID of the last DGG node in each DSR. These Last_Grid_Point_ID fields can be used to perform binary search on the data in the 8 DSRs.

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_Data s					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	1 element, maximum of	Unique identifier for Earth fixed grid point.	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
				bytes)	2.7M pixels)		
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	***Tau_Nad_LV***	real value (code as integer)	neper	unsigned integer (2 bytes)	1 element	Vegetation cover optical thickness computed at nadir The actual value is obtained using: Offset_Tau + Scaling_Factor_Tau × Tau_Nad_LV	INT
06	***Tau_Nad_LV _DQX***	integer value	N/A	unsigned byte	1 element	Tau_Nad quality index The actual value is obtained using: Offset_Tau_DQX + Scaling_Factor_Tau_DQX × Tau_Nad_LV_DQX	INT
07	***DT_branch_LV***	integer value	N/A	unsigned byte	1 element	Decision tree brance fraction code of DGG cell	INT
08	***Date_Stamp_LV***	Date	Day	unsigned integer (2 bytes)	1 element	Date stamp corresponding to number of elapsed days from SMOS launch date	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***	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						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 5-18. 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
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

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
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 5-19. SPH of the DGG Current Tau Nadir FO Product

5.3.7.2 Data Block

There is only one MDS with 8 DSRs to store all the product information.

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.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
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
04	***Longitude***	Real	deg	float (4 bytes)	1 element	Longitude of the DGG node. Range: [0-360]	INT
05	***Tau_Nad_FO***	real value (code as integer)	neper	unsigned integer (2 bytes)	1 element	Vegetation cover optical thickness computed at nadir The actual value is obtained using: Offset_Tau + Scaling_Factor_Tau × Tau_Nad	INT
06	***Tau_Nad __FO_DQX***	Integer value	N/A	unsigned byte	1 element	Tau_Nad quality index The actual value is obtained using: Offset_Tau_DQX + Scaling_Factor_Tau_DQX × Tau_Nad_DQX	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
07	***DT_Branch_FO***	Integer value	N/A	unsigned byte	1 element	Decision Tree branch fraction code of DGG cell	INT
08	***Date_Stamp_FO***	Date	Day	unsigned integer (2 bytes)	1 element	Date stamp corresponding to number of elapsed days from SMOS launch date	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 5-20. 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
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

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
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 5-21. SPH of the DGG Current Roughness H Product

5.3.8.2 Data Block

There is only one MDS with 8 DSRs to store all the product information

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.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	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 bytes)	1 element	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	***HR***	real value (code as integer)	N/A	unsigned integer (2 bytes)	1 element	Roughness parameter generated by the L2 processor The actual value is obtained using: Offset_HR+Scaling_Factor_HR x HR	INT
06	***HR_DQX***	Integer value	N/A	unsigned byte	1 element	Product Quality Index: The actual value is obtained using: Offset_HR_DQX+Scaling_Factor_HR_DQX x	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						HR_DQX	
07	***DT_branch_HR***	Integer value	N/A	unsigned byte	1 element	Aggregation class number associated with DGG cell	INT
08	***Date_Stamp_HR***	Date	N/A	unsigned integer (2 bytes)	1 element	Date stamp corresponding to number of elapsed days from SMOS launch date	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 5-22. Binary Content of a DSR in the DGG Current Roughness H Product

5.3.9 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 the Level 2 Soil Moisture User Data Product.

5.3.9.1 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

Field #	Tag Name	Type	Unit	String Length	C Format	Comment	Origin
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 5-23. SPH of the DGG Current RFI Product

5.3.9.2 Data Block

There is only one MDS with 8 DSR to store all the product information.

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

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	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.	
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	***N_Snap***	integer	NA	unsigned integer (4 bytes)	1 element	Number of FOVs considered not affected by RFI on specified DGG cell	INT
06	***N_RFI_H***	integer	NA	unsigned integer (4 bytes)	1 element	Number of FOVs considered significantly affected by RFI in horizontal polarization on specified DGG cell	INT
07	***N_RFI_V***	integer	NA	unsigned integer (4 bytes)	1 element	Number of FOVs considered significantly affected by RFI in vertical polarization on specified 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.	
	RFI_Zone					End of ***RFI_Zone*** data set record structure.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	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 5-24. Binary Content of a DSR in the DGG Current RFI Product

5.3.10 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.

5.3.10.1 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	***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 5-25. SPH of the DGG Current RFI Product

5.3.10.2 Data Block

There is only one MDS with 8 DSR to store all the product information.

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_Floodl*** 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

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
05	*FL_Flood_Prob*	integer value	NA	unsigned byte	1 element	The probability of Flood Flag.	INT
	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 5-26. Binary Content of a DSR in the DGG Current RFI Product

5.3.11 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.

5.3.11.1 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

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	1 element	Number of entries in array	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
				(2 bytes)			
	List_of_WEF_Datas					Start of list of ***Num_Entries WEF_Value*** structures, repeated Num_entries times	
	WEF_Data					Start of ***WEF_Value*** structure.	
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 5-27. Binary Content of a DSR of the WEF Product

5.3.12 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.

5.3.12.1 Specific Product Header

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

5.3.12.2 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.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Mean_WEF					Init of binary Data Set containing the Mean Weighting Function.	
	Data_Block					End of binary Data Block in the product.	

Table 5-28. Binary Content of a DSR in the Mean WEF Product

5.3.13 Soil Properties Product (AUX_SOIL_P)

The AUX_SOIL_P Auxiliary Data Product supplies values for the parameters of soil properties and soil temperature used in the Dobson Model so that the processor can compute the soil dielectric constant.

This table provides, for each fixed grid:

- ratios [%] of sand and clay;
- mass of dry soil per unit bulk volume (bulk density parameter (ρb);
- w0 and bw0: interpolating temperature coefficients that depend of 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.

The sources in charge of provide this data are listed below:

- For sand and clay percentage: FAO dataset provided as part of ECOCLIMAP package.
- For bulk density, Global Gridded Surfaces of Selected Soil Characteristics for International Satellite Land Surface Climatology Project (ISLSCP) Initiative II Data Collection => Depth selected should be 0-30 cm
- w0 and bw0 (soil temperature vertical interpolation parameters) given by ESL at the FAO scale.
- XMVT and FC given by ESL at the FAO scale.

FAO provides the information in a sacle of 5' by 5', therefore the table covering 360°×180° is of dimensions: 4320 × 2160.

ISLSCPII provides the data in a spatial scale of 1° x 1°, so the data base will consist on text file with 180 rows by 360 columns.

It will be necessary a pre-process in order to adapt the product to the operational products.

Offset and scaling factor are used to derive the actual parameter values.

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	
02-13	***Main_SPH***	structure				Main SPH structure's fields as defined in Table 5-2	
14	***Offset_SBD***	real	g cm^{-3}	10	%010.6f	Offset for soil bulk density	ICNF
15	***Scaling_Factor_SDB***	real	N/A	12	%012f	Scaling factor for soil bulk density	ICNF
16	***Offset_W0***	real	$m^3 m^{-3}$	10	%010.6f	Offset for W_0	ICNF
17	***Scaling_Factor_W0***	real	N/A	12	%012f	Scaling factor for W_0	ICNF
18	***Offset_BW0***	real	TBD	10	%010.6f	Offset for B_W0	ICNF
19	***Scaling_Factor_BW0***	real	N/A	12	%012f	Scaling factor for B_W0	ICNF
20	***Offset_XMVT***	real	N/A	10	%010.6f	Offset for XMVT	ICNF
21	***Scaling_Factor_XMVT***	real	N/A	12	%012f	Scaling factor for XMVT	ICNF
22	***Offset_FC***	real	N/A	10	%010.6f	Offset for FC	ICNF
23	***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 5-29. SPH of the Soil Properties Product

5.3.13.2 Data Block

There are two DSR to store all the information and data. The first, ***Soil_Properties_Coordinates,*** contains the dimension information. The ***Soil_Properties*** Data Set contains the values of the soil properties parameters.

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.	
	Soil_Properties_Coordinates					Init of binary Data Set containing the Soil Properties coordinates for the following data set.	
01	***Start_Lon***	Real value	deg	Float (4 bytes)	1 element	Start longitude	INT
02	***Stop_Lon***	Real value	deg	Float (4 bytes)	1 element	Stop Longitude	INT
03	***Step_Size_Lon***	Real value	deg	Float (4 bytes)	1 element	Longitude step size	INT
04	***Start_Lat***	Real value	deg	Float (4 bytes)	1 element	Start latitude	INT
05	***Stop_Lat***	Real value	deg	Float (4 bytes)	1 element	Stop Latitude	INT
06	***Step_Size_Lat***	Real value	deg	Float (4 bytes)	1 element	Latitude step size	INT
	Soil_Properties_Coordinates					End of binary Data Set containing the Soil Properties coordinates	
	Soil_Properties					Init of binary Data Set containing the Soil Properties for each cell.	
07	***Num_Rows***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of rows in 2-D grid on which data is arranged	INT
	List_of_Soil_Properties_Row_Datas					Start of list of ***Num_Rows*** ***Soil_Properties_Row*** structures, repeated Num_rows times	
	Soil_Properties_Row_Data					Start of ***Soil_Properties_Row*** structure.	
08	***Num_Columns***	Counter	N/A	unsigned integer (4 bytes)	1 element	Number of columns in 2-D grid on which data is arranged	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	List_of_Soil_Properties_Datas					Start of list of ***Num_Columns*** ***Soil_Properties_Data*** structures, repeated Num_Columns times.	
	Soil_Properties_Data					Start of ***Soil_Properties_Data*** structure.	
09	***PC_Sand***	integer value	%	unsigned byte	1 element	Percentage of sand	INT
10	***PC_Clay***	integer value	%	unsigned byte	1 element	Percentage of clay	INT
11	***Soil_Bulk_Den***	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
12	***W_0***	integer	$m^3 m^{-3}$	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
13	***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
14	***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
15	***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:	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						Offset_FC + Scaling_Factor_ FC × FC.	
	Soil_Properties_Data					End of ***Soil_Properties_Data*** structure.	
	List_of_Soil_Properties_Datas					End of list of ***Soil_Properties_Data*** structures.	
	Soil_Properties_Row_Data					End of ***Soil_Properties_Row*** structure.	
	List_of_Soil_Properties_Row_Datas					End of list of ***Soil_Properties_Row*** structures.	
	Soil_Properties					End of binary Data Set containing the Soil Properties for each cell.	
	Data_Block					End of binary Data Block in the product.	

Table 5-30. Binary Content of a DSR of the Soil Properties 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
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	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
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 5-31. 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.	
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

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
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 5-32. 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_***	real	N/A	10	%10.8f	QR –surface roughness polarisation coupling parameter (polarisation coupling factor,	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
	Coupling					describing polarisation mixing induced by the surface roughness)	
09	***COS_Power_Law_H***	real	N/A	10	%10.8f	NRH – power law of cos (θ) for horizontal polarisation	CEC
10	***COS_Power_Law_V***	real	N/A	10	%10.8f	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
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

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
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
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 5-33. XML Structure of a DSR in the Land Cover Classes Product

5.3.16 L2SM Configuration Parameters Product (AUX_CNFSM2)

This product provides configurable parameters for the L2SM Processor.

5.3.16.1 Specific Product Header

The SPH contains the fields included in Table 5-3

5.3.16.2 Data Block

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	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						the presence of the sun tails	
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	*TH_TBAM_Min*	real	K	10	%f	Antenna level TB module range check – must belong to [TH_TBAM_Min, TH_TBAM_Max]	CEC
13	*TH_TBAM_Max*	real	K	10	%f		CEC
14	*TH_TBX_Min*	real	K	10	%f	Antenna level TBX range check – must belong to [TH_TBX_Min, TH_TBX_Max]	CEC
15	*TH_TBX_Max*	real	K	10	%f		CEC
16	*TH_TBY_Min*	real	K	10	%f	Antenna level TBY range check – must belong to [TH_TBY _Min, TH_TBY _Max]	CEC
17	*TH_TBY_Max*	real	K	10	%f		CEC
18	*TBxx_RE_MIN*	real	K	10	%f	Antenna level TBxx range check: real part for full polarization	CEC
19	*TBxx_RE_MAX*	real	K	10	%f		CEC
20	*TBxx_IM_MIN*	real	K	10	%f	Antenna level TBxx range check: imagery part for full polarization	CEC
21	*TBxx_IM_MAX*	real	K	10	%f		CEC
22	*TByy_RE_MIN*	real	K	10	%f	Antenna level TByy range check: real part for full polarization	CEC
23	*TByy_RE_MAX*	real	K	10	%f		CEC
24	*TByy_IM_MIN*	real	K	10	%f	Antenna level TByy range check: imagery part for full polarization	CEC
25	*TByy_IM_MAX*	real	K	10	%f		CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
26	*TBxy_RE_MIN*	real	K	10	%f	Antenna level TBxy range check: real part for full polarization	CEC
27	*TBxy_RE_MAX*	real	K	10	%f		CEC
28	*TBxy_IM_MIN*	real	K	10	%f	Antenna level TBxy range check: imagery part for full polarization	CEC
29	*TBxy_IM_MAX*	real	K	10	%f		CEC
30	*TH_MR2_Cond*	real	N/A	10	%f	Threshold for the condition number of MR2 matrix. If condition number of MR2>TH_MR2_Cond, then the matrix is assumed singular.	CEC
31	*SF_DTB*	real	K	10	%f	Scaling factor used in computing MVAL0	CEC
32	*C_VAL_2*	real	N/A	10	%f	Coefficient used in computing MVAL0	CEC
33	*C_VAL_4*	real	N/A	10	%f	Coefficient used in computing MVAL0	CEC
34	*TH_MMin0*	real	N/A	10	%f	Minimum threshold on number of available TBs after L1c pixel filtering	CEC
35	*TH_AVA_Min*	real	N/A	10	%f	Minimum number of views for applying RFI L2 test	CEC
36	*C_1_TBS1*	real	K	10	%f	Coefficient for RFI L2 test	CEC
37	*C_2_TBS1*	real	N/A	10	%f	Coefficient for RFI L2 test	CEC
38	*TH_RFI_ST4*	real	K	10	%f	Threshold for detecting RFI using the 4th Stokes parameter.	CEC
39	*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
40	*DGG_Intercell_Distance*	real	Km	10	%f	Distance between DGG cells.	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
41	*Preprocessing_Control_Data*	Ending Tag				Tag ending a structure containing Processing Parameters Comtrol	
42	*WEF_Aproximation_Data*	Starting Tag				Tag starting the WEF_Aproximation structure containing the parameters used to approximate the weighting function (WEF)	
43	*C_WEF_1*	real	N/A	10	%f	Coefficient 1 in WEF approximation	CEC
44	*C_WEF_2*	real	N/A	10	%f	Coefficient 2 in WEF approximation	CEC
45	*C_WEF_3*	real	N/A	10	%f	Coefficient 3 in WEF approximation	CEC
46	*C_WEF_4*	real	N/A	10	%f	Coefficient 4 in WEF approximation	CEC
47	*WEF_Aproximation_Data*	Ending Tag				Tag ending a structure containing the parameters of WEF_Aproximation	
48	*Mean_WEF_Aproximation_Data*	Starting Tag				Tag starting the structure containing the parameters used to approximate the mean weighting function (MEAN_WEF)	
49	*C_MWEF_1*	real	km	10	%f	Parameter 1 in MEAN_WEF approximation	CEC
50	*C_MWEF_2*	real	N/A	10	%f	Parameter 2 in MEAN_WEF approximation	CEC
51	*Mean_WEF_Aproximation_Data*	Ending Tag				Tag ending the structure	
52	*All_Surface_Land_Models_Data*	Starting Tag				Tag starting a structure containing the Surface_Land_Models parameters	
53	*T_g*	real	K	10	%f	Default soil effective temperature (used as ECMWF fall back value)	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
54	***All_Surface_Land_Models _Data***	Ending Tag				Tag ending a structure containing the Surface_Land_Models parameters	
55	***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	
56	***Soil_Particle_Den***	real	$g \cdot m^{-3}$	10	%f	Soil particle density	CEC
57	***C_Dobson_Emp***	real	N/A	10	%f	Dobson model empirical coefficients	CEC
58	***Soil_Salinity***	real	ppt	10	%f	Soil salinity	CEC
59	***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
60	***C_CPA_2***	real	$(F \cdot m^2 \cdot g)^{1/2}$	10	%f		CEC
61	***C_CPA_3***	real	(F·m)	10	%f		CEC
62	***Dielec_Const_Particle***	real	$F \cdot m^{-1}$	10	%f	Dielectric constant of solid particles	CEC
63	***C_Sigma_eff_1***	real	N/A	10	%f	Coefficients for computing σ_{eff} $\sigma_{eff} = SGEF_1 + SGEF_2\ \rho_b + SGEF_3\ S + SGEF_4\ C$	CEC
64	***C_Sigma_eff_2***	real	N/A	10	%f		CEC
65	***C_Sigma_eff_3***	real	N/A	10	%f		CEC
66	***C_Sigma_eff_4***	real	N/A	10	%f		CEC
67	***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
68	***C_Beta_Re_2***	real	N/A	10	%f		CEC
69	***C_Beta_Re_3***	real	N/A	10	%f		CEC
70	***C_Beta_Im_1***	real	N/A	10	%f	Coefficients for computing $\beta_{\varepsilon''}$:	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
71	***C_Beta_Im_2***	real	N/A	10	%f		CEC
72	***C_Beta_Im_3***	real	N/A	10	%f		CEC
73	***Soil_Dobson_Model_Data***	Ending Tag				Tag ending a structure containing the Dobson Model parameters	
74	***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	
75	***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
76	***b_w_0***	real	N/A	10	%f		CEC
77	***Effective_temperature of Soil_Data***	Ending Tag				Tag ending the XML structure	
78	***Dielectric_Constant_for_Saline_Water_or_Pure_Water_Data***	Starting Tag				Tag starting the structure Dielectric_Constant_for_Saline_Water_or_Pure_Water	
79	***SST***	real	K	10	%f	Default SST: Water temperature (pure or saline) Fall back default for forecast SST	CEC
80	***SSS***	real	ppt	10	%f	Water salinity (saline water)	CEC
81	***Dielectric_Constant_for_Saline_Water_or_Pure_Wat***	Ending				Tag ending the structure Dielectric_Constant_for_Saline_Water_or_Pur	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
	er_Data	Tag				e_Water	
82	***Dielectric_Klein_Swift_Model_Data***	Starting Tag				Tag Starting the XML structure containing the parameters described below	
83	***C_OW_1***	real	N/A		%g	Klein and Swift	CEC
84	***C_OW_2***	real	N/A		%g		CEC
85	***C_OW_3***	real	N/A		%g		CEC
86	***C_OW_4***	real	N/A		%g		CEC
87	***C_OW_5***	real	N/A		%g	Klein and Swift	CEC
88	***C_OW_6***	real	N/A		%g		CEC
89	***C_OW_7***	real	N/A		%g		CEC
90	***C_OW_8***	real	N/A		%g		CEC
91	***C_OW_9***	real	N/A		%g	Klein and Swift	CEC
92	***C_OW_10***	real	N/A		%g		CEC
93	***C_OW_11***	real	N/A		%g		CEC
94	***C_OW_12***	real	N/A		%g		CEC
95	***C_OW_13***	real	N/A		%g		CEC
96	***C_OW_14***	real	N/A		%g	Stogryn	CEC
97	***C_OW_15***	real	N/A		%g		CEC
98	***C_OW_16***	real	N/A		%g		CEC
99	***C_OW_17***	real	N/A		%g		CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
100	***C_OW_18***	real	N/A		%g	Klein and Swift	CEC
101	***C_OW_19***	real	N/A		%g		CEC
102	***C_OW_20***	real	N/A		%g		CEC
103	***C_OW_21***	real	N/A		%g		CEC
104	***C_OW_22***	real	N/A		%g	Weyl & Stogryn	CEC
105	***C_OW_23***	real	N/A		%g		CEC
106	***C_OW_24***	real	N/A		%g		CEC
107	***C_OW_25***	real	N/A		%g		CEC
108	***C_OW_26***	real	N/A		%g		CEC
109	***C_OW_27***	real	N/A		%g	Weyl & Stogryn	CEC
110	***C_OW_28***	real	N/A		%g		CEC
111	***C_OW_29***	real	N/A		%g		CEC
112	***C_OW_30***	real	N/A		%g		CEC
113	***C_OW_31***	real	N/A		%g		CEC
114	***C_OW_32***	real	N/A		%g		CEC
115	***Dielectric_Klein_Swift_Model_Data***	Ending Tag				Tag ending the XML structure containing the parameters described below	
116	***Cardioid_Model_Data***	Starting Tag				Tag starting the XML structure containing the variables described below.	
117	***Cardioid_U***	real	rd	10	%f	Angle parameter	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
118	***Cardioid_B***	real	$F \cdot m^{-1}$	10	%f	A constant for Cardioid model	CEC
119	***Cardioid_Model_Data***	Ending Tag				Tag ending the XML Cardioid_Model structure	
120	***Dielectric_Constants_Data***	Starting Tag				Tag starting the XML structure containing dielectric constants of solids described below	
121	***Dielec_Const_Sand_Re***	real	F/m	10	%f	Real component of the dielectric constant for dry sand	CEC
122	***Dielec_Const_Sand_Im***	real	F/m	10	%f	Imaginary component of the dielectric constant for dry sand	CEC
123	***Dielec_Const_Frz_Re***	real	F/m	10	%f	Real component of the dielectric constant for frozen soil	CEC
124	***Dielec_Const_Frz_Im***	real	F/m	10	%f	Imaginary component of the dielectric constant for frozen soil	CEC
125	***Dielec_Const_Ice_Re***	real	F/m	10	%f	Real component of the dielectric constant for ice. □i" – very small for pure ice (Currently suggested: 0.05)	CEC
126	***Dielec_Const_Ice_Im***	real	F/m	10	%f	Imaginary component of the dielectric constant for ice. □i" – very small for pure ice (Currently suggested: 0.05)	CEC
127	***Dielec_Const_Urban_Re***	real	F/m	10	%f	Real component of the dielectric constant for urban area	CEC
128	***Dielec_Const_Urban_Im***	real	F/m	10	%f	Imaginary component of the dielectric constant for urban area	CEC
129	***Dielec_Const_Rock_Re***	real	F/m	10	%f	Real component of the dielectric constant for barren areas	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
130	***Dielec_Const_Rock_Im***	real	F/m	10	%f	Imaginary component of the dielectric constant for barren areas	CEC
131	***Dielectric_Constants_Data***	Ending Tag				Tag ending the XML structure described above.	
132	***Soil_Fresnel_Law_Data***	Starting Tag				XML structure containing the Soil/water magnetic permeabilities.	
133	***Mag_Perm_Soil***	real	N/A	10	%f	Soil magnetic permeability	CEC
134	***Mag_Perm_Water***	real	N/A	10	%f	Water magnetic permeability (not equal to 1)	CEC
135	***Soil_Fresnel_Law_Data***	Ending Tag				Tag ending the XML structure	
136	***Surface_roughness_Data***	Starting Tag				Tag starting the XML structure containing the variables described below	
137	***CWP_1***	real	N/A	10	%f	Coefficient for cmputing roughnessHR(SM) as a piecewise function of SM	CEC
138	***CWP_2***	real	N/A	10	%f	Coefficient for cmputing roughnessHR(SM) as a piecewise function of SM	CEC
139	***CWP_3***	real	N/A	10	%f	Coefficient for cmputing roughnessHR(SM) as a piecewise function of SM	CEC
140	***CXMVT_1***	real	N/A	10	%f	Coefficient for cmputing roughnessHR(SM) as a piecewise function of SM	CEC
141	***CXMVT_2***	real	N/A	10	%f	Coefficient for cmputing roughnessHR(SM) as a piecewise function of SM	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
142	***Surface_roughness_Data***	Ending Tag				Tag ending the XML structure described above	
143	***Optical_Thickness_of_litter_tau_LH_and_tau_LV_Data***	Starting Tag				Tag starting the XML structure containing default values for ECMWF SWVL	
144	***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 Fall back default to ECMWF SWVL unavailability	CEC
145	***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 Fall back default to ECMWF SWVL unavailability	CEC
146	***Optical_Thickness_of_litter_tau_LH_and_tau_LV_Data***	Ending Tag				Tag ending the XML structure described above	
147	***General_Data***	Starting Tag				Tag Starting the XML structure containing default values for ECMWFSKT;STL	
148	***T_c_LV***	real	K	10	%f	Low vegetation effective vegetation temperature. Fall back default to ECMWF SKT, STL and SM unavailability.	CEC
149	***T_c_FV***	real	K	10	%f	Forest vegetation effective vegetation	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						temperature. Fall back default to ECMWF SKT, STL and SM unavailability.	
150	*TH_LSM*	real	%	10	%f	Threshold for Land Sea Mask.	
151	*General_Data*	Ending Tag				Tag Ending the XML structure described above.	
152	*Parameters_for_Snow_Model_Data*	Starting Tag				Tag Starting the XML structure described below	
153	*SCR*	real	m	10	%f	Minimum snow mass that ensures complete coverage of an ECMWF grid box – used in computing snow fraction.	CEC
154	*Dielec_Const_Snow_Re*	real	[F/m]	10	%f	Real component of the dielectric constant for snow	CEC
155	*Dielec_Const_Snow_Im*	real	[F/m]	10	%f	Imaginary component of the dielectric constant for snow	CEC
156	*Parameters_for_Snow_Model_Data*	Ending Tag				Tag Ending the XML structure	
157	*Atmosphere_Forecast_Parameter_Data*	Starting Tag				Tag starting XML structure containing the Default values for ECMWF 2T, SP, TCWV	
158	*T_2m*	real	K	10	%f	Temperature at 2 meters Fall back default to ECMWF 2T unavailability	CEC
159		real		10	%f	Surface pressure	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
	P_Surf		hPa			Fall back default to ECMWF SP unavailability	
160	***WVC***	real	$kg{\cdot}m^{-2}$	10	%f	Total water vapor content Fall back default to ECMWF TWVC unavailability	CEC
161	***Atmosphere_Forecast_Parameter_Data***	Ending Tag				Tag ending the XML structure containing the variables described above	
162	***Atmosphere_Optical_Thickness_tau_atm_Data***	Starting Tag				Tag starting the XML structure containing the O2 and H2O optical thickness	
163	***k0_Tau_O2***	real	Np		%g	Oxygen optical thickness parameters fit	CEC
164	***kT0_Tau_O2***	real	$Np{\cdot}K^{-1}$		%g		CEC
165	***kP0_Tau_O2***	real	$Np{\cdot}hPa^{-1}$		%g		CEC
166	***kT02_Tau_O2***	real	$Np{\cdot}K^{-2}$		%g		CEC
167	***kP02_Tau_O2***	real	$Np{\cdot}hPa^{-2}$		%g		CEC
168	***kT0P0_Tau_O2***	real	$Np{\cdot}K^{-1}\cdot hPa^{-1}$		%g		CEC
169	***k0_Tau_H2O***	real	Np		%g	H_2O optical thickness parameters fit	CEC
170	***k1_Tau_H2O***	real	$Np{\cdot}hPa^{-1}$		%g		CEC
171	***k2_Tau_H2O***	real	$Np{\cdot}m^{2}\cdot kg^{-1}$		%g		CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
172	*Atmosphere_Optical_Thickness_tau_atm_Data*	Ending Tag				Tag ending the XML structure containing the coefficients described above	
173	*Atmospheric_Layer_Equivalent_Temperature_Tau_atm_Data*	Starting Tag				Tag starting the XML structure containing the coefficients for O2 and H2O layer temperature differences	
174	*k0_DT_O2*	real	K		%g	Oxygen temperature contribution parameters fit	CEC
175	*kT0_ DT_O2*	real	N/A		%g		CEC
176	*kP0_ DT_O2*	real	$K \cdot hPa^{-1}$		%g		CEC
177	*kT02_ DT_O2*	real	$1 \cdot K^{-1}$		%g		CEC
178	*kP02_ DT_O2*	real	$K \cdot hPa^{-2}$		%g		CEC
179	*kT0P0_ DT_O2*	real	$1 \cdot hPa^{-1}$		%g		CEC
180	*k0_DT_H2O*	real	K		%g	H_2O temperature contribution parameters fit	CEC
181	*k1_DT_H2O*	real	$K \cdot hPa^{-1}$		%g		CEC
182	*k2_DT_H2O*	real	$K \cdot m^2 \cdot kg^{-1}$		%g		CEC
183	*Atmospheric_Layer_Equivalent_Temperature_Tau_atm_Data*	Ending Tag				Tag ending the XML structure	
184	*Galactic_Contribution_Parameters_Data*	Starting Tag				Tag Starting the XML structure containing the Galactic contribution parameters	
185	*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 +	CEC
186	*C_GST0_1*	real	N/A		%g		CEC
187	*C_GST0_2*	real	N/A		%g		CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
188	***C_GST0_4***	real	N/A		%g	C_GST0_2 × $U0^2$ + C_GST0_4 × $U0^3$	CEC
189	***Galactic_Contribution_Parameters_Data***	Ending Tag				Tag ending the XML structure	
190	***Thresholds_for_Selecting_Classes_Data***	Starting Tag				Tag starting the XML structure containing the thresholds used to decide snow state and sand flag	
191	***TH_T_Dry***	real	°C	10	%f	Temperature below which non-permanent snow is considered dry	CEC
192	***TH_T_Wet***	real	°C	10	%f	Temperature above which non-permanent snow is considered wet	CEC
193	***TH_Sand***	real	%	10	%f	Scene flag is raised when sand fraction is above this threshold	CEC
194	***Thresholds_for_Selecting_Classes_Data***	Ending Tag				Tag ending the XML structure	
195	***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	
196	***TH_PWATER_FRZ***	real	K	10	%f	Pure water to ice threshold	CEC
197	***TH_SWATER_FRZ***	real	K	10	%f	Saline water to ice threshold	CEC
198	***TH_SOIL_FRZ***	real	K	10	%f	Soil to frozen soil threshold	CEC
199	***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

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
200	***TH_TAU_F1***	real	%	10	%f	Threshold for winter FFO fraction	CEC
201	***TH_TAU_F2***	real	%	10	%f	Threshold for non-winter FFO fraction	CEC
202	***TH_TAU_FN***	real	%	10	%f	Threshold for canopy opacity of FFO fraction to determine if FNO+FFO retrieval is applied.	CEC
203	***TH_VEG_FRZ***	real	K	10	%f	Threshold for frozen vegetation	CEC
204	***Thresholds_for_external_conditions_to_update_the_DFFG_pixel_context_Data***	Ending Tag				Tag ending the XML structure	
205	***Decision_Tree_Fraction_Thresholds_Data***	Starting Tag				XML structure containing the decision tree parameters:stage1	
206	***Num_Thresholds***	integer	N/A	2	%2d	Number of thresholds	CEC
207	***TH_W2***	real	%	10	%f	Threshold: applies to Open Water	CEC
208	***TH_W2_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
209	***TH_W2_D***	integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
210	***TH_W2_R***	integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
211	***TH_W1***	real	%	10	%f	Threshold: applies to Open Water	CEC
212	***TH_W1_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
213	***TH_W1_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
214	***TH_W1_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
215	***TH_TS***	real	%	10	%f	Threshold: applies to Topography (strong)	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
216	***TH_TS_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
217	***TH_TS_D***	integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
218	***TH_TS_R***	integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
219	***TH_TM***	real	%	10	%f	Threshold: applies to Topography (moderate)	CEC
220	***TH_TM_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
221	***TH_TM_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)v	CEC
222	***TH_TM_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
223	***TH_S2W***	real	%	10	%f	Threshold: applies to non permanent (wet) snow	CEC
224	***TH_S2W_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
225	***TH_S2W_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
226	***TH_S2W_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
227	***TH_S2M***	real	%	10	%f	Threshold: applies to non permanent (mixed) snow	CEC
228	***TH_S2M_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
229	***TH_S2M_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
230	***TH_S2M_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
231	***TH_S1W***	real	%	10	%f	Threshold: applies to non permanent (wet) snow	CEC
232	***TH_S1W_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
233	***TH_S1W_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
234	***TH_S1W_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
235	***TH_S1M***	real	%	10	%f	Threshold: applies to non permanent (mixed) snow	CEC
236	***TH_S1M_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
237	***TH_S1M_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
238	***TH_S1M_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
239	***TH_R2***	real	%	10	%f	Threshold: applies to NPE frozen surface	CEC
240	***TH_R2_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
241	***TH_R2_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
242	***TH_R2_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
243	***TH_R1***	real	%	10	%f	Threshold: applies to NPE frozen surface	CEC
244	***TH_R1_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
245	***TH_R1_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
246	***TH_R1_R***	integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
247	***TH_F2***	real	%	10	%f	Threshold: applies to Forest	CEC
248	***TH_F2_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
249	***TH_F2_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
250	***TH_F2_R***	Integer	N/A	2	%2d	Rank of the branch of decision tree	CEC
251	***TH_NO***	real	%	10	%f	Threshold: applies to nominal soil + low vegetation	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
252	***TH_NO_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
253	***TH_NO_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
254	***TH_NO_R***	Integer	N/A	1	%1d	Rank of the branch of decision tree	CEC
255	***TH_WL***	Real	%	10	%f	Threshold: applies to Wetlands	CEC
256	***TH_WL_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
257	***TH_WL_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
258	***TH_WL_R***	Integer	N/A	1	%1d	Rank of the branch of decision tree	CEC
259	***TH_EB***	real	%	10	%f	Threshold: applies to barren surfaces	CEC
260	***TH_EB_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
261	***TH_EB_D***	Integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
262	***TH_EB_R***	Integer	N/A	1	%1d	Rank of the branch of decision tree	CEC
263	***TH_EI***	real	%	10	%f	Threshold: applies to ice and permanent snow	CEC
264	***TH_EI_N***	string	N/A	3	3*uc	Fraction FM0 key	CEC
265	***TH_EI_D***	integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
266	***TH_EI_R***	integer	N/A	1	%1d	Rank of the branch of decision tree	CEC
267	***TH_EU***	real	%	10	%f	Threshold: applies to urban areas - high coverage.	
268	***TH_EU_N***	string	N/A	3	3*uc	Fraction FM0 key	
269	***TH_EU_D***	integer	N/A	1	%1d	Key for denominator = 0(all) or 1(FLA)	CEC
270	***TH_EU_R***	integer	N/A	1	%1d	Rank of the branch of decision tree.	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
271	***Decision_Tree_Fraction_Thresholds_Data***	Ending tag				End of XML structure containing the variables described above	
272	***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 = 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	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						where i is the rank of the decision tree branch and j is the number of the aggregated fraction.	
273	***List_of_Aggregated_Fractions_Datas***	Starting Tag				Init of list of Aggregated Fractions with a counter as attribute –there are ten fractions	
274	***Aggregated_Fractions_Data***	Starting Tag				Tag Starting Aggregated-Fractions structure	
275	***List_of_Decision_Tree_ Branches_Datas***	Starting Tag				Init of list of Decision_Tree_Branches with a counter as atribute	
276	***Decision_Tree_ Branches_Data***	Starting tag				Tag Starting Decission Tree_Branches structure –there are 17 branches	
277	***Forward_Model***	string	N/A	variable	%s		CEC
278	***Retrieved_Fraction***	integer	N/A	1	%1d	Fractions are set as free for retrieval	CEC
279	***Decission_Tree_Branches _Data***	Ending Tag				End of Decission Tree Branches structure	
280	***List_of_Decision_Tree_ BranchesDatas***	Ending Tag				End of list of Decision_Tree_Branches structures	
281	***Aggregated_Fractions_Data***	Ending Tag				End of the Aggregated_Fractions structure	
282	***List_of_Aggregated_Fractions_Datas***	Ending Tag				End of list of Aggregated Fractions with a counter as atribute	
283	***Decision_Tree_Model_ Selection_Data***	Ending Tag				Tag ending the XML structure containing above	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
284	***Decision_Tree_Stage_2_Retrieval_Condition_Thresholds_Data***	Starting Tag				XML structure containing the Decision tree parameters: stage2	
285	***TH_MMin1***	real	N/A	10	%f	No retrieval Minimum number of retrieved parameters	CEC
286	***TH_MMin2***	real	N/A	10	%f	Nominal number of retrieved parameters	CEC
287	***TH_MMin3***	real	N/A	10	%f	Maximum number of retrieved parameters	CEC
288	***TH_Tau_R_23***	real	neper	10	%f	TAU_R threshold for selecting prior standard deviation values on free parameters	CEC
289	***TH_Tau_R_34***	real	neper	10	%f	TAU_R threshold for selecting prior standard deviation values on free parameters	CEC
290	***TH_HR_Max_delay***	real	day	10	%f	Maximum delay for using current HR map	CEC
291	***TH_Tau_Max_delay***	real	day	10	%f	Maximum delay for using current TAU_LV map	CEC
292	***Decision_Tree_Stage_2_Retrieval_Condition_Thresholds_Data***	Ending Tag				End of XML structure containing the variables described above	
293	***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	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						fractions. There are 3 types of opacity options: 0 for [0, TH_23], 1 for [TH_23, TH_34], 2 for > TH_34. 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	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						retrieval condition "k"	
294	***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.	
295	***Opacity_Options_Data***	Starting Tag				Tag Starting the XML structure containing the varibles described below	
296	***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.	
297	***Models_Data***	Starting Tag				Tag Starting the XML structure containing the varibles described below.	
298	***List_of_Retrieval_Options _Datas***	Starting Tag				Tag starting a list of retrieval_Options, with Num_of_Retrieval_Options Counter as attribute indicating the number of retrieval conditions: 2,3 or 4(full retrieval versus poor based on the number of views)	
299	***Retrieval_Options_Data***	Starting Tag				Tag starting the XML structure containing the variables described below	
300	***Sigma_0_TPhys_Vector_ Data***	Starting Tag				XML structure containing the variables described below	
301	***Sigma_0_TPhys***	real	N/A	10	%f	standard deviation for TPhys based on Thau, Forward Model and Condition number	CEC
302	***Sigma_0_TPhys_Vector_***	Ending				Tag ending the XML structure containing the	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
	Data	Tag				variables described above.	
303	***Sigma_0_A_Card_vector_ Data***	Starting Tag				Tag starting Sigma_0_A_Card vector.	
304	***Sigma_0_A_Card***	real	N/A	10	%f	standard deviation for A_Card parameter based on Thau, Forward Model and Conditionnumber	CEC
305	***Sigma_0_A_Card_vector_ Data***	Ending Tag				Tag ending Sigma_0_A_Card vector.	
306	***Sigma_0_SM_Vector_Dat a***	Starting Tag				XML structure containing the variables described below	
307	***Sigma_0_SM***	real	N/A	10	%f	standard deviation for SM parameter based on Thau, Forward Model and Conditionnumber	CEC
308	***Sigma_0_SM_Vector_Dat a***	Ending Tag				XML structure containing the variables described above.	
309	***Sigma_0_HR_Vector_Data***	Starting Tag				XML structure containing the variables described below	
310	***Sigma_0_HR***	real	N/A	10	%f	standard deviation for HR parameter based on Thau, Forward Model and Conditionnumber	CEC
311	***Sigma_0_HR_Vector_Data***	Ending Tag				XML structure containing the variables described above.	
312	***Sigma_0_Tau_Vector_Dat a***	Starting Tag				XML structure containing the variables described below	
313	***Sigma_0_Tau***	real	N/A	10	%f	standard deviation for Tau parameter based on Thau, Forward Model and Conditionnumber	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
314	***Sigma_0_Tau_Vector_Data***	Ending Tag				XML structure containing the variables described above.	
315	***Sigma_0_TTH_Vector_Data***	Starting Tag				XML structure containing the variables described below	
316	***Sigma_0_TTH***	real	N/A	10	%f	standard deviation for TT_H parameter based on Thau, Forward Model and Conditionnumber	CEC
317	***Sigma_0_TTH_Vector_Data***	Ending Tag				Tag ending the XML structure	
318	***Sigma_0_RTT_Vector_Data***	Starting Tag				XML structure containing the variables described below	
319	***Sigma_0_RTT***	real	N/A	10	%f	standard deviation for RTT parameter based on Thau, Forward Model and Condition number	CEC
320	***Sigma_0_RTT_Vector_Data***	Ending Tag				Tag ending the XML structure	
321	***Sigma_0_OMH_Vector_Data***	Starting Tag				XML structure containing the variables described below	
322	***Sigma_0_OMH***	real	N/A	10	%f	standard deviation for $\omega_H$parameter based on Thau, Forward Model and Conditionnumber	N/A
323	***Sigma_0_OMH_Vector_Data***	Ending Tag				Tag ending the XML structure	
324	***Sigma_0_Diff_OM_Vector_Data***	Starting Tag				XML structure containing the variables described below	
325	***Sigma_0_Diff_OM***	real	N/A			standard deviation for $DIFF_\omega$ parameter based	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
				10	%f	on Tau, Forward Model and Conditionnumber	
326	***Sigma_0_Diff_OM_Vector _Data***	Ending Tag				Tag ending the XML structure	
327	***Retrieval_Options_Data***	Ending Tag				Tag Ending Retrieval_Options Structure	
328	***List_of_Retrieval_options _Datas***	Ending Tag				Tag ending the list of Retrieval_Option structures	
329	***Models_Data***	Ending Tag				Tag Ending Models_Structure	
330	***List_of_Models_Datas***	Ending Tag				Tag ending the list of Model Data structures	
331	***Opacity_Options_Data***	Ending Tag				Tag ending Opacity_Options structure	
332	***List_of_Opacity_Options_ Datas***	Ending tag				Tag ending the list of Opacity_Options structure	
333	***Prior_SD_2nd_Decision_ Tree_Data***	Ending Tag				Tag ending the Prior_SD_2nd_Decision_Tree_Data structure	
334	***Free_Parameters_Prior_V alues_and_Derivate_Incre ment_Data***	Starting Tag				Tag Starting the XML structure containing the Free Parameters described below	
335	***SM***	real	%	10	%f	Soil moisture prior value ECMWF fallback for STL values	CEC
336	***Diff_SM***	real	%			Soil moisture increment for computing	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
				10	%f	derivatives (DPD)	
337	***A_Card***	real	F/M	10	%f	Default cardioid magnitude prior value. To be used with MDd retrieval.	CEC
338	***Diff_A_Card***	real	F/M	10	%f	Cardioid magnitude increment for computing derivatives (DPD)	CEC
339	***Diff_Tau_Nad***	real	neper	10	%f	Tau nadir increment for computing derivatives (DPD)	CEC
340	***T_Phys***	real	K	10	%f	Soil or soil+vegetation effective temperature parameter prior value Fall back value for missing either ECMWF STL1,SM,SKT	CEC
341	***Diff_T_Phys***	real	K	10	%f	T_{ec} increment for computing derivatives (DPD)	CEC
342	***Diff_TT_H***	real	N/A	10	%f	TT_H increment for computing derivatives (DPD)	CEC
343	***Diff_RTT***	real	N/A	10	%f	RTT increment for computing derivatives (DPD)	CEC
344	***Diff_OM_H***	real	N/A	10	%f	ω_H increment for computing derivatives (DPD)	CEC
345	***Diff_Diff_Omega***	real	N/A	10	%f	DIFFω increment for computing derivatives (DPD)	CEC
346	***Diff_HR***	real	N/A			Roughness H_{SOIL} parameter increment for computing derivatives (DPD)	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
				10	%f		
347	***Free_Parameters_Prior_Values_and_Derivate_Increment_Data***	Ending Tag				Tag Ending the XML structure	
348	***Global_Algorithm_Control_Data***	Starting Tag				XML structure containing the Levenberg-Marquardt control parameters described below	
349	***Max_Iterations***	real	N/A	10	%f	Maximum number of iterations	CEC
350	***KDIA***	real	N/A	10	%f	Initial value of the diagonal increment (Levenberg-Marquardt)	CEC
351	***KDIA_Max***	real	N/A	10	%f	Maximum value allowed for the diagonal increment (Levenberg-Marquardt)	CEC
352	***FDIA***	real	N/A	10	%f	Dividing factor for KDIA (Levenberg-Marquardt)	CEC
353	***FCV1***	real	N/A	10	%f	Convergence test on parameters variation	CEC
354	***F_Con***	real	N/A		%g	Test for matrix conditioning (Levenberg-Marquardt)	CEC
355	***Use_TAU_L_In_Inv***	Real	N/A	10	%f	A switch to control if tau litter is modelled in the retrieval. 1= tau litter is modelled. 0 = tau litter is not modelled.	CEC
356	***Negative_Retrieval_Outpu***	Real	N/A	10	%f	To control the usage and output of negative	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
	t					retrieval values.	
357	***Global_Algorithm_Control_Data***	Ending Tag				Tag ending the XML structure containing the variables described above	
358	***Dielectric_Constant_Data***	Starting Tag				XML structure containing the UDP Parameter range: T_Phys	
359	***SM_min***	real	%	10	%f	Soil moisture retrieval domain	CEC
360	***SM_max***	real	%	10	%f		CEC
361	***TH_DQX_SM***	real	N/A	10	%f	Threshold for maximum acceptable DQX_{SM} value	CEC
362	***A_Card_Min***	real	N/A	10	%f	Dielectric constant retrieval domain	CEC
363	***A_Card_Max***	real	N/A	10	%f		CEC
364	***TH_DQX_A_Card***	real	N/A	10	%f	Threshold for acceptable $DQXA_{\_card}$ value	CEC
365	***Dielectric_Constant_Data***	Ending Tag				Tag ending the XML Dielectric_Constant structure	
366	***Temperature***	Starting Tag				XML structure containing the variables described below	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
367	***T_Phys_Min***	real	K	10	%f	Effective temperature or water temperature retrieval domain	CEC
368	***T_Phys_Max***	real	K	10	%f		CEC
369	***TH_DQX_T_Phys***	real	N/A	10	%f	Threshold for maximum acceptable DQX_{Tec} value	CEC
370	***Temperature***	Ending Tag				Tag ending the XML Temperature structure	
371	***Roughness_Data***	Starting Tag				XML structure containing the variables described below	
372	***HR_min***	real	N/A	10	%f	H_{soil} retrieval domain	CEC
373	***HR_max***	real	N/A	10	%f		CEC
374	***TH_DQX_HR***	real	N/A	10	%f	Threshold for maximum acceptable DQX_{Hsoil} value	CEC
375	***Roughness_Data***	Ending Tag				XML structure containing the variables described below	
376	***Vegetation_Data***	Starting Tag				XML structure containing the variables described below	
377	***Tau_Nad_Min***	real	neper			τ_{Nad} retrieval domain	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
				10	%f		
378	***Tau_Nad_Max***	real	neper	10	%f		CEC
379	***TH_DQX_Tau_Nad***	real	N/A	10	%f	Threshold for maximum acceptable $DQX\tau_{Nad}$ value	CEC
380	***TT_H_Min***	real	N/A	10	%f	TT_H retrieval domain	CEC
381	***TT_H_Max***	real	N/A	10	%f		CEC
382	***TH_DQX_TT_H***	real	N/A	10	%f	Threshold for maximum acceptable DQX_{TTH} value	CEC
383	***RTT_Max***	real	N/A	10	%f	RTT retrieval domain	CEC
384	***RTT_Min***	real	N/A	10	%f		CEC
385	***TH_DQX_RTT***	real	N/A	10	%f	Threshold for maximum acceptable DQX_{RTT} value	CEC
386	***Omega_H_Min***	real	N/A	10	%f	ω_H retrieval domain	CEC
387	***Omega_H_Max***	real	N/A	10	%f		CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
388	***TH_DQX_Omega_H***	real	N/A	10	%f	Threshold for maximum acceptable DQXω_H value	CEC
389	***DIFF_Omega_Min***	real	N/A	10	%f	DIFFω retrieval domain	CEC
390	***DIFF_Omega_Max***	real	N/A	10	%f		CEC
391	***TH_DQX_Diff_Omega***	real	N/A	10	%f	Threshold for maximum acceptable DQX$_{DIFF\omega}$ value	N/A
392	***Vegetation_Data***	Ending Tag				Tag ending the XML Vegetation structure	
393	***DAP_Additional_Flag_Thresholds_Data***	Starting Tag				XML structure containing the variables described below	
394	***TH_Fit***	real	N/A	10	%f	Threshold for detecting outliers	CEC
395	***TH_Sky***	real	K	10	%f	Threshold for sky TB contribution	CEC
396	***DAP_Additional_Flag_Thresholds_Data***	Ending tag				Tag ending DAP_Additional_Flag_Thresholds structure	
397	***PCD_Additional_Flag_Thresholds_Data***	Starting Tag				XML structure containing the variables described below	
398	***TH_SCENE_FEB***	Real	%	10	%f	Presence of rocks	CEC
399	***TH_SCENE_FTS***	Real	%	10		Presence of strong topography	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
					%f		
400	***TH_SCENE_FTM***	Real	%	10	%f	Presence of moderate topography	CEC
401	***TH_SCENE_FOW***	Real	%	10	%f	Presence of open water	CEC
402	***TH_SCENE_FSN***	Real	%	10	%f	Presence of snow	CEC
403	***TH_SCENE_FSW***	Real	%	10	%f	Presence of Wet Snow	CEC
404	***TH_SCENE_FSD***	Real	%	10	%f	Presence of Dry Snow	CEC
405	***TH_SCENE_FFO***	Real	%	10	%f	Presence of forest	CEC
406	***TH_SCENE_TAU_FO***	Real	N/A	10	%f	Large forest optical thickness	CEC
407	***TH_SCENE_FNO***	Real	%	10	%f	Presence of nominal soil	CEC
408	***TH_SCENE_FRZ***	Real	%	10	%f	Presence of frost	CEC
409	***TH_SCENE_FWL***	Real	%	10	%f	Presence of wetlands	CEC
410	***TH_SCENE_FUL***	Real	%	10	%f	Presence of limited urban area	CEC
411	***TH_SCENE_FUH***	Real	%	10	%f	Presence of large urban area	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
412	***TH_SCENE_FTI***	Real	%	10	%f	Presence of permanent ice/snow	CEC
413	***TH_SAND***	Real	%	10	%f	Presence of high sand fraction	CEC
414	***TH_TEC***	Real	N/A	10	%f	TEC threshold	CEC
415	***TH_Rain***	Real	mm/h	10	%f	Rain threshold	CEC
416	***TH_FLOOD***	Real	mm/h	10	%f	Rain intensity threshod for flood flag	CEC
417	***TH_Dry_Snow***	Real	%	10	%f	Threshold of Dry Snow	CEC
418	***TH_TAU_Litter***	Real	neper	10	%f	Threshold for mean litter opacity, which is used in setting FL_Litter flag.	CEC
419	***TH_PR***	Real	N/A	10	%f	Threshold for vegetation interception event flag.	CEC
420	***TH_Intercep***	Real	m	10	%f	ECMWF interception	CEC
421	***TH_Sea_Ice***	Real	%	10	%f	Percentage of sea ice	CEC
422	***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
423	***TH_Chi_2_P_Max***	Real	N/A	10	%f	Threshold for χ^2 interpretation. Used to set/unset FCVAL flag	CEC
424	***PCD_Additional_Flag_Thr***	Ending				Tag ending the	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
	esholds_Data	Tag				PCD_Additional_Flag_Thresholds structure	
425	***ASL_Modelled_Brightness_Temperature_Data***	Starting Tag				XML structure containing the variables described below	
426	***Theta_B***	real	°	10	%f	Angle to generate modelled ASL brightness temperature for User Data Product	CEC
427	***PR_INCI***	real	°	10	%f	Angle to generate modelled ASL brightness temperature for computing vegetation interception PR index	CEC
428	***ASL_Modelled_Brightness_Temperature_Data***	Ending Tag				Tag ending the XML ASL_Modelled_Brightness_Temperature structure	
429	***DGG_Current_Controls_Data***	Starting Tag				XML structure containing the variables described below	
430	***Use_Current_RFI***	real	N/A	10	%f	Switch controlling which map is used for RFI map: 0 = Do not use values from Current files 1 = Uses values from Current file	CEC
431	***Use_Current_Tau_Nad_LV***	real	N/A	10	%f	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

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
432	***Use_Current_Tau_Nad_FO***	real	N/A	10	%f	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
433	***Use_Current_HR***	real	N/A	10	%f	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
434	***TH_Cur_HR_Val_Period***	real	days	10	%f	Control for maximum period of validity for HR entries in DGG_Current Roughness.	CEC
435	***TH_Cur_Tau_Nad_FO_Val_Period***	real	days	10	%f	Controls maximum period of validity for Tau_Nad_FO entries in DGG_CURRENT_Tau_Nad_FO LUT	CEC
436	***TH_Cur_Tau_Nad_LV_Val_Period***	real	days	10	%f	Controls maximum period of validity for Tau_Nad_LV entries in DGG_CURRENT_Tau_Nad_LV LUT	CEC
437	***TH_Current_RFI_V***	real	N/A	10	%f	Threshold for current vertical RFI	CEC
438	***TH_Current_RFI_H***	real	N/A	10	%f	Threshold for current horizontal RFI	CEC
439	***Current_HR_ASTD***	real	N/A			A priori standard deviation for HR used in	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
				10	%f	generating output DQX_HR	
440	***Current_Tau_ASTD***	real	neper	10	%f	A priori standard deviation for HR used in generating output DQX_Tau	CEC
441	***MISSING_VAL***	real	N/A	10	%f	Missing value for DGG Current LUTs	CEC
442	***DGG_Current_Controls_Data***	Ending Tag				Tag ending DGG_Current_Controls_Data structure	
443	***N400_Gaussian_Data***	Starting Tag				Tag starting the XML structure containing the N400 Gaussian cell specifications/constants (required by DPM and processor)	
444	***gg_column_max***	real	N/A	10	%f	Number of columns in Gaussian grid	CEC
445	***gg_lat_step_size***	real	degree	10	%f	Latitude step size for Gaussian grid	CEC
446	***gg_lat_stop***	real	degree	10	%f	Latitude stop for Gaussian grid	CEC
447	***gg_long_start***	real	degree	10	%f	Longitude start for Gaussian grid	CEC
448	***gg_long_step_size***	real	degree	10	%f	Longitude step size for Gaussian grid	CEC
449	***gg_row_max***	real	N/A	10	%f	Number of rows in Gaussian grid	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
450	*N400_Gaussian_Data*	Ending Tag				Tag ending the XML Gaussian cell structure	
451	*Global_Quality_Coefficients_Data*	Starting Tag				Tag starting the XML structure containing the Parameters for overall quality (CQX coefficients)	
452	*CQX11*	real	N/A	10	%f	Radiom .TB & prior	CEC
453	*CQX21*	real	K	10	%f	Instrument	CEC
454	*CQX22*	real	Kkm^{-1}	10	%f	Instrument X_SWATH term	CEC
455	*CQX23*	real	K	10	%f	Calibration	CEC
456	*CQX24*	real	K	10	%f	Reconstruction overall bias	CEC
457	*CQX25*	real	K	10	%f	Reconstruction Coast line flag	CEC
458	*CQX26*	real	N/A	10	%f	Reconstruction Corbella term	CEC
459	*CQX31*	real	K	10	%f	Goodness of fit	CEC
460	*CQX32*	real	K			Outliers	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
				10	%f		
461	***CQX33***	real	K	10	%f	SUN in front	CEC
462	***CQX34***	real	K	10	%f	Rain	CEC
463	***CQX35***	real	K	10	%f	TEC	CEC
464	***CQX36***	real	K	10	%f	Sky	CEC
465	***CQX41***	real	K	10	%f	Default fractions	CEC
466	***CQX42***	real	K	10	%f	FNO reference values	CEC
467	***CQX43***	real	K	10	%f	LITTER (not activated)	CEC
468	***CQX44***	real	K	10	%f	Interception	CEC
469	***CQX45***	real	K	10	%f	Interception (aux)	CEC
470	***CQX46***	real	K/%	10	%f	FLOOD probability	CEC

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
471	***CQX47***	real	K	10	%f	Moderate topography	CEC
472	***CQX48***	real	K	10	%f	Strong topography	CEC
473	***CQX49***	real	K	10	%f	Evening orbit	CEC
474	***Global_Quality_Coefficients_Data***	Ending Tag				Tag ending the XML structure	
475	***CCX_Function_Coefficients_Data***	Starting Tag				Tag starting the XML structure containing the Parameters for overall quality (CQX coefficients)	
476	***CCX0***	real	N/A		%g	First coefficient	CEC
477	***CCX1***	real	$\%K^{-1}$		%g	A constant	CEC
478	***CCX2***	real	K^{-1}		%g	SM factor	CEC
479	***CCX3***	real	$\%K^{-1}$		%g	Tau factor	CEC
480	***CCX4***	real	$\%^{-1}K^{-1}$		%g	SM^2 factor	CEC
481	***CCX5***	real	$\%K^{-2}$		%g	Tau^2 factor	CEC
482	***CCX6***	real	K^{-1}		%g	SM*Tau factor	CEC
483	***CCX_Function_Coefficients_Data***	Ending Tag				Tag ending the XML structure containing the Parameters for overall quality (CQX coefficients)	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
484	***Overall_Quality_Thresholds***	Starting Tag				Tag Starting the Overall_Quality_Thresholds structure containing the variables described below	
485	***Overall_QualityThreshold_low***	integer	(10^{-2} %)	5 bytes	%05d	Low Threshold to set the SPH Overal_Quality field	
486	***Overall_QualityThreshold_high***	integer	(10^{-2} %)	5 bytes	%05d	High Threshold to set the SPH Overal_Quality field	
487	***Overall_Quality_Thresholds***	Ending Tag				Tag Ending the Overall_Quality_Thresholds structure	
488	***L2_SM_Configuration_Parameters***	Ending Tag				Tag ending a structure containing Processing Parameters Product	
489	***Data_Block***	Ending Tag				End of Data Block in the product	

Table 5-34. Description of Configuration_Parameters Data Block

5.4 AUXILIARY LEVEL 2 OCEAN SALINITY DATA TYPES BLOCKS SPECIFICATIONS

5.4.1 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.

5.4.1.1 Specific Product Header

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

5.4.1.2 Data Block

The Flat Sea model needs 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	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
13	***Data_Block***	Closing Tag				End of Data Block in the product	

Table 5-35. Description of Flat_Sea_Coef Data Record

5.4.2 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.

5.4.2.1 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

5.4.2.2 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.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Max_Valid					Init of binary Data Set containing the ***Max_Valid*** values	
01	***MaxValid***	Real array	N/A	Float (4 bytes)	4 elements	Highest SST, SSS, U10 and θ follow this order, below which the LUT is valid	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	Lowest SST, SSS, U10 and θ above which the LUT is valid	INT
	Min_Valid					End of binary Data Set containing the ***Min_Valid*** values	
	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

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	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_dim 4					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
	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	K	Float (4 bytes)	9*6*26*20	LUT of Tv0	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
		dimensional					
	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
	Data_Set_Tv2					End of binary Data set containing the Tv2 values	
	Data_Set_U1					Init of binary Data set containing the U1 values	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
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 5-36. Description of rough_LUT data record

5.4.3 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.

5.4.3.1 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

5.4.3.2 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	Highest U*, Ω, θ, SST and SSS 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	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						Min_Valid elements.	
02	***MinValid***	Real array		Float (4 bytes)	5 elements	Lowest U*, Ω, θ, SST and SSS above which the LUT is valid	
	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	U* 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.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
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.	
	Data_Set_ dT_h_0					Init of binary Data Set containing the ***Data_Set_ dT_h_0***values.	
08	***dT_h_0***	LUT 5 dimensiona l	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 dimensiona l	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.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	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.	
	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 $\Delta e_{BU}^{(2)}$	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.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
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 5-37. Description of rough2_LUT data record

5.4.4 Roughness Model 3 LUT (AUX_RGHNS3)

Sea surface roughness model 3 needs two series of coefficients, C_roug and D_roug. Both take different values depending on wind speed.

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

This ADF is specified in XML format:

Field #	Field Name	Type	Unit	String Length	CFormat	Comment	Origin
01	***Data_Block***					Tag starting the Datablock of the product	
02	***Rough3_LUT***	Starting Tag				Start of binary Data Set containing the rough3_LUT elements.	
03	***Wind_Speed_Ranges***	Starting Tag				Tag starting the Wind Speed Ranges Dataset	
04	***WS_range_max***	Real	ms^{-1}		%g	Bounds of interval of WS for the choice of C_roug and D_roug	INT
05	***WS_range_min***	Real	ms^{-1}		%g	Bounds of interval of WS for the choice of C_roug and D_roug	INT
06	***Wind_Speed_Ranges***	Ending Tag				Tag ending the Wind Speed Ranges Dataset	
07	***List_of_Models***	Starting Tag				Tag starting the List_of_model structure with a counter as attribute fixed to 25 times	
08	***List_of_Ranges***	Starting Tag				Tag starting the List_of_range structure with a counter as attribute fixed to 3 times	
09	***Range***	Starting Tag				Tag starting the range data structure	
10	***List_of_C coefs***	Starting Tag				Tag starting the List of C_roug coefficients with a counter as attribute fixed to 5 times	INT
11	***C_rough_coef***	Real value	N/A		%g	C_roug coefficient	
12	***List_of_C_ coefs***	Ending Tag				Tag ending the List of C_roug coefficients	INT
13	***List_of_D_ coefs***	Starting Tag				Tag starting the List of D_roug coefficients with a counter as attribute fixed to 10 times	
14	***D_roug_coef***	Real array	N/A		%g	D_roug coefficients	INT

Field #	Field Name	Type	Unit	String Length	CFormat	Comment	Origin
15	***List_of_D _coefs***	Ending Tag				Tag ending the List of D_roug coefficients	INT
16	***Range***	Ending Tag				Tag ending the range data structure	
17	***List_of_Ranges***	Ending Tag				Tag ending the List_of_range_datas structure	
18	***List_of_Models***	Ending Tag				Tag ending the List_of_model_datas structure	
19	***Rough3_LUT***	Ending Tag				End of binary Data Set containing the rough3_LUT elements.	
20	***Data_Block***					End of binary Data Block in the product.	

Table 5-38 Rough3_LUT XMLDatablock

5.4.5 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.

5.4.5.1 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

Field #	Field Name	Type	Unit	String Length	C Format	Comment
37	***Specific_Product_Header***	Tag				Tag ending the Specific Product Header structure

Table 5-39. AUX_GAL_OS SPH

5.4.5.2 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	Highest values of right ascension and declination below which the LUTs are valid	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	Lowest values of right ascension and declination below which the LUTs are valid	INT
	Min_Valid					End of ***Min_Valid*** binary Data Set	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	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_LUT_gal_I					Init of ***Data_Set_LUT_gal_I*** binary Data Set	
05	***LUT_gal_I***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441 values	Galactic noise given in equatorial coordinates (Total intensity = H)	INT
	Data_Set_LUT_gal_I					End of ***Data_Set_LUT_gal_I*** binary Data Set	
	Data_Set_LUT_gal_Q					Init of ***Data_Set_LUT_gal_Q*** binary Data Set	
06	***LUT_gal_Q***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441 values	Galactic noise given in equatorial coordinates (Second Stokes = H-V)	INT
	Data_Set_LUT_gal_Q					End of ***Data_Set_LUT_gal_Q*** binary Data Set	
	Data_Set_LUT_gal_U					Init of ***Data_Set_LUT_gal_U*** binary Data Set	
07	***LUT_gal_U***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441	Galactic noise given in equatorial coordinates(third Stokes Parameter)	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
					values		
	Data_Set_LUT_gal_U					End of ***Data_Set_LUT_gal_U*** binary Data Set	
	Data_Set_LUT_gal_I_Error					Init of ***Data_Set_LUT_gal_I_Error*** binary Data Set	
08	***I_Error***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441 values	Uncertainty on the galactic noise total instensity.	INT
	Data_Set_LUT_gal_I_Error					End of ***Data_Set_LUT_gal_I_Error*** binary Data Set	
	Data_Set_LUT_gal_Q_Error					Init of ***Data_Set_LUT_gal_Q_Error*** binary Data Set	
09	***Q_Error***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441 values	Uncertainty on the second Stokes parameter of the galactic noise.	INT
	Data_Set_LUT_gal_Q_Error					End of ***Data_Set_LUT_gal_Q_Error*** binary Data Set	
	Data_Set_LUT_gal_U_Error					Init of ***Data_Set_LUT_gal_U_Error*** binary Data Set	
10	***U_Error***	Matrix of real values	K	Float (4 bytes)	Matrix of 721x1441 values	Uncertainty on the third Stokes parameter of the galactic noise.	INT
	Data_Set_LUT_gal_U_Error					End of ***Data_Set_LUT_gal_U_Error*** binary Data Set	
	Data_Block					End of binary Data Block in the product.	

Table 5-40. Description of AUX_GAL_OS data record

5.4.6 OS Galaxy Map Product 2 (AUX_GAL2OS)

5.4.6.1 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 5-41. AUX_GAL2OS SPH

5.4.6.2 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		Float (4 bytes)	5 elements	Highest values of declination, right ascension, wind speed, incidence angle and psi angle below which the LUTs are valid.	INT
	Max_Valid					End of ***Max_Valid*** binary Data Set	
	Min_Valid					Init of ***Min_Valid*** binary Data Set	
02	***MinValid***	Real value		Float (4 bytes)	5 elements	Lowest values of declination, right ascension, wind speed, incidence angle and psi angle above which the LUTs are valid.	INT
	Min_Valid					End of ***Min_Valid*** binary Data Set	
	Data_Set_Sampling_dim1					Init of ***Data_Set_Sampling_dim1***binary Data Set	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
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	
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	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_th_symm					Init of ***Data Set LUT_th_symm*** binary Data Set	
08	***LUT_th_symm***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*99 elements	$\tilde{A}_h^{(0)}$ harmonic amplitude H-pol component	INT
	Data_Set_LUT_th_symm					End of ***Data Set LUT_th_symm*** binary Data Set	
	Data_Set_LUT_tv_symm					Init of ***Data Set LUT_tv_symm*** binary Data Set	
09	***LUT_tv_symm***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*99 elements	$\tilde{A}_v^{(0)}$ harmonic amplitude V-pol component	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_tv_symm					End of ***Data Set LUT_th_symm*** binary Data Set	
	Data_Set_LUT_th_hc					Init of ***Data_Set_ LUT_th_hc*** binary Data Set	
10	***LUT_th_hc***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*99 elements	$\tilde{A}_h^{(2)} \cos(2\varphi_i)$ harmonic amplitude H-Pol	INT
	Data_Set_LUT_th_hc					End of ***Data_Set_ LUT_th_hc*** binary Data Set	
	Data_Set_LUT_tv_hc					Init of ***Data_Set_ LUT_tv_hc*** binary Data Set	
11	***LUT_tv_hc***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*99 elements	$\tilde{A}_v^{(2)} \cos(2\varphi_i)$ harmonic amplitude V-pol.	INT
	Data_Set_LUT_tv_hc					End of ***Data_Set_ LUT_tv_hs*** binary Data Set	
	Data_Set_LUT_th_hs					Init of ***Data_Set_ LUT_th_hs*** binary Data Set	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
12	***LUT_th_hs***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*99 elements	$\tilde{B}_h^{(2)} \sin(2\varphi_i)$ harmonic amplitude H-pol	INT
	Data_Set_ LUT_th_hs					End of ***Data_Set_ LUT_th_hs*** binary Data Set	
	Data_Set_LUT_tv_hs					Init of ***Data_Set_ LUT_tv_hs*** binary Data Set	
13	***LUT_tv_hs***	Matrix of real values	K	Float (4 bytes)	8*15*19*51*99 elements	$\tilde{B}_v^{(2)} \sin(2\varphi_i)$harmonic amplitude V-pol..	INT
	Data_Set_LUT_tv_hs					End of ***Data_Set_ LUT_tv_hs*** binary Data Set	
	Data_Block					End of binary Data Block in the product.	

Table 5-42. Description of AUX_GAL2OS data record

5.4.7 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.

5.4.7.1 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

5.4.7.2 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	Highest WS, Tair-sea, SSS, SST, θ below which the LUTs are 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		float (4 bytes)	5 elements	Lowest WS, Tair-sea, SSS, SST, θ above which the LUTs are valid	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	
	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	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
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
	Data_Set_Foam_Fract					End of binary Data Set containing the ***Data_Set_***	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	ion					***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 5-43. Description of Foam_LUT data record

5.4.8 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 five dimentsions: θsun, φ _smos,θ,U*, φ_relat.

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

5.4.8.1 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

5.4.8.2 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		float (4 bytes)	5 elements	Highest θsun, f_smos, θ, WS, f_relat below which the	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
		array				LUTs are valid.	
	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	Lowest θsun, f_smos, θ, WS, f_relat above which the LUTs are valid.	INT
	Min_Valid					End of binary Data Set containing general information on the Sunglintmap LUTs.	
	Data_Set_Sampling_dim 1					Init of binary Data Set containing the ***Data_Set_Sampling_dim1*** elements.	
03	***Sampling_dim1***	real array	dl	float (4 bytes)	6 elements	Dimension 1 is for harmonics of the bistatic scattering coefficients.	INT
	Data_Set_Sampling_dim 1					End of binary Data Set containing the ***Data_Set_Sampling_dim1*** elements.	
	Data_Set_Sampling_dim 2					Init of binary Data Set containing the ***Data_Set_Sampling_dim2*** elements.	
04	***Sampling_dim2***	real array	deg	Float (4 bytes)	21 elements	Θsun values of sampling	INT
	Data_Set_Sampling_dim 2					End of binary Data Set containing the ***Data_Set_Sampling_dim2*** elements.	

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_Sampling_dim 3					Init of binary Data Set containing the ***Data_Set_Sampling_dim3*** elements.	
05	***Sampling_dim3***	real array	deg	float (4 bytes)	75 elements	f_Smos values of sampling	INT
	Data_Set_Sampling_dim 3					End of binary Data Set containing the ***Data_Set_Sampling_dim3*** elements.	
	Data_Set_Sampling_dim 4					Init of binary Data Set containing the ***Data_Set_Sampling_dim4*** elements.	
06	***Sampling_dim4***	real array	deg	float (4 bytes)	21 elements	θvalues of sampling	INT
	Data_Set_Sampling_dim 4					End of binary Data Set containing the ***Data_Set_Sampling_dim4*** elements.	
	Data_Set_Sampling_dim 5					Init of binary Data Set containing the ***Data_Set_Sampling_dim5*** elements.	
07	***Sampling_dim5***	real array	$m.s^{-1}$	float (4 bytes)	14 elements	WS values of sampling	INT
	Data_Set_Sampling_dim 5					End of binary Data Set containing the ***Data_Set_Sampling_dim5*** elements.	
	Data_Set_ Sigma_HH					Init of binary Data Set containing the ***Data_Set_ Sigma_HH*** elements.	
08	***Sigma_HH***	LUT 5 dimensio	dl	float (4 bytes)	6*21*75*21*14	σHH LUT	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
		nal					
	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.	
09	***sigma_HV***	LUT 5 dimensional	dl	float (4 bytes)	6*21*75*21*14	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.	
10	***Sigma_VH***	LUT 5 dimensional	dl	float (4 bytes)	6*21*75*21*14	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.	
11	***sigma_VV***	LUT 5 dimensional	dl	float (4 bytes)	6*21*75*21*14	σVV LUT	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	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 5-44. Description of Sunglint_LUT data record

5.4.9 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

5.4.9.1 Specific Product Header

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

5.4.9.2 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.	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
13	***tau_O2_coef***	real			%g	Coefficients for tauO2 computation.	CEC
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 5-45. Description of Atmosphere_Constant data record

5.4.10 Maps and Configuration

5.4.10.1 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

5.4.10.1.1 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	
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	

5.4.10.1.2 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_Coast 1	Land_Sea_Coast 2	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	Km	float (4 bytes)	1 element	Limit of acceptable resolution for coast ocean pixel or	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
		value(code as integer)				ocean pixel.	
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.	
	Distan_Data					End of binary Data Set containing the ***Distan_Data*** Data set.	
	Data_Block					End of binary Data Block in the product.	

Table 5-46. Coast Distance data record

5.4.10.2 SSS Climatology Map (AUX_SSS___)

This product provides the Sea Surface Salinity monthly mean value at DGG scale

5.4.10.2.1 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

5.4.10.2.2 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.	
	SSS_Climatological_LUT					Init of binary Data Set containing the ***SSS_Climatological_LUT***	
	List_of_Grid_Point_Datas					Init of List_of_Grid_Point_Datas structures. the number of grid points is fixed and equal to 2621442.	
	Grid_Point_Data					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	***SSS_jan***	Real value	psu	Float (4 bytes)	1 element	SSS LUT. For each ISEA grid point, climatology of SSS for January	INT
03	***SSS_feb***	Real value	psu	Float (4 bytes)	1 element	SSS LUT. For each ISEA grid point, climatology of SSS for February	INT
04	***SSS_mar***	Real value	psu	Float (4 bytes)	1 element	SSS LUT. For each ISEA grid point, climatology of SSS for March.	INT
05	***SSS_apr***	Real value	psu	Float (4 bytes)	1 element	SSS LUT. For each ISEA grid point, climatology of SSS for April	INT
06	***SSS_may***	Real value	psu	Float (4 bytes)	1 element	SSS LUT. For each ISEA grid point, climatology of SSS for May	INT
07	***SSS_jun***	Real value	psu	Float (4 bytes)	1 element	SSS LUT. For each ISEA grid point, climatology of SSS for June	INT

Field #	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
08	***SSS_jul***	Real value	psu	Float (4 bytes)	1 element	SSS LUT. For each ISEA grid point, climatology of SSS for July	INT
09	***SSS_aug***	Real value	psu	Float (4 bytes)	1 element	SSS LUT. For each ISEA grid point, climatology of SSS for August.	INT
10	***SSS_sep***	Real value	psu	Float (4 bytes)	1 element	SSS LUT. For each ISEA grid point, climatology of SSS for September	INT
11	***SSS_oct***	Real value	psu	Float (4 bytes)	1 element	SSS LUT. For each ISEA grid point, climatology of SSS for October.	INT
12	***SSS_nov***	Real value	psu	Float (4 bytes)	1 element	SSS LUT. For each ISEA grid point, climatology of SSS for November.	INT
13	***SSS_dec***	Real value	psu	Float (4 bytes)	1 element	SSS LUT. For each ISEA grid point, climatology of SSS for December.	INT
14	***SSS_prior***	Real value	psu	Float (4 bytes)	1 element	SSS prior	INT
15	***Acard_prior***	Real value	dl	Float (4 bytes)	1 element	Acard prior	INT
	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.	
	SSS_Climatological_LUT					End of binary Data Set containing the ***SSS_Climatological_LUT***	
	Data_Block					End of binary Data Block in the product.	

Table 5-47. SSS Climatological LUT

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

This file provides Auxiliary Geophysical Data Processor Tables

5.4.10.3.1 Specific Product Header

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

5.4.10.3.2 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 3 elements	Highest values of longitude, latitude and month below with the LUTs are valid.	
	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 3 elements	Lowest values of longitude, latitude and month above with the LUTs are valid.	
	Min_valid					End of ***Min_Valid*** binary data set	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_Sampling_dim1					Init of Sampling_dim1 data set	
03	***Sampling_dim1***	Real array	°	Float (4 bytes)	2 elements	longitude 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)	2 elements	Latitude 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)	2 elements	time values of sampling (12 months)	
	Data_Set_Sampling_dim3					End of Sampling_dim3 data set	
	Data_Set_LUT_bias1_MSQS					Init of ***Data_Set_LUT_bias1_MSQS*** binary data set	
06	***LUT_bias1_MSQS***	LUT	dl	Float (4 bytes)	2*2*2	LUT for MSQS bias1	
	Data_Set_LUT_bias1_MSQS					End of ***Data_Set_LUT_bias1_MSQS*** binary data set	
	Data_Set_LUT_bias2_MSQS					Init of ***Data_Set_LUT_bias2_MSQS*** binary data set	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
07	***LUT_bias2_MSQS***	LUT	dl	Float (4 bytes)	2*2*2	LUT for MSQS bias2	
	Data_Set_LUT_bias2_MSQS					End of ***Data_Set_LUT_bias2_MSQS*** binary data set	
	Data_Set_LUT_sigabs_MSQS					Init of ***Data_Set_LUT_sigabs_MSQS*** binary data set	
08	***LUT_sigabs_MSQS***	LUT	dl	Float (4 bytes)	2*2*2	LUT for MSQS theoretical uncertainty (sigma)	
	Data_Set_LUT_sigabs_MSQS					End of ***Data_Set_LUT_sigabs_MSQS*** binary data set	
	Data_Set_LUT_sigrel_MSQS					Init of ***Data_Set_LUT_sigrel_MSQS***binary data set	
09	***LUT_sigrel_MSQS***	LUT	dl	Float (4 bytes)	2*2*2	LUT for MSQS theoretical uncertainty (sigma)	
	Data_Set_LUT_sigrel_MSQS					End of ***Data_Set_LUT_sigrel_MSQS*** binary data set	
	Data_Set_LUT_first_MSQS					Init of ***Data_Set_LUT_first_MSQS*** binary data set	
10	***LUT_first_MSQS***	LUT	dl	Float (4 bytes)	2*2*2	LUT for MSQS first guess	
	Data_Set_LUT_first_MSQS					End of ***Data_Set_LUT_first_MSQS*** binary data set	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_bias1_omega					Init of ***Data_Set_LUT_bias1_omega*** binary data set	
11	***LUT_bias1_omega***	LUT	dl	Float (4 bytes)	2*2*2	LUT for omega bias1	
	Data_Set_LUT_bias1_omega					End of ***Data_Set_LUT_bias1_omega*** binary data set	
	Data_Set_LUT_bias2_omega					Init of ***Data_Set_LUT_bias2_omega*** binary data set	
12	***LUT_bias2_omega***	LUT	dl	Float (4 bytes)	2*2*2	LUT for omega bias2	
	Data_Set_LUT_bias2_omega					End of ***Data_Set_LUT_bias2_omega*** binary data set	
	Data_Set_LUT_sigabs_omega					Init of ***Data_Set_LUT_sigabs_omega*** binary data set	
13	***LUT_sigabs_omega***	LUT	dl	Float (4 bytes)	2*2*2	LUT for omega theoretical uncertainty (sigma)	
	Data_Set_LUT_sigabs_omega					End of ***Data_Set_LUT_sigabs_omega*** binary data set	
	Data_Set_LUT_sigrel_omega					Init of ***Data_Set_LUT_sigrel_omega*** binary data set	
14	***LUT_sigrel_omega***	LUT	dl	Float (4 bytes)	2*2*2	LUT for omega theoretical uncertainty (sigma)	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_sigrel_omega					End of ***Data_Set_LUT_sigrel_omega*** binary data set	
	Data_Set_LUT_first_omega					Init of ***Data_Set_LUT_first_omega*** binary data set	
15	***LUT_first_omega***	LUT	dl	Float (4 bytes)	2*2*2	LUT for omega first guess	
	Data_Set_LUT_first_omega					End of ***Data_Set_LUT_first_omega*** binary data set	
	Data_Set_LUT_bias1_phi_WSn					Init of ***Data_Set_LUT_bias1_phi_WSn*** binary data set	
16	***LUT_bias1_phi_WSn***	LUT	dl	Float (4 bytes)	2*2*2	LUT for phi_wsn bias1	
	Data_Set_LUT_bias1_phi_WSn					End of ***Data_Set_LUT_bias1_phi_WSn*** binary data set	
	Data_Set_LUT_bias2_phi_WSn					Init of ***Data_Set_LUT_bias2_phi_WSn*** binary data set	
17	***LUT_bias2_phi_WSn***	LUT	º	Float (4 bytes)	2*2*2	LUT for phi_wsn bias2	
	Data_Set_LUT_bias2_phi_WSn					End of ***Data_Set_LUT_bias2_phi_WSn*** binary data set	
	Data_Set_LUT_sigabs_phi_WSn					Init of ***Data_Set_LUT_sigabs_phi_WSn*** binary data set	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
18	***LUT_sigabs_phi_WSn***	LUT	º	Float (4 bytes)	2*2*2	LUT for phi_wsn theoretical uncertainty (sigma)	
	Data_Set_LUT_sigabs_phi_WSn					End of ***Data_Set_LUT_sigabs_phi_WSn*** binary data set	
	Data_Set_LUT_sigrel_phi_WSn					Init of ***Data_Set_LUT_sigrel_phi_WSn*** binary data set	
19	***LUT_sigrel_phi_WSn***	LUT	dl	Float (4 bytes)	2*2*2	LUT for phi_wsn theoretical uncertainty (sigma)	
	Data_Set_LUT_sigrel_phi_WSn					End of ***Data_Set_LUT_sigrel_phi_WSn*** binary data set	
	Data_Set_LUT_first_phi_WSn					Init of ***Data_Set_LUT_first_phi_WSn*** binary data set	
20	***LUT_first_phi_WSn***	LUT	º	Float (4 bytes)	2*2*2	LUT for phi_wsn first guess	
	Data_Set_LUT_first_phi_WSn					End of ***Data_Set_LUT_first_phi_WSn*** binary data set	
	Data_Set_LUT_bias1_SSS					Init of ***Data_Set_LUT_bias1_SSS*** binary data set	
21	***LUT_bias1_SSS***	LUT	dl	Float (4 bytes)	2*2*2	LUT for SSS bias1	
	Data_Set_LUT_bias1_SSS					End of ***Data_Set_LUT_bias1_SSS*** binary data set	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_bias2_SSS					Init of ***Data_Set_LUT_bias2_SSS*** binary data set	
22	***LUT_bias2_SSS***	LUT	psu	Float (4 bytes)	2*2*2	LUT for SSS bias2	
	Data_Set_LUT_bias2_SSS					End of ***Data_Set_LUT_bias2_SSS*** binary data set	
	Data_Set_LUT_sigabs_SSS					Init of ***Data_Set_LUT_sigabs_SSS*** binary data set	
23	***LUT_sigabs_SSS***	LUT	psu	Float (4 bytes)	2*2*2	LUT for SSS theoretical uncertainty (sigma)	
	Data_Set_LUT_sigabs_SSS					End of ***Data_Set_LUT_sigabs_SSS*** binary data set	
	Data_Set_LUT_sigrel_SSS					Init of ***Data_Set_LUT_sigrel_SSS*** binary data set	
24	***LUT_sigrel_SSS***	LUT	dl	Float (4 bytes)	2*2*2	LUT for SSS theoretical uncertainty (sigma)	
	Data_Set_LUT_sigrel_SSS					End of ***Data_Set_LUT_sigrel_SSS*** binary data set	
	Data_Set_LUT_first_SSS					Init of ***Data_Set_LUT_first_SSS*** binary data set	
25	***LUT_first_SSS***	LUT	psu	Float (4 bytes)	2*2*2	LUT for SSS first guess	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_first_SSS					End of ***Data_Set_LUT_first_SSS*** binary data set	
	Data_Set_LUT_bias1_SST					Init of ***Data_Set_LUT_bias1_SST*** binary data set	
26	***LUT_bias1_SST***	LUT	dl	Float (4 bytes)	2*2*2	LUT for SST bias1	
	Data_Set_LUT_bias1_SST					End of ***Data_Set_LUT_bias1_SST*** binary data set	
	Data_Set_LUT_bias2_SST					Init of ***Data_Set_LUT_bias2_SST*** binary data set	
27	***LUT_bias2_SST***	LUT	K	Float (4 bytes)	2*2*2	LUT for SST bias2	
	Data_Set_LUT_bias2_SST					End of ***Data_Set_LUT_bias2_SST*** binary data set	
	Data_Set_LUT_sigabs_SST					Init of ***Data_Set_LUT_sigabs_SST*** binary data set	
28	***LUT_sigabs_SST***	LUT	K	Float (4 bytes)	2*2*2	LUT for SST theoretical uncertainty (sigma)	
	Data_Set_LUT_sigabs_SST					End of ***Data_Set_LUT_sigabs_SST*** binary data set	
	Data_Set_LUT_sigrel_SST					Init of ***Data_Set_LUT_sigrel_SST*** binary data set	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
29	***LUT_sigrel_SST***	LUT	dl	Float (4 bytes)	2*2*2	LUT for SST theoretical uncertainty (sigma)	
	Data_Set_LUT_sigrel_SST					End of ***Data_Set_LUT_sigrel_SST*** binary data set	
	Data_Set_LUT_first_SST					Init of ***Data_Set_LUT_first_SST*** binary data set	
30	***LUT_first_SST***	LUT	K	Float (4 bytes)	2*2*2	LUT for SST first guess	
	Data_Set_LUT_first_SST					End of ***Data_Set_LUT_first_SST*** binary data set	
	Data_Set_LUT_bias1_UST					Init of ***Data_Set_LUT_bias1_UST*** binary data set	
31	***LUT_bias1_UST***	Real array	dl	Float (4 bytes)	2*2*2	LUT for UST bias1	
	Data_Set_LUT_bias1_UST					End of ***Data_Set_LUT_bias1_UST*** binary data set	
	Data_Set_LUT_bias2_UST					Init of ***Data_Set_LUT_bias2_UST*** binary data set	
32	***LUT_bias2_UST***	LUT	$m.s^{-1}$	Float (4 bytes)	2*2*2	LUT for UST bias2	
	Data_Set_LUT_bias2_UST					End of ***Data_Set_LUT_bias2_UST*** binary data set	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_sigabs_UST					Init of ***Data_Set_LUT_sigabs_UST*** binary data set	
33	***LUT_sigabs_UST***	LUT	$m.s^{-1}$	Float (4 bytes)	2*2*2	LUT for UST theoretical uncertainty (sigma)	
	Data_Set_LUT_sigabs_UST					End of ***Data_Set_LUT_sigabs_UST*** binary data set	
	Data_Set_LUT_sigrel_UST					Init of ***Data_Set_LUT_sigrel_UST*** binary data set	
34	***LUT_sigrel_UST***	LUT	dl	Float (4 bytes)	2*2*2	LUT for UST theoretical uncertainty (sigma)	
	Data_Set_LUT_sigrel_UST					End of ***Data_Set_LUT_sigrel_UST*** binary data set	
	Data_Set_LUT_first_UST					Init of ***Data_Set_LUT_first_UST*** binary data set	
35	***LUT_first_UST***	LUT	$m.s^{-1}$	Float (4 bytes)	2*2*2	LUT for UST first guess	
	Data_Set_LUT_first_UST					End of ***Data_Set_LUT_first_UST*** binary data set	
	Data_Set_LUT_bias1_WSn					Init of ***Data_Set_LUT_bias1_WSn*** binary data set	
36	***LUT_bias1_WSn***	LUT	dl	Float (4 bytes)	2*2*2	LUT for Wsn bias1	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_bias1_WSn					End of ***Data_Set_LUT_bias1_WSn*** binary data set	
	Data_Set_LUT_bias2_WSn					Init of ***Data_Set_LUT_bias2_WSn*** binary data set	
37	***LUT_bias2_WSn***	LUT	$m.s^{-1}$	Float (4 bytes)	2*2*2	LUT for Wsn bias2	
	Data_Set_LUT_bias2_WSn					End of ***Data_Set_LUT_bias2_WSn*** binary data set	
	Data_Set_LUT_sigabs_WSn					Init of ***Data_Set_LUT_sigabs_WSn*** binary data set	
38	***LUT_sigabs_WSn***	LUT	$m.s^{-1}$	Float (4 bytes)	2*2*2	LUT for Wsn theoretical uncertainty (sigma)	
	Data_Set_LUT_sigabs_WSn					End of ***Data_Set_LUT_sigabs_WSn*** binary data set	
	Data_Set_LUT_sigrel_WSn					Init of ***Data_Set_LUT_sigrel_WSn*** binary data set	
39	***LUT_sigrel_WSn***	LUT	dl	Float (4 bytes)	2*2*2	LUT for Wsn theoretical uncertainty (sigma)	
	Data_Set_LUT_sigrel_WSn					End of ***Data_Set_LUT_sigrel_WSn*** binary data set	
	Data_Set_LUT_first_WSn					Init of ***Data_Set_LUT_first_WSn*** binary data set	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
40	***LUT_first_WSn***	LUT	$m.s^{-1}$	Float (4 bytes)	2*2*2	LUT for Wsn first guess	
	Data_Set_LUT_first_WSn					End of ***Data_Set_LUT_first_WSn*** binary data set	
	Data_Set_LUT_bias1_UN10					Init of ***Data_Set_LUT_bias1_UN10*** binary data set	
41	***LUT_bias1_UN10***	LUT	dl	Float (4 bytes)	2*2*2	LUT for UN10 bias1	
	Data_Set_LUT_bias1_UN10					End of ***Data_Set_LUT_bias1_UN10*** binary data set	
	Data_Set_LUT_bias2_UN10					Init of ***Data_Set_LUT_bias2_UN10*** binary data set	
42	***LUT_bias2_UN10***	LUT	$m.s^{-1}$	Float (4 bytes)	2*2*2	LUT for UN10 bias2	
	Data_Set_LUT_bias2_UN10					End of ***Data_Set_LUT_bias2_UN10*** binary data set	
	Data_Set_LUT_sigabs_UN10					Init of ***Data_Set_LUT_sigabs_UN10*** binary data set	
43	***LUT_sigabs_UN10***	LUT	$m.s^{-1}$	Float (4 bytes)	2*2*2	LUT for UN10 theoretical uncertainty (sigma)	
	Data_Set_LUT_sigabs_UN10					End of ***Data_Set_LUT_sigabs_UN10*** binary data set	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_sigrel_UN10					Init of ***Data_Set_LUT_sigrel_UN10*** binary data set	
44	***LUT_sigrel_UN10***	LUT	dl	Float (4 bytes)	2*2*2	LUT for UN10 heoretical uncertainty (sigma)	
	Data_Set_LUT_sigrel_UN10					End of ***Data_Set_LUT_sigrel_UN10*** binary data set	
	Data_Set_LUT_first_UN10					Init of ***Data_Set_LUT_first_UN10*** binary data set	
45	***LUT_first_UN10***	LUT	$m.s^{-1}$	Float (4 bytes)	2*2*2	LUT for UN10first guess	
	Data_Set_LUT_first_UN10					End of ***Data_Set_LUT_first_UN10*** binary data set	
	Data_Set_LUT_bias1_VN10					Init of ***Data_Set_LUT_bias1_VN10*** binary data set	
46	***LUT_bias1_VN10***	LUT	dl	Float (4 bytes)	2*2*2	LUT for VN10 bias1	
	Data_Set_LUT_bias1_VN10					End of ***Data_Set_LUT_bias1_VN10*** binary data set	
	Data_Set_LUT_bias2_VN10					Init of ***Data_Set_LUT_bias2_VN10*** binary data set	
47	***LUT_bias2_VN10***	LUT	$m.s^{-1}$	Float (4 bytes)	2*2*2	LUT for VN10 bias2	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_bias2_VN10					End of ***Data_Set_LUT_bias2_VN10*** binary data set	
	Data_Set_LUT_sigabs_VN10					Init of ***Data_Set_LUT_sigabs_VN10*** binary data set	
48	***LUT_sigabs_VN10***	LUT	$m.s^{-1}$	Float (4 bytes)	2*2*2	LUT for VN10 theoretical uncertainty (sigma)	
	Data_Set_LUT_sigabs_VN10					End of ***Data_Set_LUT_sigabs_VN10*** binary data set	
	Data_Set_LUT_sigrel_VN10					Init of ***Data_Set_LUT_sigrel_VN10*** binary data set	
49	***LUT_sigrel_VN10***	LUT	dl	Float (4 bytes)	2*2*2	LUT for VN10 theoretical uncertainty (sigma)	
	Data_Set_LUT_sigrel_VN10					End of ***Data_Set_LUT_sigrel_VN10*** binary data set	
	Data_Set_LUT_first_VN10					Init of ***Data_Set_LUT_first_VN10*** binary data set	
50	***LUT_first_VN10***	LUT	$m.s^{-1}$	Float (4 bytes)	2*2*2	LUT for VN10 first guess	
	Data_Set_LUT_first_VN10					End of ***Data_Set_LUT_first_VN10*** binary data set	
	Data_Set_LUT_bias1_tec					Init of ***Data_Set_LUT_bias1_tec*** binary data set	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
51	***LUT_bias1_tec***	LUT	dl	Float (4 bytes)	2*2*2	LUT for tec bias1	
	Data_Set_LUT_bias1_tec					End of ***Data_Set_LUT_bias1_tec*** binary data set	
	Data_Set_LUT_bias2_tec					Init of ***Data_Set_LUT_bias2_tec*** binary data set	
52	***LUT_bias2_tec***	LUT	tecu	Float (4 bytes)	2*2*2	LUT for tec bias2	
	Data_Set_LUT_bias2_tec					End of ***Data_Set_LUT_bias2_tec*** binary data set	
	Data_Set_LUT_sigabs_tec					Init of ***Data_Set_LUT_sigabs_tec*** binary data set	
53	***LUT_sigabs_tec***	LUT	tecu	Float (4 bytes)	2*2*2	LUT for tec theoretical uncertainty (sigma)	
	Data_Set_LUT_sigabs_tec					End of ***Data_Set_LUT_sigabs_tec*** binary data set	
	Data_Set_LUT_sigrel_tec					Init of ***Data_Set_LUT_sigrel_tec***binary data set	
54	***LUT_sigrel_tec***	LUT	dl	Float (4 bytes)	2*2*2	LUT for tec theoretical uncertainty (sigma)	
	Data_Set_LUT_sigrel_tec					End of ***Data_Set_LUT_sigrel_tec*** binary data	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
						set	
	Data_Set_LUT_first_tec					Init of ***Data_Set_LUT_first_tec*** binary data set	
55	***LUT_first_tec***	LUT	tecu	Float (4 bytes)	2*2*2	LUT for tec first guess	
	Data_Set_LUT_first_tec					End of ***Data_Set_LUT_first_tec*** binary data set	
	Data_Set_LUT_bias1_HS					Init of ***Data_Set_LUT_bias1_HS*** binary data set	
56	***LUT_bias1_HS***	LUT	dl	Float (4 bytes)	2*2*2	LUT for HS bias1	
	Data_Set_LUT_bias1_HS					End of ***Data_Set_LUT_bias1_HS*** binary data set	
	Data_Set_LUT_bias2_HS					Init of ***Data_Set_LUT_bias2_HS*** binary data set	
57	***LUT_bias2_HS***	LUT	m	Float (4 bytes)	2*2*2	LUT for HS bias2	
	Data_Set_LUT_bias2_HS					End of ***Data_Set_LUT_bias2_HS*** binary data set	
	Data_Set_LUT_sigabs_HS					Init of ***Data_Set_LUT_sigabs_HS*** binary data set	
58	***LUT_sigabs_HS***	LUT	m	Float (4	2*2*2	LUT for HS theoretical uncertainty (sigma)	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
				bytes)			
	Data_Set_LUT_sigabs_HS					End of ***Data_Set_LUT_sigabs_HS*** binary data set	
	Data_Set_LUT_sigrel_HS					Init of ***Data_Set_LUT_sigrel_HS*** binary data set	
59	***LUT_sigrel_HS***	LUT	dl	Float (4 bytes)	2*2*2	LUT for HS theoretical uncertainty (sigma)	
	Data_Set_LUT_sigrel_HS					End of ***Data_Set_LUT_sigrel_HS*** binary data set	
	Data_Set_LUT_first_HS					Init of ***Data_Set_LUT_first_HS*** binary data set	
60	***LUT_first_HS***	LUT	m	Float (4 bytes)	2*2*2	LUT for HS first guess	
	Data_Set_LUT_first_HS					End of ***Data_Set_LUT_first_HS*** binary data set	
	Data_Set_LUT_bias1_Acard					Init of ***Data_Set_LUT_bias1_Acard*** binary data set	
61	***LUT_bias1_Acard***	LUT	dl	Float (4 bytes)	2*2*2	LUT for Acard bias1	
	Data_Set_LUT_bias1_Acard					End of ***Data_Set_LUT_bias1_Acard*** binary data set	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_bias2_Acard					Init of ***Data_Set_LUT_bias2_Acard*** binary data set	
62	***LUT_bias2_Acard***	LUT	psu	Float (4 bytes)	2*2*2	LUT for Acard bias2	
	Data_Set_LUT_bias2_Acard					End of ***Data_Set_LUT_bias2_Acard*** binary data set	
	Data_Set_LUT_sigabs_Acard					Init of **Data_Set_LUT_sigabs_Acard** Binary data set	
63	***LUT_sigabs_Acard***	LUT	K	Float (4 bytes)	2*2*2	LUT Acard theoretical uncertainty (sigma)	
	Data_Set_LUT_sigabs_Acard					End of **Data_Set_LUT_sigabs_Acard** binary data set	
	Data_Set_LUT_sigrel_Acard					Init of **Data_Set_LUT_sigrel_Acard** Binary data set	
64	***LUT_sigrel_Acard***	LUT	dl	Float (4 bytes)	2*2*2	LUT for Acard theoretical uncertainty (sigma)	
	Data_Set_LUT_sigrel_Acard					End of **Data_Set_LUT_sigrel_Acard** Binary data set	
	Data_Set_LUT_first_Acard					Init of ***Data_Set_LUT_first_Acard*** Binary data set	
65	***LUT_first_Acard***	LUT	psu	Float (4 bytes)	2*2*2	LUT for Acard first guess	

	Field Name	Type	Unit	Element Precision	Variable Format	Comment	Origin
	Data_Set_LUT_first_Acard					End of ***Data_Set_LUT_first_Acard*** Binary data set	
	Data_Block					End of binary Data Block in the product.	

Table 5-48. LUTs used by the auxiliary data processor for parameter initialisation

5.4.10.4 L2OS Auxiliary Configuration Parameters Product (AUX_CNFOS2)

The AUX_CNFOS2 ADF contains a list of parameters needed to specify the values of the configurable algorithms and to provide a common reference to all L2 executables for the set of constants needed in the processing.

5.4.10.4.1 Specific Product Header

The SPH contains the fields specified in Table 5-3

5.4.10.4.2 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_CNFOS2 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. Default=4 times	
05	***Iterative_Conf***	Starting Tag				Init of Iterative_Configuration XML structure.	
06	***nRetrievedParam***	Integer	dl	4	%04d	Number of retrieved parameter	ACRI
07	***List_of_retrived_Parameters***	Starting Tag				Init of list of Retrieved_Parameters, with a “count” as attribute indicating the number of retrieved parameters	
08	***retrievedParamId***	Integer	dl		%s	Acronym of the retrieved parameter in param vector, to be converted into the index on the parameter.	ACRI
09	***List_of_retrived_Parameters***	Ending Tag				End of list of Retrieved_Parameters.	
10	***sig_th_mod***	real	K		%g	TbH model error	ACRI
11	***sig_tv_mod***	real	K		%g	TbV model error	ACRI
12	***sig_t3_mod***	real	K		%g	Tb3 model error	ACRI

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
13	***sig_t4_mod***	real	K		%g	Tb4 model error	ACRI
14	***KappaDia***	real	dl		%g	Factor for multiplying Marquardt diagonal Amplifier	ACRI
15	***lamdaIni***	real	dl		%g	Initial Marquardt diagonal Amplifier	ACRI
16	***deltasig***	real	dl		%g	Increment to sttd ratio for convergence test	ACRI
17	***deltaChi***	real	dl		%g	Chi variance ratio for convergence test	ACRI
18	***fCon***	real	dl		%g	Min admissible value for conditioning factor	ACRI
19	***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	
20	***deltaP***	real	dl		%g	Small parameter variation in order to compute numerically partial derivative with retrieved parameters.	ACRI
21	***List_of_Delta_Parameters***	Ending Tag				End of list of Delta_Parameters, with a "count" as attribute indicating the number of retrieved parameters	
22	***itMax***	real	dl	4	%04d	Max number of iterations allowed	ACRI
23	***lamdaMax***	real	dl		%g	Max value of Marquardt diagonal Amplifier	ACRI
24	***Tg_num_meas_min***	Real	dl	2	%02d	Minimum number of valid measurements to perform retrieval	
25	***Switch_foam***	string	dl		%s	Boolean. If false, no foam contribution is applied; if true, foam contribution is computed	ACRI
26	***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	ACRI

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						dual; if ==4, Stokes 1 from full	
27	***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	ACRI
28	***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	ACRI
29	***Switch_rough3***	integer	dl	4	%04d	Index of the roughness 3 model used by the processor	ACRI
30	***Switch_retr***	integer	dl	1	%01d	Boolean. If true: iterative Scheme If false: Neural Network. Not in use	ACRI
31	***Switch_err_mod***	string	dl		%s	Boolean. If true, model error is taken into consideration in cost function computation and outlier detection. Possible strings are “true” or “false”	ACRI
32	***Switch_card***	integer	dl		%s	Switch for cardioid computation. If = = false, direct model begins with FOM_1; if = = true, direct model begins with FOM_10	ACRI
33	***Delta_sn***	real	dl		%g	Maximum admissible time between two successive snapshot in order to compute Stokes 1	ACRI
34	***Tg_WS_roughness***	float	$m*s^{-1}$		%g	Min. WS to apply roughness correction	ACRI
35	***Tg_WS_foam***	float	$m*s^{-1}$		%g	Foam effect vanishes if WS<Tg_WS_foam	ACRI
36	***List_of_Guess_Datas***	Starting				Init of list of Guess_Datas, with a fixed “count” as attribute	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
		Tag				(=10) indicating the number of retrieved parameters	
37	***Guess_prior***	string	dl		%s	Boolean vector. 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	ACRI
38	***List_of_Guess_Datas***	Ending Tag				End of list of Guess_Datas.	
39	***Iterative_Conf***	Ending Tag				End of Iterative_Configuration XML structure.	
40	***List_of_Iterconf***	Ending Tag				End of list of iterative scheme configurations.	
41	***Iterative_Scheme***	Ending Tag				Tag ending the Iterative_Scheme XML structure	
42	***Parameter_Index***	Starting Tag				Initial Data Set definition tag. Start of Data Set XML structure containing the variables described below	
43	***List_of_definitions***	Starting Tag				Tag starting a list of definitions for each parameter. It contains an attribute "*count*.	
44	***Geophy_Param***	Starting Tag				Tag starting Geophy_param structure	
45	***Ind_SST***	Integer	dl	2	%02d	Index of SST in p_tot_aux vector	ACRI
46	***ind_SSS***	Integer	dl	2	%02d	Index of SSS in p_tot_aux vector	ACRI

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
47	*ind_WS*	Integer	dl	2	%02d	Index of wind module in p_tot_aux vector	ACRI
48	*ind_WSn*	Integer	dl	2	%02d	Index of neutral wind module in p_tot_aux vector	ACRI
49	*ind_phi_wsn*	Integer	dl	2	%02d	Index of phi_wsn in p_tot_aux vector	ACRI
50	*ind_Tsea_air*	Integer	dl	2	%02d	Index of Tsea-air in p_tot_aux vector	ACRI
51	*ind_WFV*	Integer	dl	2	%02d	Index of friction velocity from atmospheric model in p_tot_aux vector	ACRI
52	*ind_OMEGA*	Integer	dl	2	%02d	Index of the inverse wave age parameter in p_tot_aux vector	ACRI
53	*ind_HS*	Integer	dl	2	%02d	Index of wave height in p_tot_aux vector	ACRI
54	*ind_MSQS*	Integer	dl	2	%02d	Index of mean square slope in p_tot_aux vector	ACRI
55	*ind_TAU*	Integer	dl	2	%02d	Index of the optical thickness of air at the nadir	ACRI
56	*ind_TatmEq*	Integer	dl	2	%02d	Index of the atmospheric emission at the nadir	ACRI
57	*ind_Tair*	Integer	dl	2	%02d	Index of Tair in p_tot_aux vector	ACRI
58	*ind_TCWV*	Integer	dl	2	%02d	Index of total column water vapour in p_tot_aux vector	ACRI
59	*ind_tec*	Integer	dl	2	%02d	Index of tec parameter in p_tot_aux vector	ACRI
60	*ind_Tp*	Integer	dl	2	%02d	Index of mean period of wind waves in p_tot_aux vector	ACRI
61	*ind_U*	Integer	dl	2	%02d		ACRI
62	*ind_Uwav*	Integer	dl	2	%02d	Index of wave model friction velocity in p_tot_aux vector	ACRI
63	*ind_2mDT*	Integer	dl	2	%02d	Index of 2 m dewpoint temperature	ACRI
64	*ind_Cd*	Integer	dl	2	%02d	Index of drag coefficient with waves in p_tot_aux vector	ACRI
65	*ind_phi_wind*	Integer	dl	2	%02d	Index of phi_wind in p_tot_aux vector	ACRI

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
66	*ind_SHWW*	Integer	dl	2	%02d	Index of significant height of wind waves in p_tot_aux vector	ACRI
67	*ind_SLP*	Integer	dl	2	%02d	Index of sea level pressure	ACRI
68	*ind_SP*	Integer	dl	2	%02d	Index of surface pressure	ACRI
69	*ind_UN10*	Integer	dl	2	%02d	Index of wind zonal component in p_tot_aux vector	ACRI
70	*ind_VN10*	Integer	dl	2	%02d	Index of wind meridian component in p_tot_aux vector	ACRI
71	*ind_WSwav*	Integer	dl	2	%02d	Index of wave model 10 m wind speed in p_tot_aux vector	ACRI
72	*ind_WS_U*	Integer	dl	2	%02d	Index of wind zonal component in p_tot_aux vector	ACRI
73	*ind_WS_V*	Integer	dl	2	%02d	Index of wind meridian component in p_tot_aux vector	ACRI
74	*ind_PP1D*	Integer	dl	2	%02d	Index of the peak period of 1D spectrum	ACRI
75	*ind_Rain*	Integer	dl	2	%02d	Index of the rain rate parameter	ACRI
76	*ind_ice_sea_conc*	Integer	dl	2	%02d	Index of the sea ice concentration parameter	ACRI
77	*ind_ZNT*	Integer	dl	2	%02d	ind_ZNT	ACRI
78	*ind_Acard*	Integer	dl	2	%02d	ind_Acard	ACRI
79	*ind_EWSS*	Integer	dl	2	%02d	Index of eastward surface stress, accumulated since start of forecast	ACRI
80	*ind_NSSS*	Integer	dl	2	%02d	Index of northward surface stress, accumulated since start of forecast	ACRI
81	*ind_NSLHF*	Integer	dl	2	%02d	Index of net downward latent heat flux, accumulated since start of forecast	ACRI
82	*ind_SSHF*	Integer	dl	2	%02d	Index of net downward sensible heat flux, accumulated since start of forecast	ACRI
83	*ind_SSR*	Integer	dl	2	%02d	Index of net downward shortwave flux at surface, accumulated since start of forecast	ACRI

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
84	*ind_STR*	Integer	dl	2	%02d	Index of net downward thermal radiative flux at surface, accumulated since start of forecast	ACRI
85	*name*	integer	dl	200	%s	Index of Acard parameter (from cardioid model)	ACRI
86	*nameLong*	integer	dl	200	%s	Acronym of parameter	ACRI
87	*unit*	integer	dl	200	%s	Name of parameter	ACRI
88	*desc*	integer	dl	200	%s	Unit of parameter	ACRI
89	*origin*	integer	dl	200	%s	Parameter Description	ACRI
90	*originID*	integer	dl	200	%s	Origin of the parameter	ACRI
91	*Geophy_Param*	Ending Tag				Tag ending Geophy_param structure	
92	*List_of_definitions*	Ending Tag				Tag ending a list of definitions for each parameter	
93	*Parameter_Index*	Ending Tag				End of Data Set definition tag.	
94	*Thresholds*	Starting Tag				Init of Data Set containing the Thresholds elements.	
95	*Switch_af*	string	dl		%s	only measurements from alias free FOV are selected if true	ACRI
96	*nsig*	integer	dl	2	%02d	Sigma number from which measurement becomesan outlier	ACRI
97	*Tg_gal_noise_max*	integer	dl	2	%02d	Minimum % of measurements flagged for galactic noise to	ACRI

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						flag a grid point.	
98	***Tg_high_SSS***	real	psu		%g	Boundary between "medium SSS" and "high SSS"	ACRI
99	***Tg_high_SST***	real	K		%g	Boundary between "medium SST" and "high SST"	ACRI
100	***Tg_high_wind***	real	m.s-1		%g	Boundary between "medium wind" and "high wind"	ACRI
101	***Tg_ice_concentration***	real	dl		%g	Limit of ice concentration for retrieval execution	ACRI
102	***Tg_low_SSS***	real	psu		%g	Upper limit for very low SSS	ACRI
103	***Tg_low_SST***	real	K		%g	Upper limit for very low SST	ACRI
104	***Tg_low_SST_ice***	real	K		%g	Temperature under which ice could be present (Celsius)	ACRI
105	***Tg_low_wind***	real	m.s-1		%g	Upper limit for low wind speed	ACRI
106	***Tg_medium_SSS***	real	psu		%g	Boundary between "low SSS" and "medium SSS"	ACRI
107	***Tg_medium_SST***	real	K		%g	Boundary between "low SST" and "medium SST"	ACRI
108	***Tg_medium_wind***	real	m.s-1		%g	Boundary between"low wind" and "medium wind"	ACRI
109	***Tg_moonglint_max***	integer	dl	2	%02d	minimum % of measurements flagged for moonglint to flag a grid point	ACRI
110	***Tg_num_meas_valid***	integer	dl	2	%02d	Threshold of number of valid measurements	ACRI
111	***Tg_num_outliers_max***	integer	dl	2	%02d		
112	***Tg_suspect_ice***	real	dl		%g	Limit of measurement percentage for which presence of	ACRI

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
						ice is suspected.	
113	***Tg_Sunglint_max***	integer	dl		%g	Minimum % of measurements flagged for sunglint to flag a grid point.	ACRI
114	***Tg_max_rainfall***	real	m.s-1		%g	Limit of acceptable rain.	ACRI
115	***Tg_TEC_gradient***	real	tecu		%g	Threshold for TEC gradient.	ACRI
116	***Tg_lat_ice_Acard***	Real	º		%g	Latitude min for ice detection from Acard model.	ACRI
117	***Tg_SST_ice_Acard***	Real	K		%g	SST threshold for ice detection from Acard model.	ACRI
118	***Tg_Acard_ice***	Real	dl		%g	Acard threshold for ice detection	ACRI
119	***Tm_angle_moon***	real	°		%g	Limit of acceptable angle between the specular direction and the moon direction.	ACRI
120	***Tm_DT_ice***	Real	K		%g	For testing if ice contaminates the brightness temperatures (Celsius)	ACRI
121	***Tm_high_gal_noise***	real	K		%g	High galactic noise boundary	ACRI
122	***Tm_high_sun_glint***	real	K		%g	Boundary between “mediun sunglint” and “high sunglint”	ACRI
123	***Tm_low_sun_glint***	real	K		%g	Upper limit for no sunglint.	ACRI
124	***Tm_max_GN_error***	real	K		%g	Limit of acceptable galactic background error.	ACRI
125	***Tm_medium_sun_glint***	real	K		%g	Boundary between “low sun glint” and “medium sun glint”	ACRI
126	***Tm_out_of_range***	real	K		%g	Limit for TB out of range detection.	ACRI
127	***Tm_sun_limit***	real	K		%g	Limit of acceptable sunglint contamination	ACRI

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
128	***Thresholds***	Ending Tag				Tag ending Thresholds structure	
129	***Physical_constants***	Starting Tag				Tag starting Physical constants structure	
130	***Freq_smos***	Real	GHz		%g	High frequency limit value of relative dielectric constant	ACRI
131	***T0***	real	K		%g	Temperature at 0 Celsius degrees.	ACRI
132	***epsilonInf***	real	dl		%g	High frequency limits value of relative dielectric constant.	ACRI
133	***Epsilon0***	Real	Fm^{-1}		%g	Permitivity of free space	ACRI
134	***Fac_omega***	real	dl		%g	Ω factor	ACRI
135	***g***	real	Ms^{-2}		%g	Acceleracion of free fall	ACRI
136	***Orbit_duration***	real	s		%g	Orbit duration	ACRI
137	***Omega_sun***	real	strad		%g	Apparent solid angle of the sun seen from the Earth	ACRI
138	***Cst_far***	real	dl		%g	Faraday constant (=6950)	ACRI
139	***Ucard***	real	º		%g	Ucard parameter	ACRI
140	***Bcard***	real	dl		%g	Bcard paramenter	ACRI
141	***TB_gal_mean***	real	K		%g	Value of the constant incident galactic noise.	ACRI
142	***Physical_constants***	Ending Tag				End of Data Set containing the Physical_Constants	
143	***Post_processing***	Starting Tag				Init of Data Set containing the constants post processing elements.	

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
144	*Tg_Chi2_P_max*	real	dl		%g	Maximum admissible value for Dg_chi2_P	ACRI
145	*Tg_Chi2_P_min*	real	dl		%g	Minimum admissible value for Dg_chi2_P	ACRI
146	*Tg_chi2*	real	dl		%g	Threshold to set the quality flag of the retrieval process	ACRI
147	*Tg_sigma_max*	real	psu		%g	Maximum SSS retrieved sigma acceptable	ACRI
148	*Tg_SSS_max*	real	psu		%g	Maximum salinity acceptable	ACRI
149	*Tg_SSS_min*	real	psu		%g	Minimum salinity acceptable	ACRI
150	*dT_dS_0*	real	psu. K-1		%g	Zero order of sensitivity dS_dT	ACRI
151	*dT_dS_1*	real	psu. K-1.C-1		%g	Fist order of sensitivity dS_dT with respect to SST	ACRI
152	*SC11*	real	Dl		%g	Scale factor for C(1) computation	ACRI
153	*SC21*	real	K		%g	Scale factor for C(2) computation	ACRI
154	*SC22*	real	K.k. m^{-1}		%g	Scale factor for C(3) computation	ACRI
155	*SC23*	real	K		%g	Scale factor for C(4) computation	ACRI
156	*SC24*	real	K		%g	Scale factor for C(5) computation	ACRI
157	*SC25*	real	dl		%g	Scale factor for C(6) computation	ACRI
158	*SC26*	real	K		%g	Scale factor for C(7) computation	ACRI
159	*SC27*	real	K		%g	Scale factor for C(8) computation	ACRI

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
160	***SC28***	real	K		%g	Scale factor for C(9) computation	ACRI
161	***SC31***	real	K		%g	Scale factor for C(10) computation	ACRI
162	***SC32***	real	K		%g	Scale factor for C(11) computation	ACRI
163	***SC33***	real	K		%g	Scale factor for C(14) computation	ACRI
164	***SC34***	real	K		%g	Scale factor for C(15) computation	ACRI
165	***SC35***	real	K		%g	Scale factor for C(16) computation	ACRI
166	***SC36***	real	K		%g	Scale factor for C(17) computation	ACRI
167	***SC41***	real	K		%g	Scale factor for C(19) computation	ACRI
168	***SC42***	real	K		%g	Scale factor for C(20) computation	ACRI
169	***SC43***	real	K		%g	Scale factor for C(21) computation	ACRI
170	***SC44***	real	K		%g	Scale factor for C(22)computation	ACRI
171	***SC45***	real	K		%g	Scale factor for C(23) computation	ACRI
172	***SC46***	real	K		%g	Scale factor for C(24) computation	ACRI
173	***SC47***	real	K		%g	Scale factor for C(25) computation	ACRI
174	***SC48***	real	K		%g	Scale factor for C(26) computation	ACRI
175	***SC49***	real	K		%g	Scale factor for C(27) computation	ACRI
176	***SC50***	real	K		%g	Scale factor for C(28) computation	ACRI
177	***SC51***	real	K		%g	Scale factor for C(29) computation	ACRI

Field #	Field Name	Type	Unit	String Length	C Format	Comment	Origin
178	***SC52***	real	K		%g	Scale factor for C(30) computation	ACRI
179	***SC53***	real	K		%g	Scale factor for C(31) computation	ACRI
180	***SC54***	real	K		%g	Scale factor for C(32) computation	ACRI
181	***SC55***	real	K		%g	Scale factor for C(33) computation	ACRI
182	***SC56***	real	K		%g	Scale factor for C(34) computation	ACRI
183	***SC57***	real	K		%g	Scale factor for C(35) computation	ACRI
184	***Post_ processing***	Ending Tag				End of Data Set containing the constants post processing elements.	
185	***Overall_Quality_Thresholds***	Starting Tag				Tag starting the Overall_Quality_Thresholds structure containing the information detailed below	ACRI
186	***Overall_Quality_Threshold_Low***	Real	10^{-2}*%	5	%05d	Low threshold for Overall_Quality computation	ACRI
187	***Overall_Quality_Threshold_High***	Integer	10^{-2}*%	5	%05d	High threshold for Overall_Quality computation	ACRI
188	***Overall_Quality_Thresholds***	Ending Tag				Tag ending the Overall_Quality_Thresholds structure.	ACRI
189	***L2_OS_Configuration_Parameters***	Ending Tag				Tag Ending L2_OS Configuration_Parameters structure	
190	***Data_Block***	Ending Tag				End of Data Block in the product.	

Table 5-49. L2OS Configuration Constants

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	181	80000	**14480004**
L2 Soil Moisture Data Analysis Product	SM_SWATH_ANALYSIS	1396	80000	**111680004**
L2 Ocean Salinity User Data Product	SSS_SWATH	174	80000	**13920004**
L2 Ocean Salinity Data Analysis Product	SSS_SWATH_ANALYSIS	1933	80000	**154640004**
DFFG Fractions Product	DFFG_Area	11098652	2	**671187168**
		9013748	72	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
DFFG XYZ Product	DFFG_XYZ	7402624	2	**450482144**
		6051068	72	
DFFG LAI Product	DFFG_LAI	1240074	2	**80481204**
		1083348	72	
DFFG LAI_Max Product	DFFG_LAI_MAX	623819	2	**43481110**
		586576	72	
DGG XYZ Product	Grid_Point_Data ata	4194332	10	**41943320**
DGG Current Tau Nadir LV	Current_Tau_Nadir_LV_Data	1759468	8	**14075744**

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	Data Set			
DGG Current Tau Nadir FO	Current_Tau_Nadir_FO_Data	1759468	8	14075744
DGG Current Roughness H Product	Current_Roughness_H_Data	1759468	8	14075744
DGG Current RFI Product	Current_RFI_Data	2345952	8	18767616
WEF Product	WEF_Data	17150	1	17150
Mean WEF product	Mean_WEF_Data	17150	1	17150
Soil Properties	Soil_Properties_Coordinates	24	1	111991708
	Soil_Properties	25920	4320	
SM Galaxy Map Product	Galaxy_Map	8311688	1	8311688
Current Flood Product	Flood_Data	1270724	8	10165792
Water_Body_Flag_Product	Big_Water_Body_Flag_Coordinates	20	1	158736
	Water_Body_Flag	204	778	
Roughness 1	Max_Valid	4	4	1123476
	Min_Valid	4	4	

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_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	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
Roughness 2	Data_Set_Th2	4	28080	74807496
	Data_Set_Tv2	4	28080	
	Data_Set_U1	4	28080	
	Data_Set_V1	4	28080	
	Data_Set_U2	4	28080	
	Data_Set_V2	4	28080	
	Max_Valid	4	5	
	Min_Valid	4	5	

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_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**			
Foam	Data_Set_ dT_v_2	4	3116960	**88609596**
	Data_Set_ dT_U2	4	3116960	
	Data_Set_ dT_V2	4	3116960	
	Max_Valid	4	5	
	Min_Valid	4	5	
	Data_Set_Sampling_dim1	4	31	
	Data_Set_Sampling_dim2	4	29	
	Data_Set_Sampling_dim3	4	22	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
Sunglint contamination	Data_Set_Sampling_dim4	4	20	44453388
	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	
	Max_Valid	4	5	
	Min_Valid	4	5	
	Data_Set_Sampling_dim1	4	6	
	Data_Set_Sampling_dim2	4	21	
	Data_Set_Sampling_dim3	4	75	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
OS Galaxy Map	Data_Set_Sampling_dim4	4	21	24943728
	Data_Set_Sampling_dim5	4	14	
	Data_Set_ Sigma_HH	4	2778300	
	Data_Set_ Sigma_HV	4	2778300	
	Data_Set_ Sigma_VH	4	2778300	
	Data_Set_ Sigma_VV	4	2778300	
	Max_Valid	4	2	
	Min_Valid	4	2	
	Data_Set_Sampling_dim1	4	721	
	Data_Set_Sampling_dim2	4	1441	
	LUT_gal_I	4	721*1441	
	LUT_gal_Q	4	721*1441	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
OS Galaxy Map 2	LUT_gal_U	4	721*1441	276282088
	I_error	4	721*1441	
	Q_error	4	721*1441	
	U_error	4	721*1441	
	Max_Valid	4	5	
	Min_Valid	4	5	
	Data_Set_Sampling_dim1	4	51	
	Data_Set_Sampling_dim2	4	99	
	Data_Set_Sampling_dim3	4	8	
	Data_Set_Sampling_dim4	4	15	
	Data_Set_Sampling_dim5	4	19	
	LUT_th_symm	4	51*99*8*15*19	

Type of Data		Size of data set record (DSR)	Typical number of DSR in a product	Total size of product
Product	**Data Set**			
Constants and LUTs used by the Aux. Processor	LUT_tv_symm	4	51*99*8*15*19	1968
	LUT_th_hc	4	51*99*8*15*19	
	LUT_tv_hc	4	51*99*8*15*19	
	LUT_th_hs	4	51*99*8*15*19	
	LUT_tv_hs	4	51*99*8*15*19	
	Max_Valid	4	3	
	Min_valid	4	3	
	Data_Set_Sampling_dim1	4	2	
	Data_Set_Sampling_dim2	4	2	
	Data_Set_Sampling_dim3	4	2	
	Data_Set_LUT_bias1_MSQS	4	8	
	Data_Set_LUT_bias2_MSQS	4	8	

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_sigabs_MSQS	4	8	
	Data_Set_LUT_sigrel_MSQS	4	8	
	Data_Set_LUT_first_MSQS	4	8	
	Data_Set_LUT_bias1_omega	4	8	
	Data_Set_LUT_bias2_omega	4	8	
	Data_Set_LUT_sigabs_omega	4	8	
	Data_Set_LUT_sigrel_omega	4	8	
	Data_Set_LUT_first_omega	4	8	
	Data_Set_LUT_bias1_phi_WSn	4	8	
	Data_Set_LUT_bias2_phi_WSn	4	8	
	Data_Set_LUT_sigabs_phi_WSn	4	8	
	Data_Set_LUT_sigrel_phi_WSn	4	8	
	Data_Set_LUT_first_phi_WSn	4	8	

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_bias1_SSS	4	8	
	Data_Set_LUT_bias2_SSS	4	8	
	Data_Set_LUT_sigabs_SSS	4	8	
	Data_Set_LUT_sigrel_SSS	4	8	
	Data_Set_LUT_first_SSS	4	8	
	Data_Set_LUT_bias1_SST	4	8	
	Data_Set_LUT_bias2_SST	4	8	
	Data_Set_LUT_sigabs_SST	4	8	
	Data_Set_LUT_sigrel_SST	4	8	
	Data_Set_LUT_first_SST	4	8	
	Data_Set_LUT_bias1_UST	4	8	
	Data_Set_LUT_bias2_UST	4	8	
	Data_Set_LUT_sigabs_UST	4	8	

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_sigrel_UST	4	8	
	Data_Set_LUT_first_UST	4	8	
	Data_Set_LUT_bias1_WSn	4	8	
	Data_Set_LUT_bias2_WSn	4	8	
	Data_Set_LUT_sigabs_WSn	4	8	
	Data_Set_LUT_sigrel_WSn	4	8	
	Data_Set_LUT_first_WSn	4	8	
	Data_Set_LUT_bias1_UN10	4	8	
	Data_Set_LUT_bias2_UN10	4	8	
	Data_Set_LUT_sigabs_UN10	4	8	
	Data_Set_LUT_sigrel_UN10	4	8	
	Data_Set_LUT_first_UN10	4	8	
	Data_Set_LUT_bias1_VN10	4	8	

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_bias2_VN10	4	8	
	Data_Set_LUT_sigabs_VN10	4	8	
	Data_Set_LUT_sigrel_VN10	4	8	
	Data_Set_LUT_first_VN10	4	8	
	Data_Set_LUT_bias1_tec	4	8	
	Data_Set_LUT_bias2_tec	4	8	
	Data_Set_LUT_sigabs_tec	4	8	
	Data_Set_LUT_sigrel_tec	4	8	
	Data_Set_LUT_first_tec	4	8	
	Data_Set_LUT_bias1_HS	4	8	
	Data_Set_LUT_bias2_HS	4	8	
	Data_Set_LUT_sigabs_HS	4	8	
	Data_Set_LUT_sigrel_HS	4	8	

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_first_HS	4	8	
	Data_Set_LUT_bias1_Acard	4	8	
	Data_Set_LUT_bias2_Acard	4	8	
	Data_Set_LUT_sigabs_Acard	4	8	
	Data_Set_LUT_sigrel_Acard	4	8	
	Data_Set_LUT_first_Acard	4	8	
Distance to the Coast	Distan_data	15	2621442	**39321630**
SSS Climatologic Data	SSS_Climato_Data	60	2621442	**157286520**
ECMWF	ECMWF_Parameters	217	100000	**21700004**

Table 6-1. Products sizes