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NIES
GOSAT-2 Product File Format Descriptions
(Product edition)

Vol.4
GOSAT-2 TANSO-FTS-2 SWIR L2
Chlorophyll Fluorescence and Proxy-method Product

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National Institute for Environmental Studies
GOSAT-2 Project

Revision History

Version	Revised on	Page	Description
00	Dec. 2019	-	-
01	Apr. 2020	p.1	Changed product version
		p.3	Added the following group - SolarInducedFluorescence
		p.4	Changed "Outline" of the following group - RetrievalResult_B1_SIF
		p.5	Changed the special mention about "Group"
		p.8	Added the following group and datasets - SolarInducedFluorescence/ - SolarInducedFluorescence/SIF - SolarInducedFluorescence/SIF_uncert - SolarInducedFluorescence/SIF_quality_flag Removed the following datasets - RetrievalResult_B1_SIF/fluorescence_radiance_755nm_corr_B1_SIF - RetrievalResult_B1_SIF/fluorescence_radiance_755nm_quality_flag_B1_SIF Changed "Group / Dataset" of the following datasets - RetrievalResult_B1_SIF/fluorescence_radiance_755nm_uncert_B1_SIF - RetrievalResult_B1_SIF/fluorescence_radiance_755nm_dfs_B1_SIF
02	Jul. 2021	p.1	Added product version
		p.6, p.11	Added a note of the following dataset - SceneAttribute/numSounding
03	Oct. 2021	p.1	Added product version
04	Apr. 2023	p.1	Changed product version
		p.8, p.9, p.10, p.11, p.12	Added the following datasets - RetrievalResult_B1_SIF/ils_stretch_factor_* - RetrievalResult_B1_Psrf/zero_level_offset_* - RetrievalResult_B1_Psrf/ils_stretch_factor_* - RetrievalResult_B2_1590/zero_level_offset_* - RetrievalResult_B2_1590/ils_stretch_factor_* - RetrievalResult_B2_1660/zero_level_offset_* - RetrievalResult_B2_1660/ils_stretch_factor_* - RetrievalResult_B3_2060/zero_level_offset_* - RetrievalResult_B3_2060/ils_stretch_factor_* - RetrievalResult_B3_2350/zero_level_offset_* - RetrievalResult_B3_2350/ils_stretch_factor_*

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1 Introduction

1.1 Purpose

The purpose of this document is to define the file format of the GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product which is one of the Greenhouse gases Observing SATellite-2 (hereinafter referred to as “GOSAT-2”) products generated by the National Institute for Environmental Studies, Japan (hereinafter referred to as “NIES”).

1.2 Data product and version

The product and its version described in this document are listed below (Table 1-1).

Table 1-1 Product and version explained in the document

Product name	Product version
GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product	02.00

04

2 GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product

(1) Description of GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product

GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product is a dataset of multiple individual retrieval results under the assumption of clear-sky condition from spectral radiance data in TANSO-FTS-2 L1B Product (L1B Product) using MAP method*. This product stores solar induced chlorophyll fluorescence data retrieved from Band 1 spectral radiance data in L1B Product as well as column-averaged dry-air mole fraction of atmospheric gases retrieved from Band 2 and 3 spectral radiance data in L1B Product. In principle, all TANSO-FTS-2 SWIR data are subject to process to generate this product.

* MAP method: maximum a posteriori method

(2) Major dataset

Solar induced chlorophyll fluorescence, XCH₄ (proxy method), XCO (proxy method)

(3) Category

Standard

(4) Unit

Daily (00:00~23:59 (UTC))

(5) File format

HDF5

(6) File naming convention

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
G	O	S	A	T	2	T	F	T	S	2	Y	Y	Y	Y	M	M	D	D	_	0	2	S	W	P	R	V	M	M	N	N	R	R	o	o	o	o	.	h	5

GOSAT2: Satellite name (Fixed)

TFTS2: Sensor name (Fixed)

YYYYMMDD: Observation date (UTC)

02: Processing level (Fixed)

SWPR: Product code (Fixed)

V: Processing identifier (V: Steady, T: Test), added as necessary

MMNN: Product version (MM: Major version, NN: Minor version)

RR: Revision

oooo: Input data version

h5: Extension

(7) File size

Approx. 11MB

3 Product Format

3.1 Dataset structure

Table 3-1 shows the dataset structure of GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product.

Table 3-1 Dataset structure of GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product (1/2)

No.	Group	Outline
1	Metadata	The following items are mainly included to describe overview of the product. <ul style="list-style-type: none"> - Processing date - Start/End date - Sensor name - Processing level - Algorithm researcher
2	SceneAttribute	The following items are mainly included to provide information related to the observation. <ul style="list-style-type: none"> - Number of retrievals - Number of bands - Number of albedo parameters
3	SoundingAttribute	The following items are mainly included to provide information related to the observation. <ul style="list-style-type: none"> - Sounding unique ID - Detailed operation mode - Observation time
4	SoundingGeometry	The following items are mainly included to provide information related to the observation. <ul style="list-style-type: none"> - Geodetic latitude/longitude - Mean of the DEM altitude within the FTS-2 IFOV - Sensor zenith/azimuth angle - Solar zenith/azimuth angle
5	L1QualityInfo	The following items are mainly included to provide information related to the observation. <ul style="list-style-type: none"> - Sounding quality flag transferred from L1 product - SNR for synthesized spectrum
6	CloudInformation	The following items are mainly included to provide information related to the observation. <ul style="list-style-type: none"> - Confidence level within the FTS-2 IFOV (GOSAT-2 TANSO-CAI-2 L2 Cloud Discrimination Product) - Coherent within the FTS-2 IFOV (GOSAT-2 TANSO-CAI-2 L1B Product) - Cloud flags based on the FTS-2 TIR measurement (GOSAT-2 TANSO-FTS-2 TIR L2 Cloud and Aerosol Property Product)
7	GasColumn_Proxy	The following items are mainly included to provide information related to the observation. <ul style="list-style-type: none"> - XCH₄ (proxy method) - XCO (proxy method)
8	SolarInducedFluorescence	The following items are mainly included to provide information related to the observation. <ul style="list-style-type: none"> - Solar induced chlorophyll fluorescence

Table 3-1 Dataset structure of GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product (2/2)

No.	Group	Outline
9 *	RetrievalResult_B1_SIF	The following items are mainly included to provide information related to the observation. - Solar induced chlorophyll fluorescence (raw retrieval of total offset)
10 *	RetrievalResult_B1_Psrf	The following items are mainly included to provide information related to the observation. - Surface pressure (clear-sky retrieval)
11 *	RetrievalResult_B2_1590	The following items are mainly included to provide information related to the observation. - XCO ₂ (clear-sky retrieval) - XH ₂ O (clear-sky retrieval)
12 *	RetrievalResult_B2_1660	The following items are mainly included to provide information related to the observation. - XCH ₄ (clear-sky retrieval) - XH ₂ O (clear-sky retrieval)
13 *	RetrievalResult_B3_2060	The following items are mainly included to provide information related to the observation. - XCO ₂ (clear-sky retrieval) - XH ₂ O (clear-sky retrieval)
14 *	RetrievalResult_B3_2350	The following items are mainly included to provide information related to the observation. - XCO (clear-sky retrieval) - XCH ₄ (clear-sky retrieval) - XH ₂ O (clear-sky retrieval)

* Each group of No.9 through 14 corresponds to each individual retrieval processing. Each retrieval processing is conducted under assumption of clear-sky condition; therefore, note that retrieval results are affected by cloud and aerosol.

The special mention about “Group” above is shown below.

- **GasColumn_Proxy**
XCH4_proxy under GasColumn_Proxy is calculated by multiplying the ratio of XCH4_B2_1660 under Retrievalresult_B2_1660 to XCO2_B2_1590 under RetrievalResult_B2_1590 by XCO2_model under GasColumn_Proxy.
XCO_proxy under GasColumn_Proxy is calculated by multiplying the ratio of XCO_B3_2350 to XCH4_B3_2350 under Retrievalresult_B3_2350 by XCH4_proxy under GasColumn_Proxy.
Since these datasets may contain low-quality case data or invalid value, each quality flag (*_quality_flag) should be referred together.
- **SolarInducedFluorescence**
SIF under SolarInducedFluorescence stores the value converted into solar induced chlorophyll fluorescence (SIF) by correcting fluorescence_radiance_755nm_raw_B1_SIF, estimated filling-in signal of solar Fraunhofer lines, under RetrievalResult_B1_SIF.
Since these datasets may contain low-quality case data or invalid value, quality flag (SIF_quality_flag) should be referred together.
- **RetrievalResult_***
Datasets under RetrievalResult_* store results of each retrieval processing. Note that these results are under the assumption of clear-sky condition, and include error of optical path fluctuations.

3.2 File format details

Table 3-2 shows the file format details of the GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product.

Table 3-2 GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product Format (1/7)

Group	Group / Dataset	Dataspace		Datatype	Dataset name	attribute				
		Rank	Size			unit	validRange	invalidValue	description	
G	Metadata									
	fileID	1	1	H5T_STRING	File identifier	(none)	(none)	(none)	file identifier of the product	
	processingDate	1	1	H5T_STRING	Processing date	UTC	(none)	(none)	date of product creation (UTC): Time format is "YYYY-MM-DDThh:mm:ss.ffffffZ"	
	startDate	1	1	H5T_STRING	Start date	UTC	(none)	"_"	start date of file(UTC): Time format is "YYYY-MM-DDThh:mm:ss.ffffffZ"	
	endDate	1	1	H5T_STRING	End date	UTC	(none)	"_"	end date of file(UTC): Time format is "YYYY-MM-DDThh:mm:ss.ffffffZ"	
	geodeticDatum	1	1	H5T_STRING	Geodetic datum	(none)	(none)	(none)	reference ellipsoid model/frame of reference: "WGS84/WGS84" (Fixed)	
	satelliteName	1	1	H5T_STRING	Satellite name	(none)	(none)	(none)	satellite name: "GOSAT-2" - Greenhouse gases Observing SATellite-2 (Fixed)	
	sensorName	1	1	H5T_STRING	Sensor name	(none)	(none)	(none)	sensor name: "TANSO-FTS-2" - Fourier Transform Spectrometer-2 (Fixed)	
	processingLevel	1	1	H5T_STRING	Processing level	(none)	(none)	(none)	processing level: "L2" - Level 2 (Fixed)	
	algorithmName	1	1	H5T_STRING	Algorithm name	(none)	(none)	(none)	algorithm name: "TANSO-FTS-2 SWIR L2" (Fixed)	
	algorithmVersion	1	1	H5T_STRING	Algorithm version	(none)	(none)	(none)	algorithm version is stored	
	productVersion	1	1	H5T_STRING	Product version	(none)	(none)	(none)	product version is stored	
	inputDataVersion	1	1	H5T_STRING	Input data version	(none)	(none)	(none)	version of input data list is stored	
	processingFacility	1	1	H5T_STRING	Processing facility	(none)	(none)	(none)	processing facility name: "G2DPS" - GOSAT-2 Data Processing System (Fixed)	
	contact_01	1	1	H5T_STRING	Organization name 01	(none)	(none)	(none)	organization name: "Japan Aerospace Exploration Agency (JAXA)" (Fixed)	
	contact_02	1	1	H5T_STRING	Organization name 02	(none)	(none)	(none)	organization name: "National Institute for Environmental Studies (NIES)" (Fixed)	
	contact_03	1	1	H5T_STRING	Algorithm researcher	(none)	(none)	(none)	researcher	
	e-mail	1	1	H5T_STRING	E-mail address	(none)	(none)	(none)	e-mail address	
G	SceneAttribute									
	numSounding	1	1	H5T_STD_I32LE	Number of retrievals *1	(none)	(none)	0	number of retrievals	
	numBand	1	1	H5T_STD_I32LE	Number of bands	(none)	(none)	(none)	number of FTS-2 SWIR bands "6" (Fixed)	
	numAlb_B1_SIF	1	1	H5T_STD_I32LE	Number of albedo parameters *2	(none)	(none)	(none)	number of retrieved albedo parameters for B1_SIF	
	numAlb_B1_Psrf	1	1	H5T_STD_I32LE	Number of albedo parameters *2	(none)	(none)	(none)	number of retrieved albedo parameters for B1_Psrf	
	numAlb_B2_1590	1	1	H5T_STD_I32LE	Number of albedo parameters *2	(none)	(none)	(none)	number of retrieved albedo parameters for B2_1590	
	numAlb_B2_1660	1	1	H5T_STD_I32LE	Number of albedo parameters *2	(none)	(none)	(none)	number of retrieved albedo parameters for B2_1660	
	numAlb_B3_2060	1	1	H5T_STD_I32LE	Number of albedo parameters *2	(none)	(none)	(none)	number of retrieved albedo parameters for B3_2060	
	numAlb_B3_2350	1	1	H5T_STD_I32LE	Number of albedo parameters *2	(none)	(none)	(none)	number of retrieved albedo parameters for B3_2350	
G	SoundingAttribute									
	soundingUniqueID	1	numSounding	H5T_STRING	Sounding unique ID	(none)	(none)	(none)	sounding unique ID is stored: Format is "YYYYMMDD_AAA_NNNN". "YYYYMMDD" - Observation date, "AAA" - Path No., "NNNN" - Sounding ID(0-1245)	
	detailedOperationMode	1	numSounding	H5T_STRING	Detailed operation mode	(none)	(none)	(none)	detailed operation mode is stored: "OB1D" - Observation Mode (day/All data are observed by decimated mode.), "OB2D" - Observation Mode except for full-observation (day/All data are observed by decimated mode. specific bands are not observed.), "SUNG" - Sunlint observation Mode, "SPPT" - Specific point observation Mode	
	observationRequestID	1	numSounding	H5T_STRING	Observation request ID	(none)	(none)	(none)	observation request ID is stored: Format is "XKYYYYMMDDaaaaannnn_mmmmmmm". "X" - Request from (J:JAXA, N:NIES), "K" - Kind of request(F:routine, T:temporary, I:internal), "YYYYMMDD" - start date of observation of request, "aaaaa" - observation code(e.g. "FT206"), "nnnn" - observation request Number (0000-9999), "mmmmmm" - branch Number (0000000-9999999)	
	observationTime	1	numSounding	H5T_STRING	Observation time	UTC	(none)	"_"	observation time of each sounding is stored: Observation time is expressed as follows: ObservationTime =Launched time of sample window + 2.012 sec. Time format is "YYYY-MM-DDThh:mm:ss.ffffffZ"	
	scanDirection	1	numSounding	H5T_STRING	Scan direction	(none)	(none)	"_"	scan direction of each sounding is stored: "FWD" - Forward, "BWD" - Backward	
	sensorGain	2	numSounding, numBand	H5T_STD_I8LE	Sensor gain	(none)	0, 15	-128	gain for each bands are stored in order of 1P, 1S, 2P, 2S, 3P, 3S	
	IP_Request	1	numSounding	H5T_STD_I8LE	IP request flag	(none)	0, 1	-128	IP request flag is stored: 0 - Intelligent pointing was disabled. (IP="No"), 1 - Intelligent pointing was enabled. (IP="Yes")	
	yawSteeringFlag	1	numSounding	H5T_STD_I8LE	Yaw steering flag	(none)	0, 1	2	yaw steering flag indicates the operation of yaw steering: 0 - Not execute(OFF), 1 - Execute(ON)	
	pointingAT	1	numSounding	H5T_IEEE_F64LE	The motor rotation angle about the AT axis	deg	-180.0, 180.0	-999.0	The motor rotation angle about the AT axis at observation time is stored.The range that the motor can be physically driven is as follows: -180.0 < pointingAT <= 180.0	

Table 3-2 GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product Format (2/7)

Group	Group / Dataset	Dataspace		Datatype	Dataset name	attribute			
		Rank	Size			unit	validRange	invalidValue	description
	pointingCT	1	numSounding	H5T_IEEE_F64LE	The motor rotation angle about the CT axis	deg	-180.0, 180.0	-999.0	The motor rotation angle about the CT axis at observation time is stored. The range that the motor can be physically driven is as follows: -180.0 < pointingCT <= 180.0
G	SoundingGeometry								
	latitude	1	numSounding	H5T_IEEE_F32LE	Geodetic latitude	deg	-90.0, 90.0	-999.0	geodetic latitude of observation point is stored
	longitude	1	numSounding	H5T_IEEE_F32LE	Longitude	deg	-180.0, 180.0	-999.0	longitude of observation point is stored: -180 < longitude <= 180
	height	1	numSounding	H5T_IEEE_F32LE	Mean of the DEM altitude within the FTS-2 IFOV	m	-407.0, 8752.0	-999.0	mean of the DEM altitude within the FTS-2 IFOV
	surfaceRoughness	1	numSounding	H5T_IEEE_F32LE	Standard deviation of the DEM altitude within the FTS-2 IFOV	m	(none)	-999.0	standard deviation of the DEM altitude within the FTS-2 IFOV
	landFraction	1	numSounding	H5T_IEEE_F32LE	Percent of the land cover within the FTS-2 IFOV	%	0.0, 100.0	-999.0	percent of the land cover within the FTS-2 IFOV
	viewZenith	1	numSounding	H5T_IEEE_F32LE	Sensor zenith angle	deg	0.0, 180.0	-999.0	sensor (satellite) zenith angle at observation point is stored: 0 <= viewZenith <= 180
	viewAzimuth	1	numSounding	H5T_IEEE_F32LE	Sensor azimuth angle	deg	0.0, 360.0	-999.0	sensor (satellite) azimuth angle at observation point is stored: 0 <= viewAzimuth < 360
	solarZenith	1	numSounding	H5T_IEEE_F32LE	Solar zenith angle	deg	0.0, 180.0	-999.0	solar zenith angle at observation point is stored: 0 <= solarZenith <= 180
	solarAzimuth	1	numSounding	H5T_IEEE_F32LE	Solar azimuth angle	deg	0.0, 360.0	-999.0	solar azimuth angle at observation point is stored: 0 <= solarAzimuth < 360
	sunglintFlag	1	numSounding	H5T_STD_I8LE	Sunglint flag	(none)	0, 1	-128	the flag indicates whether each exposure is sunglint observation or not is stored: This flag is valid for any landType. 0 - Not sunglint, 1 - Sunglint
	specular_viewVector_angle	1	numSounding	H5T_IEEE_F32LE	The angle between specular reflection vector and view vector	deg	0.0, 180.0	-999.0	the angle between specular reflection vector and view vector of observation time is stored: 0 <= specular_viewVector_angle < 180
	solarDistance	1	numSounding	H5T_IEEE_F64LE	Solar Distance	AU	(none)	-999.0	distance from sun to observation point is stored
G	L1QualityInfo								
	soundingQualityFlag	1	numSounding	H5T_STRING	Sounding quality flag	(none)	(none)	"NG"	quality of each observation point on a four level scale as follows: "Good", "Fair", "Poor", "NG"
	IMC_StabilityFlag	1	numSounding	H5T_STD_I8LE	IMC stability flag	(none)	0, 1	2	IMC stability flag is stored: 0 - Stable, 1 - Not stable
	missingFlag	2	numSounding, numBand	H5T_STD_I8LE	Missing flag	(none)	(none)	1	missing data flag is stored in order of 1P, 1S, 2P, 2S, 3P, 3S: 0 - Normal (No loss), 1 - Full loss of interferogram, 9 - Normal without data (No interferogram for the sounding)
	saturationFlag	2	numSounding, numBand	H5T_STD_I8LE	Saturation flag	(none)	0, 1	2	interferogram saturation flag is stored in order of 1P, 1S, 2P, 2S, 3P, 3S: 0 - DN saturation detection=Normal, 1 - DN saturation detection=Saturation
	spikeFlag	2	numSounding, numBand	H5T_STD_I8LE	Spike flag	(none)	0, 1	2	spike flag is stored in order of 1P, 1S, 2P, 2S, 3P, 3S: If spike flag is "1", interferogram data are removed spikes. 0 - Normal (no spike), 1 - With spike
	scanStabilityFlag	1	numSounding	H5T_STD_I8LE	Scan stability flag	(none)	0, 1	2	scan stability flag is stored: 0 - Stable, 1 - Not stable
	interferogramQualityFlag	2	numSounding, numBand	H5T_STD_I8LE	Interferogram quality flag	(none)	0, 1	2	interferogram quality flag for each band is judged by saturation, scan stability, DC level flag is stored in order of 1P, 1S, 2P, 2S, 3P, 3S: 0 - Normal, 1 - Abnormal
	spectrumQualityFlag	2	numSounding, numBand	H5T_STD_I8LE	Spectrum quality flag	(none)	0, 1	2	spectrum quality flag for each band spectrum is judged by out of spectral coverage data is stored in order of 1P, 1S, 2P, 2S, 3P, 3S: 0 - Normal, 1 - Abnormal
	SNR	2	numSounding, numBand	H5T_IEEE_F64LE	SNR	(none)	(none)	-999.0	simplified calculated SNR is stored in order of 1P, 1S, 2P, 2S, 3P, 3S
	SNR_synthesized	2	numSounding, numBand/2	H5T_IEEE_F64LE	SNR for synthesized spectrum	(none)	(none)	-999.0	simplified calculated SNR for synthesized spectrum is stored
G	CloudInformation								
	CAI-2_CLDD	3	numSounding, 2, 16	H5T_STD_I32LE	Confidence level within the FTS-2 IFOV (CAI-2 L2 Cloud Discrimination)	(none)	(none)	-999	frequency distribution of 16 levels of cloud discrimination for forward-/backward-viewing of CAI-2 within the FTS-2 IFOV are stored
	CAI-2_Coherent	3	numSounding, 2, 5	H5T_IEEE_F32LE	Coherent within the FTS-2 IFOV (CAI-2 L1B)	W/m^2/str/micro m	(none)	-999.0	standard deviation of observed radiance of each CAI-2 band (5 bands for each forward-/backward-viewing) within the FTS-2 IFOV
	FTS-2_2um	2	numSounding, 2	H5T_STD_I8LE	Scattering matter existence flags (2um)	(none)	0, 1	-1	higher-level scattering matter existence flags based on FTS-2 Band 3 P-/S-polarization measurement are stored: 0 - Not exist, 1 - Exist
	FTS-2_TIR	2	numSounding, 3	H5T_STD_I8LE	Cloud flags based on the FTS-2 TIR measurement (FTS-2 TIR L2 Cloud and Aerosol Property Product)	(none)	0, 2	-1	cloud flags based on the threshold method, split-window method, and slicing method based on the FTS-2 TIR measurement are stored: 0 - No cloud, 1 - With cloud, 2 - Unclassifiable
	surface_pressure_delta	1	numSounding	H5T_IEEE_F32LE	Difference of surface pressure	hPa	(none)	-999.0	difference of retrieved surface pressure (clear-sky retrieval) and its a priori value
	co2Ratio	1	numSounding	H5T_IEEE_F32LE	Ratio of XC02	(none)	(none)	-999.0	ratio of retrieved XC02 (clear-sky retrieval) in 1590 nm and 2060 nm CO2 band

Table 3-2 GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product Format (3/7)

Group	Group / Dataset	Dataspace		Datatype	Dataset name	attribute			
		Rank	Size			unit	validRange	invalidValue	description
G	h2oRatio	1	numSounding	H5T_IEEE_F32LE	Ratio of XH2O	(none)	(none)	-999.0	ratio of retrieved XH2O (clear-sky retrieval) in 1590 nm and 2060 nm H2O band
	ch4Ratio	1	numSounding	H5T_IEEE_F32LE	Ratio of XCH4	(none)	(none)	-999.0	ratio of retrieved XCH4 (clear-sky retrieval) in 1660 nm and 2350 nm CH4 band
G	GasColumn Proxy								
	XCO2_model	1	numSounding	H5T_IEEE_F32LE	XCO2 (model)	ppm	(none)	-999.0	model XCO2 as a proxy
	XCH4_proxy	1	numSounding	H5T_IEEE_F32LE	XCH4 (proxy method)	ppm	(none)	-999.0	XCH4 retrieved by the proxy approach, i.e., observed ratio of CH4/CO2 is multiplied with the model XCO2
	XCH4_proxy_quality_flag	1	numSounding	H5T_STD_I8LE	Quality flag for XCH4 (proxy method)	(none)	0, 3	-1	quality flag for XCH4 (proxy method). 0 - Good, 1 - Fair, 2 - Poor, 3 - NG
	XCO_proxy	1	numSounding	H5T_IEEE_F32LE	XCO (proxy method)	ppm	(none)	-999.0	XCO retrieved by the proxy approach, i.e., observed ratio of CO/CH4 is multiplied with the proxy XCH4
	XCO_proxy_quality_flag	1	numSounding	H5T_STD_I8LE	Quality flag for XCO (proxy method)	(none)	0, 3	-1	quality flag for XCO (proxy method). 0 - Good, 1 - Fair, 2 - Poor, 3 - NG
G	SolarInducedFluorescence								
	SIF	1	numSounding	H5T_IEEE_F32LE	Corrected chlorophyll fluorescence at 755 nm	mW/m ² /str/nm	(none)	-999.0	retrieved chlorophyll fluorescence at 755 nm after the correction of zero-level-offset
	SIF_uncert	1	numSounding	H5T_IEEE_F32LE	Uncertainty of corrected chlorophyll fluorescence at 755 nm	mW/m ² /str/nm	(none)	-999.0	uncertainty of corrected chlorophyll fluorescence at 755 nm
	SIF_quality_flag	1	numSounding	H5T_STD_I8LE	Quality flag for corrected chlorophyll fluorescence at 755 nm	(none)	0, 3	-1	quality flag for corrected chlorophyll fluorescence at 755 nm. 0 - Good, 1 - Fair, 2 - Poor, 3 - NG
G	RetrievalResult_B1_SIF								
	fluorescence_radiance_755nm_raw_B1_SIF	1	numSounding	H5T_IEEE_F32LE	Raw retrieval result of total offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	raw retrieval result of total offset (fluorescence + zero-level-offset)
	fluorescence_radiance_755nm_apriori_B1_SIF	1	numSounding	H5T_IEEE_F32LE	A priori value of chlorophyll fluorescence at 755 nm	W/cm ² /str/cm ⁻¹	(none)	-999.0	a priori value of chlorophyll fluorescence at 755 nm
	fluorescence_radiance_755nm_raw_uncert_B1_SIF	1	numSounding	H5T_IEEE_F32LE	Uncertainty of uncorrected chlorophyll fluorescence at 755 nm	W/cm ² /str/cm ⁻¹	(none)	-999.0	uncertainty of uncorrected chlorophyll fluorescence at 755 nm
	fluorescence_radiance_755nm_raw_dfs_B1_SIF	1	numSounding	H5T_IEEE_F32LE	DFS for uncorrected chlorophyll fluorescence at 755 nm	(none)	(none)	-999.0	degree of freedom for signals for uncorrected chlorophyll fluorescence at 755 nm
	albedo_B1_SIF	2	numSounding, numAlb_B1_SIF	H5T_IEEE_F32LE	Surface albedo	(none)	(none)	-999.0	retrieved surface albedo at 755 nm retrieval window (for land case)
	albedo_apriori_B1_SIF	2	numSounding, numAlb_B1_SIF	H5T_IEEE_F32LE	A priori value of surface albedo	(none)	(none)	-999.0	a priori value of surface albedo at 755 nm retrieval window (for land case)
	albedo_uncert_B1_SIF	2	numSounding, numAlb_B1_SIF	H5T_IEEE_F32LE	Uncertainty of surface albedo	(none)	(none)	-999.0	uncertainty of surface albedo at 755 nm retrieval window (for land case)
	wind_speed_B1_SIF	1	numSounding	H5T_IEEE_F32LE	Surface wind speed	m/s	(none)	-999.0	retrieved surface wind speed (for ocean case)
	wind_speed_apriori_B1_SIF	1	numSounding	H5T_IEEE_F32LE	A priori value of surface wind speed	m/s	(none)	-999.0	a priori value of surface wind speed (for ocean case)
	wind_speed_uncert_B1_SIF	1	numSounding	H5T_IEEE_F32LE	Uncertainty of surface wind speed	m/s	(none)	-999.0	uncertainty of surface wind speed (for ocean case)
	dispersion_adjustment_B1_SIF	1	numSounding	H5T_IEEE_F32LE	Dispersion adjustment factor	(none)	(none)	-999.0	retrieved dispersion adjustment factor for 755 nm retrieval window
	dispersion_adjustment_apriori_B1_SIF	1	numSounding	H5T_IEEE_F32LE	A priori value for dispersion adjustment factor	(none)	(none)	-999.0	a priori value for dispersion adjustment factor for 755 nm retrieval window
	dispersion_adjustment_uncert_B1_SIF	1	numSounding	H5T_IEEE_F32LE	Uncertainty of dispersion adjustment factor	(none)	(none)	-999.0	uncertainty of dispersion adjustment factor for 755 nm retrieval window
	ils_stretch_factor_B1_SIF	1	numSounding	H5T_IEEE_F32LE	ILS stretch factor	(none)	(none)	-999.0	retrieved ILS stretch factor
	ils_stretch_factor_apriori_B1_SIF	1	numSounding	H5T_IEEE_F32LE	A priori value for ILS stretch factor	(none)	(none)	-999.0	a priori value for ILS stretch factor
	ils_stretch_factor_uncert_B1_SIF	1	numSounding	H5T_IEEE_F32LE	Uncertainty of ILS stretch factor	(none)	(none)	-999.0	uncertainty of ILS stretch factor
	iteration_B1_SIF	1	numSounding	H5T_STD_I32LE	Number of iterations	(none)	(none)	-999	number of iterations for clear-sky retrieval using 755 nm retrieval window
	residual_reduced_chi2_B1_SIF	1	numSounding	H5T_IEEE_F32LE	Squares of normalized residuals	(none)	(none)	-999.0	squares of normalized residuals for clear-sky retrieval using 755 nm retrieval window
G	RetrievalResult_B1_Psrf								
	surface_pressure_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Surface pressure	hPa	(none)	-999.0	retrieved surface pressure (clear-sky retrieval from 760 nm retrieval window)
	surface_pressure_apriori_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	A priori value of surface pressure	hPa	(none)	-999.0	a priori value of surface pressure
	surface_pressure_uncert_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Uncertainty of surface pressure	hPa	(none)	-999.0	uncertainty of surface pressure (clear-sky retrieval from 760 nm retrieval window)
	surface_pressure_dfs_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	DFS for surface pressure	(none)	(none)	-999.0	degree of freedom for signals for surface pressure (clear-sky retrieval from 760 nm retrieval window)
	fluorescence_at_reference_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Chlorophyll fluorescence at reference wavelength	W/cm ² /str/cm ⁻¹	(none)	-999.0	retrieved chlorophyll fluorescence at reference wavelength (clear-sky retrieval from 760 nm retrieval window)
	fluorescence_at_reference_apriori_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	A priori value of chlorophyll fluorescence at reference wavelength	W/cm ² /str/cm ⁻¹	(none)	-999.0	a priori value of chlorophyll fluorescence at reference wavelength

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Table 3-2 GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product Format (4/7)

Group	Group / Dataset	Dataspace		Datatype	Dataset name	attribute			
		Rank	Size			unit	validRange	invalidValue	description
	fluorescence_at_reference_uncert_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Uncertainty of chlorophyll fluorescence at reference wavelength	W/cm ² /str/cm ⁻¹	(none)	-999.0	uncertainty of chlorophyll fluorescence at reference wavelength (clear-sky retrieval from 760 nm retrieval window)
	fluorescence_slope_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Fluorescence slope	(none)	(none)	-999.0	retrieved fluorescence slope (clear-sky retrieval from 760 nm retrieval window)
	fluorescence_slope_apriori_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	A priori value of fluorescence slope	(none)	(none)	-999.0	a priori value of fluorescence slope
	fluorescence_slope_uncert_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Uncertainty of fluorescence slope	(none)	(none)	-999.0	uncertainty of fluorescence slope (clear-sky retrieval from 760 nm retrieval window)
	albedo_B1_Psrf	2	numSounding, numAlb_B1_Psrf	H5T_IEEE_F32LE	Surface albedo	(none)	(none)	-999.0	retrieved surface albedo at 760 nm retrieval window (for land case)
	albedo_apriori_B1_Psrf	2	numSounding, numAlb_B1_Psrf	H5T_IEEE_F32LE	A priori value of surface albedo	(none)	(none)	-999.0	a priori value of surface albedo at 760 nm retrieval window (for land case)
	albedo_uncert_B1_Psrf	2	numSounding, numAlb_B1_Psrf	H5T_IEEE_F32LE	Uncertainty of surface albedo	(none)	(none)	-999.0	uncertainty of surface albedo at 760 nm retrieval window (for land case)
	wind_speed_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Surface wind speed	m/s	(none)	-999.0	retrieved surface wind speed (for ocean case)
	wind_speed_apriori_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	A priori value of surface wind speed	m/s	(none)	-999.0	a priori value of surface wind speed (for ocean case)
	wind_speed_uncert_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Uncertainty of surface wind speed	m/s	(none)	-999.0	uncertainty of surface wind speed (for ocean case)
	dispersion_adjustment_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Dispersion adjustment factor	(none)	(none)	-999.0	retrieved dispersion adjustment factor for 760 nm retrieval window
	dispersion_adjustment_apriori_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	A priori value for dispersion adjustment factor	(none)	(none)	-999.0	a priori value for dispersion adjustment factor for 760 nm retrieval window
	dispersion_adjustment_uncert_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Uncertainty of dispersion adjustment factor	(none)	(none)	-999.0	uncertainty of dispersion adjustment factor for 760 nm retrieval window
	zero_level_offset_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	retrieved zero level offset
	zero_level_offset_apriori_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	A priori value for zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	a priori value for zero level offset
	zero_level_offset_uncert_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Uncertainty of zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	uncertainty of zero level offset
	ils_stretch_factor_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	ILS stretch factor	(none)	(none)	-999.0	retrieved ILS stretch factor
	ils_stretch_factor_apriori_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	A priori value for ILS stretch factor	(none)	(none)	-999.0	a priori value for ILS stretch factor
	ils_stretch_factor_uncert_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Uncertainty of ILS stretch factor	(none)	(none)	-999.0	uncertainty of ILS stretch factor
	iteration_B1_Psrf	1	numSounding	H5T_STD_I32LE	Number of iterations	(none)	(none)	-999.0	number of iterations for clear-sky retrieval using 760 nm retrieval window
	residual_reduced_chi2_B1_Psrf	1	numSounding	H5T_IEEE_F32LE	Squares of normalized residuals	(none)	(none)	-999.0	squares of normalized residuals for clear-sky retrieval using 760 nm retrieval window
G	RetrievalResult_B2_1590								
	XC02_B2_1590	1	numSounding	H5T_IEEE_F32LE	XC02	ppm	(none)	-999.0	retrieved XC02 (clear-sky retrieval from 1590 nm retrieval window)
	XC02_apriori_B2_1590	1	numSounding	H5T_IEEE_F32LE	A priori value of XC02	ppm	(none)	-999.0	a priori value of XC02
	XC02_uncert_B2_1590	1	numSounding	H5T_IEEE_F32LE	Uncertainty of XC02	ppm	(none)	-999.0	uncertainty of XC02 (clear-sky retrieval from 1590 nm retrieval window)
	XC02_dfs_B2_1590	1	numSounding	H5T_IEEE_F32LE	DFS for XC02	(none)	(none)	-999.0	degree of freedom for signals for XC02 (clear-sky retrieval from 1590 nm retrieval window)
	XH20_B2_1590	1	numSounding	H5T_IEEE_F32LE	XH20	ppm	(none)	-999.0	retrieved XH20 (clear-sky retrieval from 1590 nm retrieval window)
	XH20_apriori_B2_1590	1	numSounding	H5T_IEEE_F32LE	A priori value of XH20	ppm	(none)	-999.0	a priori value of XH20
	XH20_uncert_B2_1590	1	numSounding	H5T_IEEE_F32LE	Uncertainty of XH20	ppm	(none)	-999.0	uncertainty of XH20 (clear-sky retrieval from 1590 nm retrieval window)
	XH20_dfs_B2_1590	1	numSounding	H5T_IEEE_F32LE	DFS for XH20	(none)	(none)	-999.0	degree of freedom for signals for XH20 (clear-sky retrieval from 1590 nm retrieval window)
	albedo_B2_1590	2	numSounding, numAlb_B2_1590	H5T_IEEE_F32LE	Surface albedo	(none)	(none)	-999.0	retrieved surface albedo at 1590 nm retrieval window (for land case)
	albedo_apriori_B2_1590	2	numSounding, numAlb_B2_1590	H5T_IEEE_F32LE	A priori value of surface albedo	(none)	(none)	-999.0	a priori value of surface albedo at 1590 nm retrieval window (for land case)
	albedo_uncert_B2_1590	2	numSounding, numAlb_B2_1590	H5T_IEEE_F32LE	Uncertainty of surface albedo	(none)	(none)	-999.0	uncertainty of surface albedo at 1590 nm retrieval window (for land case)
	wind_speed_B2_1590	1	numSounding	H5T_IEEE_F32LE	Surface wind speed	m/s	(none)	-999.0	retrieved surface wind speed (for ocean case)
	wind_speed_apriori_B2_1590	1	numSounding	H5T_IEEE_F32LE	A priori value of surface wind speed	m/s	(none)	-999.0	a priori value of surface wind speed (for ocean case)
	wind_speed_uncert_B2_1590	1	numSounding	H5T_IEEE_F32LE	Uncertainty of surface wind speed	m/s	(none)	-999.0	uncertainty of surface wind speed (for ocean case)
	dispersion_adjustment_B2_1590	1	numSounding	H5T_IEEE_F32LE	Dispersion adjustment factor	(none)	(none)	-999.0	retrieved dispersion adjustment factor for 1590 nm retrieval window
	dispersion_adjustment_apriori_B2_1590	1	numSounding	H5T_IEEE_F32LE	A priori value for dispersion adjustment factor	(none)	(none)	-999.0	a priori value for dispersion adjustment factor for 1590 nm retrieval window
	dispersion_adjustment_uncert_B2_1590	1	numSounding	H5T_IEEE_F32LE	Uncertainty of dispersion adjustment factor	(none)	(none)	-999.0	uncertainty of dispersion adjustment factor for 1590 nm retrieval window
	zero_level_offset_B2_1590	1	numSounding	H5T_IEEE_F32LE	Zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	retrieved zero level offset

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Table 3-2 GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product Format (5/7)

Group	Group / Dataset	Dataspace		Datatype	Dataset name	attribute			
		Rank	Size			unit	validRange	invalidValue	description
	zero_level_offset_apriori_B2_1590	1	numSounding	H5T_IEEE_F32LE	A priori value for zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	a priori value for zero level offset
	zero_level_offset_uncert_B2_1590	1	numSounding	H5T_IEEE_F32LE	Uncertainty of zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	uncertainty of zero level offset
	ils_stretch_factor_B2_1590	1	numSounding	H5T_IEEE_F32LE	ILS stretch factor	(none)	(none)	-999.0	retrieved ILS stretch factor
	ils_stretch_factor_apriori_B2_1590	1	numSounding	H5T_IEEE_F32LE	A priori value for ILS stretch factor	(none)	(none)	-999.0	a priori value for ILS stretch factor
	ils_stretch_factor_uncert_B2_1590	1	numSounding	H5T_IEEE_F32LE	Uncertainty of ILS stretch factor	(none)	(none)	-999.0	uncertainty of ILS stretch factor
	iteration_B2_1590	1	numSounding	H5T_STD_I32LE	Number of iterations	(none)	(none)	-999	number of iterations for clear-sky retrieval using 1590 nm retrieval window
	residual_reduced_chi2_B2_1590	1	numSounding	H5T_IEEE_F32LE	Squares of normalized residuals	(none)	(none)	-999.0	squares of normalized residuals for clear-sky retrieval using 1590 nm retrieval window
G	RetrievalResult_B2_1660								
	XCH4_B2_1660	1	numSounding	H5T_IEEE_F32LE	XCH4	ppm	(none)	-999.0	retrieved XCH4 (clear-sky retrieval from 1660 nm retrieval window)
	XCH4_apriori_B2_1660	1	numSounding	H5T_IEEE_F32LE	A priori value of XCH4	ppm	(none)	-999.0	a priori value of XCH4
	XCH4_uncert_B2_1660	1	numSounding	H5T_IEEE_F32LE	Uncertainty of XCH4	ppm	(none)	-999.0	uncertainty of XCH4 (clear-sky retrieval from 1660 nm retrieval window)
	XCH4_dfs_B2_1660	1	numSounding	H5T_IEEE_F32LE	DFS for XCH4	(none)	(none)	-999.0	degree of freedom for signals for XCH4 (clear-sky retrieval from 1660 nm retrieval window)
	XH20_B2_1660	1	numSounding	H5T_IEEE_F32LE	XH20	ppm	(none)	-999.0	retrieved XH20 (clear-sky retrieval from 1660 nm retrieval window)
	XH20_apriori_B2_1660	1	numSounding	H5T_IEEE_F32LE	A priori value of XH20	ppm	(none)	-999.0	a priori value of XH20
	XH20_uncert_B2_1660	1	numSounding	H5T_IEEE_F32LE	Uncertainty of XH20	ppm	(none)	-999.0	uncertainty of XH20 (clear-sky retrieval from 1660 nm retrieval window)
	XH20_dfs_B2_1660	1	numSounding	H5T_IEEE_F32LE	DFS for XH20	(none)	(none)	-999.0	degree of freedom for signals for XH20 (clear-sky retrieval from 1660 nm retrieval window)
	albedo_B2_1660	2	numSounding, numAlb_B2_1660	H5T_IEEE_F32LE	Surface albedo	(none)	(none)	-999.0	retrieved surface albedo at 1660 nm retrieval window (for land case)
	albedo_apriori_B2_1660	2	numSounding, numAlb_B2_1660	H5T_IEEE_F32LE	A priori value of surface albedo	(none)	(none)	-999.0	a priori value of surface albedo at 1660 nm retrieval window (for land case)
	albedo_uncert_B2_1660	2	numSounding, numAlb_B2_1660	H5T_IEEE_F32LE	Uncertainty of surface albedo	(none)	(none)	-999.0	uncertainty of surface albedo at 1660 nm retrieval window (for land case)
	wind_speed_B2_1660	1	numSounding	H5T_IEEE_F32LE	Surface wind speed	m/s	(none)	-999.0	retrieved surface wind speed (for ocean case)
	wind_speed_apriori_B2_1660	1	numSounding	H5T_IEEE_F32LE	A priori value of surface wind speed	m/s	(none)	-999.0	a priori value of surface wind speed (for ocean case)
	wind_speed_uncert_B2_1660	1	numSounding	H5T_IEEE_F32LE	Uncertainty of surface wind speed	m/s	(none)	-999.0	uncertainty of surface wind speed (for ocean case)
	dispersion_adjustment_B2_1660	1	numSounding	H5T_IEEE_F32LE	Dispersion adjustment factor	(none)	(none)	-999.0	retrieved dispersion adjustment factor for 1660 nm retrieval window
	dispersion_adjustment_apriori_B2_1660	1	numSounding	H5T_IEEE_F32LE	A priori value for dispersion adjustment factor	(none)	(none)	-999.0	a priori value for dispersion adjustment factor for 1660 nm retrieval window
	dispersion_adjustment_uncert_B2_1660	1	numSounding	H5T_IEEE_F32LE	Uncertainty of dispersion adjustment factor	(none)	(none)	-999.0	uncertainty of dispersion adjustment factor for 1660 nm retrieval window
	zero_level_offset_B2_1660	1	numSounding	H5T_IEEE_F32LE	Zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	retrieved zero level offset
	zero_level_offset_apriori_B2_1660	1	numSounding	H5T_IEEE_F32LE	A priori value for zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	a priori value for zero level offset
	zero_level_offset_uncert_B2_1660	1	numSounding	H5T_IEEE_F32LE	Uncertainty of zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	uncertainty of zero level offset
	ils_stretch_factor_B2_1660	1	numSounding	H5T_IEEE_F32LE	ILS stretch factor	(none)	(none)	-999.0	retrieved ILS stretch factor
	ils_stretch_factor_apriori_B2_1660	1	numSounding	H5T_IEEE_F32LE	A priori value for ILS stretch factor	(none)	(none)	-999.0	a priori value for ILS stretch factor
	ils_stretch_factor_uncert_B2_1660	1	numSounding	H5T_IEEE_F32LE	Uncertainty of ILS stretch factor	(none)	(none)	-999.0	uncertainty of ILS stretch factor
	iteration_B2_1660	1	numSounding	H5T_STD_I32LE	Number of iterations	(none)	(none)	-999	number of iterations for clear-sky retrieval using 1660 nm retrieval window
	residual_reduced_chi2_B2_1660	1	numSounding	H5T_IEEE_F32LE	Squares of normalized residuals	(none)	(none)	-999.0	squares of normalized residuals for clear-sky retrieval using 1660 nm retrieval window
G	RetrievalResult_B3_2060								
	XC02_B3_2060	1	numSounding	H5T_IEEE_F32LE	XC02	ppm	(none)	-999.0	retrieved XC02 (clear-sky retrieval from 2060 nm retrieval window)
	XC02_apriori_B3_2060	1	numSounding	H5T_IEEE_F32LE	A priori value of XC02	ppm	(none)	-999.0	a priori value of XC02
	XC02_uncert_B3_2060	1	numSounding	H5T_IEEE_F32LE	Uncertainty of XC02	ppm	(none)	-999.0	uncertainty of XC02 (clear-sky retrieval from 2060 nm retrieval window)
	XC02_dfs_B3_2060	1	numSounding	H5T_IEEE_F32LE	DFS for XC02	(none)	(none)	-999.0	degree of freedom for signals for XC02 (clear-sky retrieval from 2060 nm retrieval window)
	XH20_B3_2060	1	numSounding	H5T_IEEE_F32LE	XH20	ppm	(none)	-999.0	retrieved XH20 (clear-sky retrieval from 2060 nm retrieval window)
	XH20_apriori_B3_2060	1	numSounding	H5T_IEEE_F32LE	A priori value of XH20	ppm	(none)	-999.0	a priori value of XH20
	XH20_uncert_B3_2060	1	numSounding	H5T_IEEE_F32LE	Uncertainty of XH20	ppm	(none)	-999.0	uncertainty of XH20 (clear-sky retrieval from 2060 nm retrieval window)
	XH20_dfs_B3_2060	1	numSounding	H5T_IEEE_F32LE	DFS for XH20	(none)	(none)	-999.0	degree of freedom for signals for XH20 (clear-sky retrieval from 2060 nm retrieval window)

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Table 3-2 GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product Format (6/7)

Group	Group / Dataset	Dataspace		Datatype	Dataset name	attribute			
		Rank	Size			unit	validRange	invalidValue	description
	albedo_B3_2060	2	numSounding, numAlb_B3_2060	H5T_IEEE_F32LE	Surface albedo	(none)	(none)	-999.0	retrieved surface albedo at 2060 nm retrieval window (for land case)
	albedo_apriori_B3_2060	2	numSounding, numAlb_B3_2060	H5T_IEEE_F32LE	A priori value of surface albedo	(none)	(none)	-999.0	a priori value of surface albedo at 2060 nm retrieval window (for land case)
	albedo_uncert_B3_2060	2	numSounding, numAlb_B3_2060	H5T_IEEE_F32LE	Uncertainty of surface albedo	(none)	(none)	-999.0	uncertainty of surface albedo at 2060 nm retrieval window (for land case)
	wind_speed_B3_2060	1	numSounding	H5T_IEEE_F32LE	Surface wind speed	m/s	(none)	-999.0	retrieved surface wind speed (for ocean case)
	wind_speed_apriori_B3_2060	1	numSounding	H5T_IEEE_F32LE	A priori value of surface wind speed	m/s	(none)	-999.0	a priori value of surface wind speed (for ocean case)
	wind_speed_uncert_B3_2060	1	numSounding	H5T_IEEE_F32LE	Uncertainty of surface wind speed	m/s	(none)	-999.0	uncertainty of surface wind speed (for ocean case)
	dispersion_adjustment_B3_2060	1	numSounding	H5T_IEEE_F32LE	Dispersion adjustment factor	(none)	(none)	-999.0	retrieved dispersion adjustment factor for 2060 nm retrieval window
	dispersion_adjustment_apriori_B3_2060	1	numSounding	H5T_IEEE_F32LE	A priori value for dispersion adjustment factor	(none)	(none)	-999.0	a priori value for dispersion adjustment factor for 2060 nm retrieval window
	dispersion_adjustment_uncert_B3_2060	1	numSounding	H5T_IEEE_F32LE	Uncertainty of dispersion adjustment factor	(none)	(none)	-999.0	uncertainty of dispersion adjustment factor for 2060 nm retrieval window
	zero_level_offset_B3_2060	1	numSounding	H5T_IEEE_F32LE	Zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	retrieved zero level offset
	zero_level_offset_apriori_B3_2060	1	numSounding	H5T_IEEE_F32LE	A priori value for zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	a priori value for zero level offset
	zero_level_offset_uncert_B3_2060	1	numSounding	H5T_IEEE_F32LE	Uncertainty of zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	uncertainty of zero level offset
	ils_stretch_factor_B3_2060	1	numSounding	H5T_IEEE_F32LE	ILS stretch factor	(none)	(none)	-999.0	retrieved ILS stretch factor
	ils_stretch_factor_apriori_B3_2060	1	numSounding	H5T_IEEE_F32LE	A priori value for ILS stretch factor	(none)	(none)	-999.0	a priori value for ILS stretch factor
	ils_stretch_factor_uncert_B3_2060	1	numSounding	H5T_IEEE_F32LE	Uncertainty of ILS stretch factor	(none)	(none)	-999.0	uncertainty of ILS stretch factor
	iteration_B3_2060	1	numSounding	H5T_STD_I32LE	Number of iterations	(none)	(none)	-999	number of iterations for clear-sky retrieval using 2060 nm retrieval window
	residual_reduced_chi2_B3_2060	1	numSounding	H5T_IEEE_F32LE	Squares of normalized residuals	(none)	(none)	-999.0	squares of normalized residuals for clear-sky retrieval using 2060 nm retrieval window
G	RetrievalResult_B3_2350								
	XCO_B3_2350	1	numSounding	H5T_IEEE_F32LE	XCO	ppm	(none)	-999.0	retrieved XCO (clear-sky retrieval from 2350 nm retrieval window)
	XCO_apriori_B3_2350	1	numSounding	H5T_IEEE_F32LE	A priori value of XCO	ppm	(none)	-999.0	a priori value of XCO
	XCO_uncert_B3_2350	1	numSounding	H5T_IEEE_F32LE	Uncertainty of XCO	ppm	(none)	-999.0	uncertainty of XCO (clear-sky retrieval from 2350 nm retrieval window)
	XCO_dfs_B3_2350	1	numSounding	H5T_IEEE_F32LE	DFS for XCO	(none)	(none)	-999.0	degree of freedom for signals for XCO (clear-sky retrieval from 2350 nm retrieval window)
	XCH4_B3_2350	1	numSounding	H5T_IEEE_F32LE	XCH4	ppm	(none)	-999.0	retrieved XCH4 (clear-sky retrieval from 2350 nm retrieval window)
	XCH4_apriori_B3_2350	1	numSounding	H5T_IEEE_F32LE	A priori value of XCH4	ppm	(none)	-999.0	a priori value of XCH4
	XCH4_uncert_B3_2350	1	numSounding	H5T_IEEE_F32LE	Uncertainty of XCH4	ppm	(none)	-999.0	uncertainty of XCH4 (clear-sky retrieval from 2350 nm retrieval window)
	XCH4_dfs_B3_2350	1	numSounding	H5T_IEEE_F32LE	DFS for XCH4	(none)	(none)	-999.0	degree of freedom for signals for XCH4 (clear-sky retrieval from 2350 nm retrieval window)
	XH2O_B3_2350	1	numSounding	H5T_IEEE_F32LE	XH2O	ppm	(none)	-999.0	retrieved XH2O (clear-sky retrieval from 2350 nm retrieval window)
	XH2O_apriori_B3_2350	1	numSounding	H5T_IEEE_F32LE	A priori value of XH2O	ppm	(none)	-999.0	a priori value of XH2O
	XH2O_uncert_B3_2350	1	numSounding	H5T_IEEE_F32LE	Uncertainty of XH2O	ppm	(none)	-999.0	uncertainty of XH2O (clear-sky retrieval from 2350 nm retrieval window)
	XH2O_dfs_B3_2350	1	numSounding	H5T_IEEE_F32LE	DFS for XH2O	(none)	(none)	-999.0	degree of freedom for signals for XH2O (clear-sky retrieval from 2350 nm retrieval window)
	albedo_B3_2350	2	numSounding, numAlb_B3_2350	H5T_IEEE_F32LE	Surface albedo	(none)	(none)	-999.0	retrieved surface albedo at 2350 nm retrieval window (for land case)
	albedo_apriori_B3_2350	2	numSounding, numAlb_B3_2350	H5T_IEEE_F32LE	A priori value of surface albedo	(none)	(none)	-999.0	a priori value of surface albedo at 2350 nm retrieval window (for land case)
	albedo_uncert_B3_2350	2	numSounding, numAlb_B3_2350	H5T_IEEE_F32LE	Uncertainty of surface albedo	(none)	(none)	-999.0	uncertainty of surface albedo at 2350 nm retrieval window (for land case)
	wind_speed_B3_2350	1	numSounding	H5T_IEEE_F32LE	Surface wind speed	m/s	(none)	-999.0	retrieved surface wind speed (for ocean case)
	wind_speed_apriori_B3_2350	1	numSounding	H5T_IEEE_F32LE	A priori value of surface wind speed	m/s	(none)	-999.0	a priori value of surface wind speed (for ocean case)
	wind_speed_uncert_B3_2350	1	numSounding	H5T_IEEE_F32LE	Uncertainty of surface wind speed	m/s	(none)	-999.0	uncertainty of surface wind speed (for ocean case)
	dispersion_adjustment_B3_2350	1	numSounding	H5T_IEEE_F32LE	Dispersion adjustment factor	(none)	(none)	-999.0	retrieved dispersion adjustment factor for 2350 nm retrieval window
	dispersion_adjustment_apriori_B3_2350	1	numSounding	H5T_IEEE_F32LE	A priori value for dispersion adjustment factor	(none)	(none)	-999.0	a priori value for dispersion adjustment factor for 2350 nm retrieval window
	dispersion_adjustment_uncert_B3_2350	1	numSounding	H5T_IEEE_F32LE	Uncertainty of dispersion adjustment factor	(none)	(none)	-999.0	uncertainty of dispersion adjustment factor for 2350 nm retrieval window
	zero_level_offset_B3_2350	1	numSounding	H5T_IEEE_F32LE	Zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	retrieved zero level offset
	zero_level_offset_apriori_B3_2350	1	numSounding	H5T_IEEE_F32LE	A priori value for zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	a priori value for zero level offset
	zero_level_offset_uncert_B3_2350	1	numSounding	H5T_IEEE_F32LE	Uncertainty of zero level offset	W/cm ² /str/cm ⁻¹	(none)	-999.0	uncertainty of zero level offset

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Table 3-2 GOSAT-2 TANSO-FTS-2 SWIR L2 Chlorophyll Fluorescence and Proxy-method Product Format (7/7)

Group	Group / Dataset	Dataspace		Datatype	Dataset name	attribute			
		Rank	Size			unit	validRange	invalidValue	description
	ils_stretch_factor_B3_2350	1	numSounding	H5T_IEEE_F32LE	ILS stretch factor	(none)	(none)	-999.0	retrieved ILS stretch factor
	ils_stretch_factor_apriori_B3_2350	1	numSounding	H5T_IEEE_F32LE	A priori value for ILS stretch factor	(none)	(none)	-999.0	a priori value for ILS stretch factor
	ils_stretch_factor_uncert_B3_2350	1	numSounding	H5T_IEEE_F32LE	Uncertainty of ILS stretch factor	(none)	(none)	-999.0	uncertainty of ILS stretch factor
	iteration_B3_2350	1	numSounding	H5T_STD_I32LE	Number of iterations	(none)	(none)	-999	number of iterations for clear-sky retrieval using 2350 nm retrieval window
	residual_reduced_chi2_B3_2350	1	numSounding	H5T_IEEE_F32LE	Squares of normalized residuals	(none)	(none)	-999.0	squares of normalized residuals for clear-sky retrieval using 2350 nm retrieval window

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*1 If numSounding is 0, corresponding datasets under the following groups are not stored.

SoundingAttribute, SoundingGeometry, L1QualityInfo, CloudInformation, GasColumn_Proxy, SolarInducedFluorescence, RetrievalResult_B1_SIF, RetrievalResult_B1_Psrf, RetrievalResult_B2_1590, RetrievalResult_B2_1660, RetrievalResult_B3_2060, RetrievalResult_B3_2350

2 If numAlb_ is 0, corresponding datasets under the following groups are not stored.

RetrievalResult_B1_SIF, RetrievalResult_B1_Psrf, RetrievalResult_B2_1590, RetrievalResult_B2_1660, RetrievalResult_B3_2060, RetrievalResult_B3_2350