

EPS-SG IASI-NG Level 2 Product Format Specification

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Document Change Record

Issue / Revision	Date	DCN No.	Description
v1 draft	16/10/2014	—	Initial version in view of the Processing Specification Version 0
v1	19/12/2014	—	First version in view of the V0 as per EPS-SG Development Logic Plan, for internal review in view of the System PDR.
v1A draft	12/02/2015	—	Including comments from internal review
v1B,v1C	05/03/2015	—	Intermediate version, editorial
v1D	05/03/2015	—	V0 in EPS-SG Development Logic
v2 draft	10/09/2015	—	Changes in view of the V1 for the GS PDAP ITT. It implements comments from GS PDR Updated Product ID as per GPFS Clarified that LSE/LSI is a by-product in 3.1 Changed H2O product name to Water-vapour profile, as per EURD v3J table 31, instead of Specific humidity. Removed the open issues raised for internal tracking.
v2A draft	21/12/2015	—	Updated Document Title. Incorporating changes after review. Included the summary sheet and descriptive tables per scanline for each IASI-NG L2 products, Group Status-Satellite-Variable name "manoeuvre_occurrence": the valid_max value is set equal to 2.
v2B	12/01/2016	—	Updated the individual product summary tables, including the range and fixing the types.
v2C	13/01/2016	—	Added CO ₂ as by-product. Removed non green-house gases from the GHG product. Removed FORLI surface-z (altitude) from IASI-02-SFC product (table 44). Refreshed all Word fields (internal cross-referencing).
v2D	15/01/2016	—	Fixed typos.Added CO ₂ in table 67.
v2F	17 October 2016	—	Updates in view of specifications v2 for PDAP KO. Specified content of IASI-NG L2 individual products. Updated products size estimates
v2G	05 December 2016	EPSSG_DCR_497	Editorial updates to follow the GPFS guidelines. Update of the xml files. Detailed content of the IASI-NG L2 products are presented following the sequence presented in the GPFS document. Open issue and assumptions are moved to annex. Upgrade of the product format version control number.
v2H	29 May 2017	EPSSG_DCR_640	The diagnostics group is added in IAS-02-TWV and IAS-02-CLD. The dimension of atmosphere_mass_content_of_nitrous_oxide and atmosphere_mass_content_of_methane and atmosphere_mass_content_of_carbon_dioxide in IAS-02-GHG are updated. Products size correction (This change is not related to the changes to the products, but rather it is related to a previous errors in the calculation of the size.)
v3	29 September 2017	—	The BUFR Specification of the IASI-NG L2 products is added. Editorial updates to follow the GPFS guidelines.

Issue / Revision	Date	DCN No.	Description
v3A	07 March 2018	EPSG_DCR_833	Data type update for sounder_pixel_latitude, sounder_pixel_longitude, sounder_pixel_zenith, sounder_pixel_azimuth, sounder_pixel_sun_zenith and sounder_pixel_sun_azimuth. The overall_quality_flag was completely reshaped in this version. Changes of the Product Format Version Control Number for all the products. Deletion of the resolution version column in the TBD/TBC table.
v3B	27 September 2018	—	A new subgroup (l2p_sst) is added to IAS-02-SFC. Two attributes (scale_factor and add_offset) are added to the variables. New version of the XML. The size of SFC is changed. The type of sounder_pixel_latitude is changed from float to short. In the variable sounder_pixel_longitude, the type is changed from float to short, the valid_min from -90 to -32767 and the valid_max from 90 to 32767. In the variable sounder_pixel_latitude, the type is changed from float to short, the valid_min from -180 to -32767 and the valid_max from 180 to 32767. In the variable sounder_pixel_zenith, the type is changed from float to uint, the valid_min from 0 to 0 and the valid_max from 65 to 4294967295. In the variable sounder_pixel_azimuth, the type is changed from float to int, the valid_min from 0 to -2147483647 and the valid_max from 360 to 2147483647. In the variable sounder_pixel_sun_zenith, the type is changed from float to uint, the valid_min from 5 to 0 and the valid_max from 175 to 4294967295. In the variable sounder_pixel_sun_azimuth, the type is changed from float to int, the valid_min from 0 to -2147483647 and the valid_max from 360 to 2147483647. New meta-information is added in IAS-02-CLD\data (atmosphere_mass_content_of_cloud_ice). The variable mass_concentration_of_cloud_liquid_water_in_air is called now atmosphere_mass_content_of_cloud_liquid_water. The figures 4.2, 4.3 and 4.6 are changed. The size of IAS-02-CLD is reduced since n_levels is now 1 (it was 101).
v3C	06 March 2019	EPSG_DCR_1114	The attributes not used are removed. The min and max of IAS-02-CLD\data\air_pressure_at_cloud_top are modified. The description and the max of IAS-02-CLD\data\thermodynamic_phase_of_cloud_water_particles_at_cloud_top are updated. The unit of so2_col_at_altitudes and so2_col is changed. The list of TBD and TBC is updated. The BUFR format is modified. The signature table is changed.
v3D	12 November 2019	EPSG_DCR_1384	XML files are updated.

<i>Issue / Revision</i>	<i>Date</i>	<i>DCN No.</i>	<i>Description</i>
v3D	25/03/2020	EPSSG_DCR_1635	Changed datatype for x_pca in CO, HNO3 and O3 products from ubyte to byte. Changed datatype for wind_speed in SFC product from short to float. Changed datatype for nbr_iterations in TWV product from float to int. Changed datatype for leap_second_value from double to short in all products. Changed datatype for manoeuvre_occurrence from double to byte in all products.

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1 INTRODUCTION

1.1 Purpose and Scope

This document is the Format Specification for EPS-SG IASI-NG Level 2 products generated centrally by the EPS-SG Ground Segment at the EUMETSAT Headquarters. It specifies the detailed format of the IASI-NG Level 2 products in agreement with the format and naming conventions set out in the Generic Product Format Specification [GPFS] applicable to all EPS-SG products. The instrument specific Product Format Specification contains all the instrument specific NetCDF details, including specific metadata. The common groups and metadata are defined in the [GPFS].

This document addresses the native format of the products generated in the EPS-SG Ground Segment, which is netCDF-4 as specified in [GPFS]. Other user formats will be specified elsewhere.

1.2 Relation to other documents

The EPS-SG IASI-NG Level 2 Product Format Specification [IAS-L2-PFS] is a System document in the System Specification Tree. It is called up in [SRD], [OGSRD], IASI-NG L2 Product Generation Specification [IAS-L2-PGS] and EPS-SG System and Ground Segment documents including ICDs/IRDs wishing to convey information about the IASI-NG L2 products format and content.

This document is derived from and compliant to [GPFS] for generic product format and naming conventions applicable to all EPS-SG products.

1.3 Applicable Documents

ID	Title	Reference and version
[GPFS]	"EPS-SG Generic Product Format Specification (GPFS)"	EUM/LEO-EPSSG/SPE/13/702108 (V3D)
[MCSD]	"EPS-SG Mission Conventions and Standards Document"	EUM/LEO-EPSSG/STD/14/745221 (V2E)
[DEV]	"Development Logic for EPS-SG L0-L1-L2 Processing Specifications"	EUM/LEO-EPSSG/TEN/14/763159 (V3A)
[HQBAS]	"EPS-SG Data and Products Generation, Archiving and Dissemination Baseline at EUMETSAT HQ"	EUM/LEO-EPSSG/SPE/15/819557 (V3)

1.4 Reference Documents

ID	Title	Reference and version
[SRD]	EPS-SG System Requirements Document	EUM/LEO-EPSSG/SPE/13/735903
[OGSRD]	EPS-SG Overall Ground Segment Requirements Document	EUM/LEO-EPSSG/REQ/13/725156
[IAS-L2-PGS]	EPS-SG IASI-NG L2 Product Generation Specification	EUM/LEO-EPSSG/SPE/14/776814
[IAS-L2-ADS]	EPS-SG IASI-NG L2 Auxiliary Data Specification	EUM/LEO-EPSSG/SPE/14/776812

1.5 Acronyms

The definition of conventions, terms and abbreviations applicable to the EPS-SG programme can be found in [MCSD].

1.6 Convention and Terminology

1.6.1 Meaning of Table Heading

Filename	The name of the product (following naming convention described in [GPFS])
Product ID	The product identifier of the product (global attribute: Product identifier as described in the [GPFS])
Product Description	A summary as defined in the relevant product format specification (global attribute: product_description described in the [GPFS])
Format	Native format of the product (i.e. netCDF-4)
Size	Estimated size of the product (Mbyte/Orbit)
Duration	Duration of product disseminated to the user (To be defined by PDAP Contractor).
Group Name	The name of the NetCDF group
Variable Name	The name of the NetCDF variable
Attribute Name	The name of the NetCDF attribute (see also http://www.unidata.ucar.edu/software/netcdf/docs/netcdf/Attribute-Conventions.html). Attributes may be global or related to a group instead of a variable; in this case they must appear before dimensions
Dimension Name	The name of NetCDF dimension
Description	"Description of the element; for a variable the description must coincide with its ""long_name"" attribute."
Usage	Usage of the product: Internal: Product/Data is for use within the EPS-SG system. It is not made available to the end-users. User: the product is disseminated to the end-users.

1.7 Document Structure

Section Number	Title	Content
1	Introduction	The Scope and Purpose of the PFS document is described in this section along with Open Issues Assumptions Applicable and Reference documents.
2	Overview of the instrument	A description of the main features and characteristics of the IASI-NG is provided in this section along with its acquisition modes generating data to be processed in the Ground Segment.
3	EPS-SG IASI-NG Level 2 Products Overview	A high-level overview on the IASI-NG Level 2 Products structure is presented in this section. The Product Tree and the Product Naming convention are also specified here.
4	EPS-SG IASI-NG Level 2 Product Detailed Format	The format of each IASI-NG Level 2 Product (detailed description of the NetCDF Data Files of each product) is described in this section.
5	Product Format Version Control	This section is aimed to describe the product format version control number for each product described in this document.
APP A	Size of EPS-SG IASI-NG Level 2 products	In this section the size of each IASI-NG Level 2 Products is provided.
APP B	XML Description of EPS-SG IASI-NG Level 2 Products Format	The .xml schemas for the IASI-NG Level 2 Products are provided in this section.
APP C	BUFR Format description of EPS-SG IASI-NG Level 2 Products	The BUFR format for the IASI-NG Level 2 Products are provided in this section.

2 OVERVIEW OF THE INSTRUMENT: IASI-NG

An overview of the IASI-NG instrument: acquisition principle and scanning geometry is given in [IAS-L2-PGS].

A scan line is made of 14 fields of regard (FOR) consisting of 16 instantaneous and individual fields of view (FOV). An individual measurement is an infrared spectrum, originally containing 16921 channels in the L1C represented by a smaller number of principal components in the L1D products.

3 EPS-SG IASI-NG LEVEL 2 PRODUCT OVERVIEW

3.1 Product List

The product list is in accordance with [HQBAS].

Product ID	Product Description	Usage	Spatial Resolution
IAS-02-TWV	Temperature profile	Global/Regional	Pixel
	Water vapour profile	Global/Regional	Pixel
	Water vapour total column from IAS and MWS	Global/Regional	MWS Pixel
IAS-02-SFC	Surface temperature (Sea)	Global/Regional	Clear Pixel
	Surface temperature (Land, Ice)	Global/Regional	Clear Pixel
	Land and ice surface emissivity	Global/Regional	Clear Pixel
IAS-02-CLD	Cloud detection and fractional coverage from VII and IAS	Global/Regional	IAS Pixel
	Cloud top phase	Global/Regional	Cloudy Pixel
	Cloud top height/pressure	Global/Regional	Cloudy Pixel
	Cloud drop effective radius at cloud top (by-product)	Global/Regional	Cloudy Pixel
IAS-02-O3_	Cloud liquid water path from MWS and IAS	Global/Regional	Pixel
	Ozone profile	Global/Regional	Clear or partly cloudy pixel
IAS-02-CO_	Ozone total column	Global/Regional	Clear or partly cloudy pixel
	Carbon monoxide profile	Global/Regional	Clear or partly cloudy pixel
IAS-02-SO2	Carbon monoxide partial column	Global/Regional	Clear or partly cloudy pixel
	Sulphur dioxide total column	Global/Regional	Clear or partly cloudy pixel
IAS-02-NAC	Nitric acid partial column	Global/Regional	Clear or partly cloudy pixel
	Methan partial column	Global/Regional	Clear or partly cloudy pixel
IAS-02-GHG	Nitrous oxide total column	Global/Regional	Clear or partly cloudy pixel

3.2 Naming convention

The naming convention of EPS-SG products complies with the naming convention specified in [GPFS] for all EPS-SG Ground Segment products generated in native format.

The product name of the IASI-NG L2 products is according to the following convention:

(pflag)'_(productidentifier)'_(oflag)'_(originator)'_(YYYYMMDDhhmmss)'_(freeformat)

Where freeformat contains a number of product name fields separated by the underscore symbol `_` as explained in the [GPFS].

An example product name using NetCDF formatting is provided (for illustrative purpose only):

**W_xx-eumetsat-darmstadt,SAT,SGA1-IAS-02-
TWV_C_EUMT_20220101121212_G_O_20220101103000_20220101104000_O_N____.nc**

This is a global Level 2 (02) sounding (TWV) product, generated in the context of the EPS-SG Global mission, for the IASI-NG instrument (IAS mission) embarked on the Metop-SG/A1 satellite (SGA1). The product was created on the 01 January 2022 at 12:12:12 hours, with a sensing start date of 01 January 2022 at 10:30:00 hours and a sensing end date of 01 January 2022 at 10:40:00 hours. The file was generated in the Ground Segment operational (O) environment. The disposition mode indicates that it was produced during routine operations (O), in NRT processing (N)

4 EPS-SG IASI-NG LEVEL 2 PRODUCT DETAILED FORMAT

4.1 Overall Structure of EPS-SG

All EPS-SG product types generated by the EPS-SG Ground Segment are NetCDF-4 files complying with the generic structure and data model set out in the [GPFS]. Their high-level structure is presented in the [GPFS] and consists of a root group, holding global attributes defined in the [GPFS] and the following sub-groups: status, data and quality. In the following sections, the physical composition of each product type is specified for the IASI-NG instrument.

4.2 IAS-02-TWV

This section describes the detailed content of the NetCDF file, including groups, attributes, variables and dimensions applicable to the IAS-02-TWV product.

4.2.1 Product Summary Sheet

The table provides a summary for the IASI-NG Level 02 TWV product.

Filename	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-TWV_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N R]_.nc
Product ID	IAS-02-TWV
Product Description	Temperature profile; Water vapour profile and Water vapour total column from IAS and MWS
Format	netCDF-4
Size (MBytes/orbit)	see Appendix A
Duration	TBD

Table 4.1: IAS-02-TWV Product Summary Sheet

4.2.2 Overall Group Structure

The overall structure of the IASI-NG Level 02 TWV product is in accordance with [GPFS] and is shown in the figure 4.1.

Group dimensions, variables and attributes complement each subgroups in accordance with the NetCDF 4 model described in [GPFS].

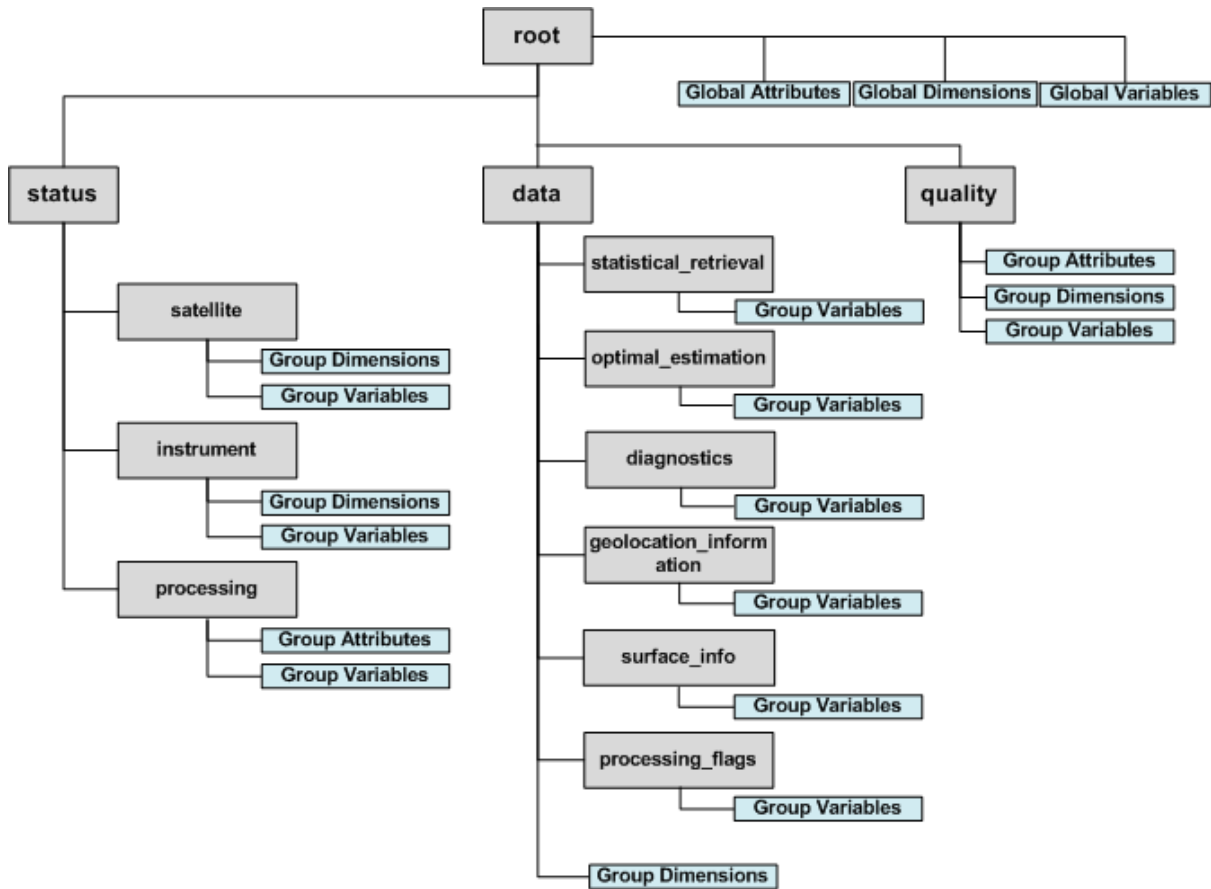


Figure 4.1: Overview of the groups in the IAS-02-TWV product

4.2.3 root

4.2.3.0.1 Attributes (global)

Attribute Name	Data Type	Meaning and/or Value
Conventions	string	CF-1.6
metadata_conventions	string	Unidata Dataset Discovery v1.0
product_name	string	W_xx-eumetsat-darmstadt, SAT,SGA[1-3]-IAS-02-TWV_C_EUMT_ YYYYMMDDhhmmss_[G R L]_[O V I D E]_ YYYYMMDDhhmmss_ YYYYMMDDhhmmss_[T C O V]_[N I R]_.nc
title	string	IAS Level 2 TWV
summary	string	Temperature profile; Water vapour profile and Water vapour total column from IAS and MWS.
doi	string	
keywords	string	IASI-NG; EPS-SG; Level 2; Infrared; Temperature; Water vapour
history	string	(original generated product aggregated product sub-setted product)
institution	string	EUMETSAT
spacecraft	string	Metop-SG A satellites: (SGA[1-3])

Attribute Name	Data Type	Meaning and/or Value
instrument	string	IAS
product_level	string	2
type	string	TWV
mission_type	string	(Global Regional Local)
disposition_mode	string	(Test Commissioning Operational Validation)
sensing_start_time_utc	string	YYYYMMDDhhmmss.ddd
sensing_end_time_utc	string	YYYYMMDDhhmmss.ddd
environment	string	(Operational Validation Integration & Verification Development Engineering)
references	string	www.eumetsat.int
orbit_start	uint	Absolute orbit number at sensing_start_time_utc
orbit_end	uint	Absolute orbit number at sensing_end_time_utc

Table 4.2: Global Dimensions for IAS-02-TWV Product

4.2.3.0.2 Dimensions (global)

No common Global Dimensions are currently envisaged.

4.2.3.0.3 Variables (global)

No common Global Variables are currently envisaged.

4.2.4 status Group

4.2.4.1 satellite Group

4.2.4.1.1 satellite Attributes

No Attributes are currently envisaged.

4.2.4.1.2 satellite Dimensions

Dimension Name	Comment	Dimension length
manoeuvre_items	Number of manoeuvres occurring between product start and end.	$0 \leq N$

Table 4.3: satellite: Dimensions for IAS-02-TWV Product

4.2.4.1.3 satellite Variables

Variables Name	Description	Type	Range or Value	Dimension
epoch_time_utc	Epoch time in UTC of the orbital elements	double	valid_min to valid_max	1
long_name	Description of the variables	string	Epoch time in UTC of the orbital elements	–
units	Physical Units	string	seconds since 2020-01-01 00:00:00.000	–

Variables Name	Description	Type	Range or Value	Dimension
valid_min	Minimum value	double	-1000000000	—
valid_max	Maximum value	double	1000000000	—
missing_value	Missing value	double	-9000000000	—
semi_major_axis	Semi major axis of the orbit at epoch time [TOD]	double	valid_min to valid_max	1
long_name	Description of the variables	string	Semi major axis of the orbit at epoch time [TOD]	—
units	Physical Units	string	m	—
valid_min	Minimum value	double	7190000	—
valid_max	Maximum value	double	7200000	—
missing_value	Missing value	double	-9000000	—
eccentricity	Eccentricity of the orbit at epoch time [TOD]	double	valid_min to valid_max	1
long_name	Description of the variables	string	Eccentricity of the orbit at epoch time [TOD]	—
valid_min	Minimum value	double	0.00116	—
valid_max	Maximum value	double	0.00117	—
missing_value	Missing value	double	-900	—
inclination	Inclination of the orbit at epoch time [TOD]	double	valid_min to valid_max	1
long_name	Description of the variables	string	Inclination of the orbit at epoch time [TOD]	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	double	98.65	—
valid_max	Maximum value	double	98.75	—
missing_value	Missing value	double	-99	—
perigee_argument	Argument of perigee of the orbit at epoch time [TOD]	double	valid_min to valid_max	1
long_name	Description of the variables	string	Argument of perigee of the orbit at epoch time [TOD]	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	double	0	—
valid_max	Maximum value	double	360	—
missing_value	Missing value	double	-999	—
right_ascension	Right ascension of the orbit at epoch time [TOD]	double	valid_min to valid_max	1
long_name	Description of the variables	string	Right ascension of the orbit at epoch time [TOD]	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	double	0	—
valid_max	Maximum value	double	360	—
missing_value	Missing value	double	-999	—

Variables Name	Description	Type	Range or Value	Dimension
mean_anomaly	Mean anomaly of the orbit at epoch time [TOD]	double	valid_min to valid_max	1
long_name	Description of the variables	string	Mean anomaly of the orbit at epoch time [TOD]	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	double	0	—
valid_max	Maximum value	double	360	—
missing_value	Missing value	double	-999	—
earth_sun_distance_ratio	Ratio of current Earth-Sun distance to Mean Earth-Sun distance	double	valid_min to valid_max	1
long_name	Description of the variables	string	Ratio of current Earth-Sun distance to Mean Earth-Sun distance	—
valid_min	Minimum value	double	0.983	—
valid_max	Maximum value	double	1.017	—
missing_value	Missing value	double	-9999	—
subsat_latitude_start	Latitude of subsatellite point at start of the product	double	valid_min to valid_max	1
long_name	Description of the variables	string	Latitude of subsatellite point at start of the product	—
units	Physical Units	string	degrees_north	—
valid_min	Minimum value	double	-90	—
valid_max	Maximum value	double	90	—
missing_value	Missing value	double	-99	—
subsat_longitude_start	Longitude of subsatellite point at start of the product	double	valid_min to valid_max	1
long_name	Description of the variables	string	Longitude of subsatellite point at start of the product	—
units	Physical Units	string	degrees_east	—
valid_min	Minimum value	double	0	—
valid_max	Maximum value	double	360	—
missing_value	Missing value	double	-999	—
subsat_latitude_end	Latitude of subsatellite point at end of the product	double	valid_min to valid_max	1
long_name	Description of the variables	string	Latitude of subsatellite point at end of the product	—
units	Physical Units	string	degrees_north	—
valid_min	Minimum value	double	-90	—
valid_max	Maximum value	double	90	—
missing_value	Missing value	double	-99	—

Variables Name	Description	Type	Range or Value	Dimension
subsat_longitude_end	Longitude of sub-satellite point at end of the product	double	valid_min to valid_max	1
long_name	Description of the variables	string	Longitude of sub-satellite point at end of the product	–
units	Physical Units	string	degrees_east	–
valid_min	Minimum value	double	0	–
valid_max	Maximum value	double	360	–
missing_value	Missing value	double	-999	–
state_vector_time_utc	Time of the state vector and attitude items	double	valid_min to valid_max	1
long_name	Description of the variables	string	Time of the state vector and attitude items	–
units	Physical Units	string	seconds since 2020-01-01 00:00:00.000	–
valid_min	Minimum value	double	-1000000000	–
valid_max	Maximum value	double	1000000000	–
missing_value	Missing value	double	-9000000000	–
x_position	X position of the orbital state vector [EARTH+FIXED]	double	valid_min to valid_max	1
long_name	Description of the variables	string	X position of the orbital state vector [EARTH+FIXED]	–
units	Physical Units	string	m	–
valid_min	Minimum value	double	-7200000	–
valid_max	Maximum value	double	7200000	–
missing_value	Missing value	double	-9000000	–
y_position	Y position of the orbital state vector [EARTH+FIXED]	double	valid_min to valid_max	1
long_name	Description of the variables	string	Y position of the orbital state vector [EARTH+FIXED]	–
units	Physical Units	string	m	–
valid_min	Minimum value	double	-7200000	–
valid_max	Maximum value	double	7200000	–
missing_value	Missing value	double	-9000000	–
z_position	Z position of the orbital state vector [EARTH+FIXED]	double	valid_min to valid_max	1
long_name	Description of the variables	string	Z position of the orbital state vector [EARTH+FIXED]	–
units	Physical Units	string	m	–
valid_min	Minimum value	double	-7200000	–
valid_max	Maximum value	double	7200000	–
missing_value	Missing value	double	-9000000	–
x_velocity	X velocity of the orbital state vector [EARTH+FIXED]	double	valid_min to valid_max	1

Variables Name	Description	Type	Range or Value	Dimension
long_name	Description of the variables	string	X velocity of the orbital state vector [EARTH+FIXED]	–
units	Physical Units	string	m/s	–
valid_min	Minimum value	double	-8000	–
valid_max	Maximum value	double	8000	–
missing_value	Missing value	double	-9000	–
y_velocity	Y velocity of the orbital state vector [EARTH+FIXED]	double	valid_min to valid_max	1
long_name	Description of the variables	string	Y velocity of the orbital state vector [EARTH+FIXED]	–
units	Physical Units	string	m/s	–
valid_min	Minimum value	double	-8000	–
valid_max	Maximum value	double	8000	–
missing_value	Missing value	double	-9000	–
z_velocity	Z velocity of the orbital state vector [EARTH+FIXED]	double	valid_min to valid_max	1
long_name	Description of the variables	string	Z velocity of the orbital state vector [EARTH+FIXED]	–
units	Physical Units	string	m/s	–
valid_min	Minimum value	double	-8000	–
valid_max	Maximum value	double	8000	–
missing_value	Missing value	double	-9000	–
yaw_error	Yaw attitude error	double	valid_min to valid_max	1
long_name	Description of the variables	string	Yaw attitude error	–
units	Physical Units	string	degrees	–
valid_min	Minimum value	double	0	–
valid_max	Maximum value	double	360	–
missing_value	Missing value	double	-999	–
roll_error	Roll attitude error	double	valid_min to valid_max	1
long_name	Description of the variables	string	Roll attitude error	–
units	Physical Units	string	degrees	–
valid_min	Minimum value	double	0	–
valid_max	Maximum value	double	360	–
missing_value	Missing value	double	-999	–
pitch_error	Pitch attitude error	double	valid_min to valid_max	1
long_name	Description of the variables	string	Pitch attitude error	–
units	Physical Units	string	degrees	–
valid_min	Minimum value	double	0	–
valid_max	Maximum value	double	360	–
missing_value	Missing value	double	-999	–

Variables Name	Description	Type	Range or Value	Dimension
leap_second_time_utc	UTC time of occurrence of a leap second in this product	double	valid_min to valid_max	1
long_name	Description of the variables	string	UTC time of occurrence of a leap second in this product	–
units	Physical Units	string	seconds since 2020-01-01 00:00:00	–
valid_min	Minimum value	double	-1000000000	–
valid_max	Maximum value	double	1000000000	–
missing_value	Missing value	double	-9000000000	–
leap_second_value	Value of leap second in product (1 0 or -1)	short	valid_min to valid_max	1
long_name	Description of the variables	string	Value of leap second in product (1 0 or -1)	–
units	Physical Units	string	s	–
valid_min	Minimum value	short	-1	–
valid_max	Maximum value	short	1	–
missing_value	Missing value	short	-32768	–
only in case of manoeuvre				
manoeuvre_occurrence	Occurrence of manoeuvres between start and end times of the product (1 or 2) 1 for in-plane manoeuvre and 2 for out-of-plane manoeuvre	byte	valid_min to valid_max	manoeuvre_items
long_name	Description of the variables	string	Occurrence of manoeuvres between start and end times of the product (1 or 2) 1 for in-plane manoeuvre and 2 for out-of-plane manoeuvre	–
valid_min	Minimum value	byte	0	–
valid_max	Maximum value	byte	1	–
missing_value	Missing value	byte	-9	–
manoeuvre_start_time_utc	UTC time of start of manoeuvre	double	valid_min to valid_max	manoeuvre_items
long_name	Description of the variables	string	UTC time of start of manoeuvre	–
units	Physical Units	string	seconds since 2020-01-01 00:00:00.000	–
valid_min	Minimum value	double	-1000000000	–
valid_max	Maximum value	double	1000000000	–
missing_value	Missing value	double	-9000000000	–
manoeuvre_end_time_utc	UTC time of end of manoeuvre	double	valid_min to valid_max	manoeuvre_items
long_name	Description of the variables	string	UTC time of end of manoeuvre	–
units	Physical Units	string	seconds since 2020-01-01 00:00:00.000	–
valid_min	Minimum value	double	-1000000000	–
valid_max	Maximum value	double	1000000000	–

Variables Name	Description	Type	Range or Value	Dimension
missing_value	Missing value	double	-9000000000	—

Table 4.4: satellite: Variables for IAS-02-TWV Product

4.2.4.2 instrument Group

4.2.4.2.1 instrument Attributes

No Attributes are currently envisaged.

4.2.4.2.2 instrument Dimensions

Dimension Name	Comment	Dimension length
mode_items	Number of modes the instrument assumed during product duration	$1 \leq N$

Table 4.5: instrument: Dimensions for IAS-02-TWV Product

4.2.4.2.3 instrument Variables

Variables Name	Description	Type	Type or Value	Dimension
mode_start_time_utc	Start time of the mode	double	valid_min to valid_max	mode_items
long_name	Description of the variables	string	Start time of the mode	—
units	Physical Units	string	seconds since 2020-01-01 00:00:00.000	—
valid_min	Minimum value	double	-1.e9	—
valid_max	Maximum value	double	1.e9	—
missing_value	Missing value	double	-9.e9	—
mode_end_time_utc	End time of the mode	double	valid_min to valid_max	mode_items
long_name	Description of the variables	string	End time of the mode	—
units	Physical Units	string	seconds since 2020-01-01 00:00:00.000	—
valid_min	Minimum value	double	-1.e9	—
valid_max	Maximum value	double	1.e9	—
missing_value	Missing value	double	-9.e9	—
instrument_mode	Name of the instrument mode assumed during period	string	valid_min to valid_max	mode_items
long_name	Description of the variables	string	Name of the instrument mode assumed during period	—
missing_value	Missing value	string		—

Table 4.6: instrument: Variables for IAS-02-TWV Product

4.2.4.3 processing Group

4.2.4.3.1 processing Attributes

Attribute Name	Data Type	Meaning and/or Value
processor_name	string	IAS_L2
processor_version	string	
processing_mode	string	(NRT Reprocessing)
format_version	string	3.2
pgs_reference_and_version	string	EUM/LEO-EPSSG/SPE/14/776814 v3D
pfs_reference_and_version	string	EUM/LEO-EPSSG/SPE/14/776810 v3D
atbd_reference_and_version	string	EUM/LEO-EPSSG/SPE/13/737524 v3C
baseline	string	
source	string	(AUXILIARY_DATA_NAME)*(INPUT_PRODUCT_NAME)* where the asterisks indicate zero or more instance

Table 4.7: processing: Attributes for IAS-02-TWV Product

4.2.4.3.2 processing Dimensions

No Dimensions are currently envisaged.

4.2.4.3.3 processing Variables

Variables Name	Description	Type	Range or Value	Dimension
creation_time_utc	UTC time of the start of the product creation	double	valid_min to valid_max	1
long_name	Description of the variables	string	UTC time of the start of the product creation	–
units	Physical Units	string	seconds since 2020-01-01 00:00:00	–
valid_min	Minimum value	double	-1.e9	–
valid_max	Maximum value	double	1.e9	–
missing_value	Missing value	double	-9.e9	–

Table 4.8: processing: Variables for IAS-02-TWV Product

4.2.5 data Group

4.2.5.0.1 data Attributes

No data attributes are envisaged

4.2.5.0.2 data Dimensions

Dimension Name	Comment	Dimension length
n_lines	number of considered lines in the orbit	383
n_for	number of considered acquisition in the BRC	14
n_fov	number of field of view in the field of regard	16
n_levels	number of vertical levels	101
esize_w	number of elements in the water vapour error record	<820
esize_t	number of elements in the temperature error record	<1275
n_err	number of error data records in the orbit	≤ n_lines n_fov n_for

Table 4.9: data: Dimensions for IAS-02-TWV Product

4.2.5.1 statistical_retrieval Group

4.2.5.1.1 statistical_retrieval Variables

Variables Name	Description	Type	Range or Value	Dimension
air_temperature	A-priori temperature profiles	float	valid_min to valid_max	n_lines n_for n_fov n_levels
long_name	Description of the variables	string	A-priori temperature profiles	–

Variables Name	Description	Type	Range or Value	Dimension
units	Physical Units	string	K	—
valid_min	Minimum value	float	100	—
valid_max	Maximum value	float	400	—
missing_value	Missing value	float	3.4e+38	—
specific_humidity	A-priori water vapour profiles	float	valid_min to valid_max	n_lines n_for n_fov n_levels
long_name	Description of the variables	string	A-priori water vapour profiles	—
units	Physical Units	string	kg/kg	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	1	—
missing_value	Missing value	float	3.4e+38	—
atmosphere_mass_content_of_water	Integrated water vapour	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Integrated water vapour	—
units	Physical Units	string	kg.m ⁻²	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	300	—
missing_value	Missing value	float	3.4e+38	—
qi_air_temperature	Quality indicator for a-priori temperature profile	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Quality indicator for a-priori temperature profile	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	25	—
missing_value	Missing value	float	3.4e+38	—
qi_specific_humidity	Quality indicator for a-priori water vapour profile	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Quality indicator for a-priori water vapour profile	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	25	—
missing_value	Missing value	float	3.4e+38	—
surface_air_temperature	A-priori surface air temperature	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	A-priori surface air temperature	—
units	Physical Units	string	K	—
valid_min	Minimum value	float	100	—

Variables Name	Description	Type	Range or Value	Dimension
valid_max	Maximum value	float	400	—
missing_value	Missing value	float	3.4e+38	—
surface_specific _humidity	A-priori surface air water vapour	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	A-priori surface air water vapour	—
units	Physical Units	string	K	—
valid_min	Minimum value	float	100	—
valid_max	Maximum value	float	400	—
missing_value	Missing value	float	3.4e+38	—

Table 4.10: statistical_retrieval: Variables for IAS-02-TWV Product

4.2.5.2 optimal_estimation Group

4.2.5.2.1 optimal_estimation Variables

Variables Name	Description	Type	Range or Value	Dimension
air_temperature	Temperature	float	valid_min to valid_max	n_lines n_for n_fov n_levels
long_name	Description of the variables	string	Temperature	—
units	Physical Units	string	K	—
valid_min	Minimum value	float	100	—
valid_max	Maximum value	float	400	—
missing_value	Missing value	float	3.4e+38	—
specific_humidity	Water vapour	float	valid_min to valid_max	n_lines n_for n_fov n_levels
long_name	Description of the variables	string	Water vapour	—
units	Physical Units	string	kg/kg	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	1	—
missing_value	Missing value	float	3.4e+38	—
atmosphere_mass _content_of_water	Integrated water vapour	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Integrated water vapour	—
units	Physical Units	string	kg.m ⁻²	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	300	—

Variables Name	Description	Type	Range or Value	Dimension
missing_value	Missing value	float	3.4e+38	—
error_data_index	Index of the error data record corresponding to the IFOVs in the line (=255 if N/A)	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Index of the error data record corresponding to the IFOVs in the line (=255 if N/A)	—
missing_value	Missing value	uint	4294967295	—
humidity_error_data	Retrieval error covariance matrix for water vapour in principal component domain	float	valid_min to valid_max	n_err esize_w
long_name	Description of the variables	string	Retrieval error covariance matrix for water vapour in principal component domain	—
missing_value	Missing value	float	3.4e+38	—
temperature_error_data	Retrieval error covariance matrix for temperature in principal component domain	float	valid_min to valid_max	n_err esize_t
long_name	Description of the variables	string	Retrieval error covariance matrix for temperature in principal component domain	—
missing_value	Missing value	float	3.4e+38	—

Table 4.11: optimal_estimation: Variables for IAS-02-TWV Product

4.2.5.3 diagnostics Group

4.2.5.3.1 diagnostics Variables

Variables Name	Description	Type	Range or Value	Dimension
rt_cost_x	Statevector cost of optimal estimation retrieval	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Statevector cost of optimal estimation retrieval	—
missing_value	Missing value	float	3.4e+38	—
rt_cost_y	Measurement cost of optimal estimation retrieval	float	valid_min to valid_max	n_lines n_for n_fov

Variables Name	Description	Type	Range or Value	Dimension
long_name	Description of the variables	string	Measurement cost of optimal estimation retrieval	—
missing_value	Missing value	float	3.4e+38	—
fg_cost	Cost of first guess retrieval	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Cost of first guess retrieval	—
missing_value	Missing value	float	3.4e+38	—
nbr_iterations	Number of optimal estimation iterations	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Number of optimal estimation iterations	—
missing_value	Missing value	int	2147483647	—

Table 4.12: diagnostics: Variables for IAS-02-TWV Product

4.2.5.4 geolocation_information Group

4.2.5.4.1 geolocation_information Variables

Variables Name	Description	Type	Range or Value	Dimension
onboard_utc	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	double	valid_min to valid_max	n_lines n_for
long_name	Description of the variables	string	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	—
units	Physical Units	string	seconds	—
valid_min	Minimum value	double	-1000000000	—
valid_max	Maximum value	double	1000000000	—
missing_value	Missing value	double	-9000000000	—
sounder_pixel_latitude	Latitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Latitude at sounder pixel centre	—
units	Physical Units	string	degrees_north	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.002746666	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—

Variables Name	Description	Type	Range or Value	Dimension
sounder_pixel _longitude	Longitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Longitude at sounder pixel centre	—
units	Physical Units	string	degrees_east	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.005493332	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_zenith	Measurement zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967295	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel _azimuth	Measurement azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—
sounder_pixel_sun _zenith	Solar zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967294	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_sun _azimuth	Solar azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—

Variables Name	Description	Type	Range or Value	Dimension
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-9	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—

Table 4.13: geolocation_information: Variables for IAS-02-TWV Product

4.2.5.5 surface_info Group

4.2.5.5.1 surface_info Variables

Variables Name	Description	Type	Range or Value	Dimension
land_fraction	Land fraction	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Land fraction	—
units	Physical Units	string	%	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	100	—
missing_value	Missing value	float	3.4e+38	—
height	Surface elevation	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Surface elevation	—
units	Physical Units	string	m	—
valid_min	Minimum value	float	-418	—
valid_max	Maximum value	float	8848	—
missing_value	Missing value	float	3.4e+38	—
height_std	Standard deviation of surface elevation	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Standard deviation of surface elevation	—
units	Physical Units	string	m	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	999	—
missing_value	Missing value	float	3.4e+38	—
ice_fraction	Fraction of IFOV covered by sea ice	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Fraction of IFOV covered by sea ice	—
units	Physical Units	string	%	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	100	—

Variables Name	Description	Type	Range or Value	Dimension
missing_value	Missing value	float	3.4e+38	—

Table 4.14: surface_info: Variables for IAS-02-TWV Product

4.2.5.6 processing_flags Group

4.2.5.6.1 processing_flags Variables

Variables Name	Description	Type	Range or Value	Dimension
flg_cldnes	Cloudiness assessment summary	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Cloudiness assessment summary	—
missing_value	Missing value	ubyte	255	—
flg_cldtst	Details of cloud tests executed and their results	ushort	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Details of cloud tests executed and their results	—
missing_value	Missing value	ushort	65535	—
flg_fgcheck	Check that geophysical parameters from the first guess are within bounds	ushort	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Check that geophysical parameters from the first guess are within bounds	—
missing_value	Missing value	ushort	65535	—
flg_iasibad	Availability and quality of IASI L1 measurements	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of IASI L1 measurements	—
missing_value	Missing value	ubyte	255	—
flg_itrcld	Convergence and acceptance of the OEM cloud retrieval	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM cloud retrieval	—
missing_value	Missing value	ubyte	255	—

Variables Name	Description	Type	Range or Value	Dimension
flg_itrems	Convergence and acceptance of the OEM surface emissivity retrieval	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM surface emissivity retrieval	–
missing_value	Missing value	ubyte	255	–
flg_itrlwp	Convergence and acceptance of the OEM cloud liquid water path retrieval	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM cloud liquid water path retrieval	–
missing_value	Missing value	ubyte	255	–
flg_itrtwo	Convergence and acceptance of the OEM simultaneous Temperature Humidity and Ozone retrievals	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM simultaneous Temperature Humidity and Ozone retrievals	–
missing_value	Missing value	ubyte	255	–
flg_metimbad	Availability and quality of MetImage measurements	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of MetImage measurements	–
missing_value	Missing value	ubyte	255	–
flg_mwsbad	Availability and quality of MWS measurements	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of MWS measurements	–
missing_value	Missing value	ubyte	255	–
flg_nwpbad	Availability and quality of NWP data	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of NWP data	–

Variables Name	Description	Type	Range or Value	Dimension
missing_value	Missing value	ubyte	255	—
flg_physcheck	Check for physical conditions in profiles	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Check for physical conditions in profiles	—
missing_value	Missing value	ubyte	255	—
flg_retcheck	Check that geophysical parameters from the OEM are within bounds	ushort	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Check that geophysical parameters from the OEM are within bounds	—
missing_value	Missing value	ushort	65535	—
flg_sunglnt	Identification of sun glint	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Identification of sun glint	—
missing_value	Missing value	ubyte	255	—

Table 4.15: processing_flags: Variables for IAS-02-TWV Product

4.2.6 quality Group

4.2.6.0.1 quality Attributes

Attribute Name	Data Type	Meaning and/or Value
overall_quality_flag	ushort	0 if overall quality is OK. Bit 0: Missing input product(s). Bit 1: Data gap(s). Bit 2: Corrupted input product(s). Bit 3: Instrument anomaly. Bit 4: missing or degraded auxiliary data. Bit 5 to 15: not used.

Table 4.16: quality: Attributes for IAS-02-TWV Product

4.2.6.0.2 quality Dimensions

Dimension Name	Comment	Dimension length
gap_items	Number of gaps identified during product duration	$1 \leq N$

Table 4.17: quality: Dimensions for IAS-02-TWV Product

4.2.6.0.3 quality Variables

Variables Name	Description	Type	Range or Value	Dimension
duration_of_product	Entire duration of the product	double	valid_min to valid_max	1
long_name	Description of the variables	string	Entire duration of the product	–
units	Physical Units	string	s	–
valid_min	Minimum value	double	0	–
missing_value	Missing value	double		–
duration_of_data_present	Amount of data present in the product	double	valid_min to valid_max	1
long_name	Description of the variables	string	Amount of data present in the product	–
units	Physical Units	string	s	–
valid_min	Minimum value	double	0	–
missing_value	Missing value	double		–
duration_of_data_missing	Amount of data missing in the product	double	valid_min to valid_max	1
long_name	Description of the variables	string	Amount of data missing in the product	–
units	Physical Units	string	s	–
valid_min	Minimum value	double	0	–
missing_value	Missing value	double		–
duration_of_data_degraded	Amount of data degraded in product	double	valid_min to valid_max	1
long_name	Description of the variables	string	Amount of data degraded in product	–
units	Physical Units	string	s	–
valid_min	Minimum value	double	0	–
missing_value	Missing value	double		–
gap_start_time_utc	Gap start time in UTC	double	valid_min to valid_max	gap_items
long_name	Description of the variables	string	Gap start time in UTC	–
units	Physical Units	string	seconds since 2020-01-01 00:00:00.000	–
valid_min	Minimum value	double	-1.e9	–
valid_max	Maximum value	double	1.e9	–
missing_value	Missing value	double	-9.e9	–
gap_end_time_utc	Gap end time in UTC	double	valid_min to valid_max	gap_items
long_name	Description of the variables	string	Gap end time in UTC	–
units	Physical Units	string	seconds since 2020-01-01 00:00:00.000	–
valid_min	Minimum value	double	-1.e9	–
valid_max	Maximum value	double	1.e9	–
missing_value	Missing value	double	-9.e9	–

Variables Name	Description	Type	Range or Value	Dimension
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Table 4.18: Quality: Variables for IAS-02-TWV Product

4.3 IAS-02-SFC

This section describes the detailed content of the NetCDF file, including groups, attributes, variables and dimensions applicable to the IAS-02-SFC product.

4.3.1 Product Summary Sheet

The table provides a summary for the IASI-NG Level 02 SFC product.

Filename	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-SFC_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N R]_.nc
Product ID	IAS-02-SFC
Product Description	Surface temperature (Sea); Surface temperature (land and ice) and Land and ice surface emissivity
Format	netCDF-4
Size (MBytes/orbit)	see Appendix A
Duration	TBD

Table 4.19: IAS-02-SFC Product Summary Sheet

4.3.2 Overall Group Structure

The overall structure of the IASI-NG Level 02 SFC product is in accordance with [GPFS] and is shown in the figure 4.2.

Group dimensions, variables and attributes complement each subgroups in accordance with the NetCDF 4 model described in [GPFS].

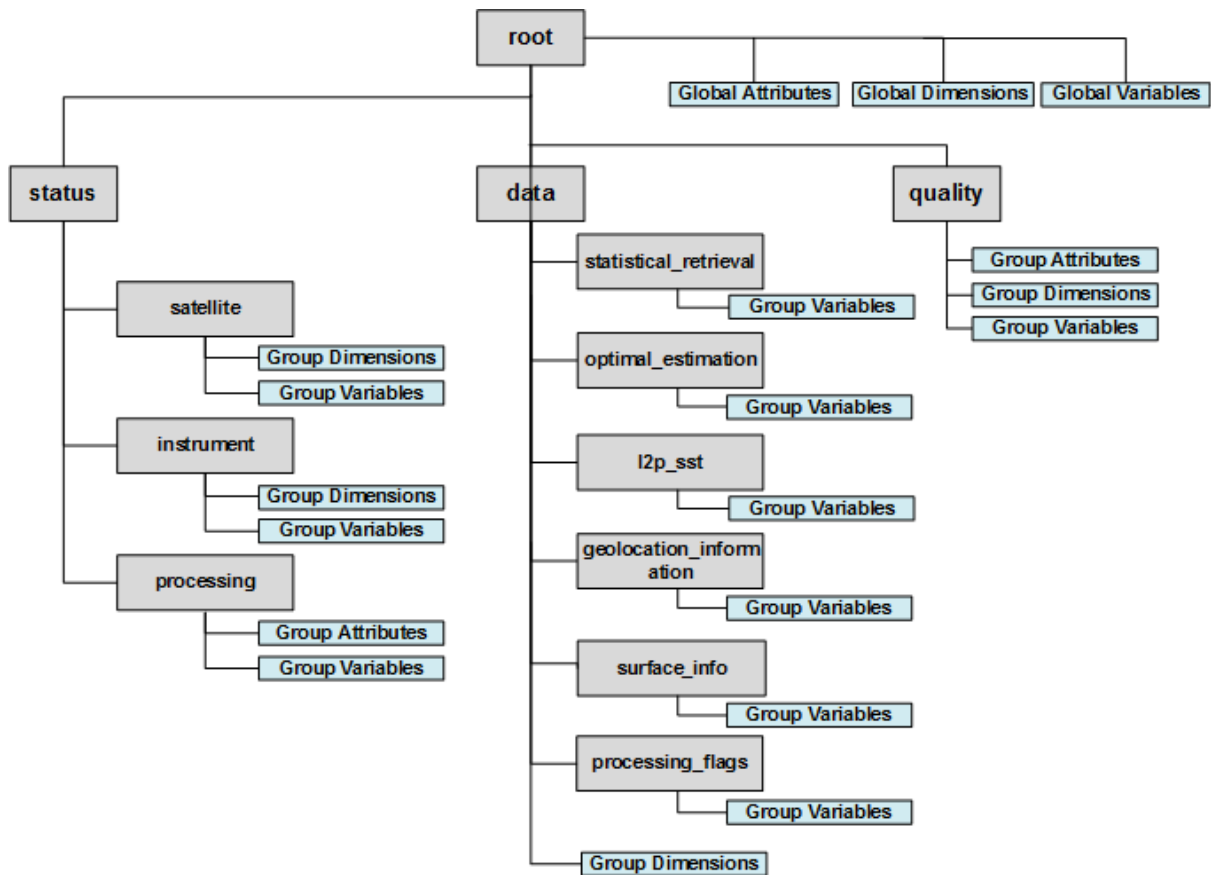


Figure 4.2: Overview of the groups in the IAS-02-SFC product

4.3.3 root

4.3.3.0.1 Attributes (global)

Attribute Name	Data Type	Meaning and/or Value
Conventions	string	CF-1.6
metadata_conventions	string	Unidata Dataset Discovery v1.0
product_name	string	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-SFC_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N R]_..nc
title	string	IAS Level 2 SFC
summary	string	The SFC product contains Sea surface temperature; Land and ice surface temperature and Land and ice surface emissivity (by-product).
doi	string	
keywords	string	IASI-NG; EPS-SG; Level 2; Infrared; Surface temperature; Surface emissivity
history	string	(original generated product aggregated product sub-setted product)
institution	string	EUMETSAT
spacecraft	string	Metop-SG A satellites:(SGA[1-3])

Attribute Name	Data Type	Meaning and/or Value
instrument	string	IAS
product_level	string	2
type	string	SFC
mission_type	string	(Global Regional Local)
disposition_mode	string	(Test Commissioning Operational Validation)
sensing_start_time_utc	string	YYYYMMDDhhmmss.ddd
sensing_end_time_utc	string	YYYYMMDDhhmmss.ddd
environment	string	(Operational Validation)
references	string	www.eumetsat.int
orbit_start	uint	Absolute orbit number at sensing_start_time_utc
orbit_end	uint	Absolute orbit number at sensing_end_time_utc

Table 4.20: Global Dimensions for IAS-02-SFC Product

4.3.3.0.2 Dimensions (global)

No global dimensions are envisaged.

4.3.3.0.3 Variables (global)

No global variables are envisaged.

4.3.4 status Group

4.3.4.1 satellite Group

4.3.4.1.1 satellite Attributes

No satellite attributes are envisaged.

4.3.4.1.2 satellite Dimensions

See (4.2.4.1.2).

4.3.4.1.3 satellite Variables

See (4.2.4.1.3).

4.3.4.2 instrument Group

4.3.4.2.1 instrument Attributes

No instrument attributes are envisaged.

4.3.4.2.2 instrument Dimensions

See (4.2.4.2.2).

4.3.4.2.3 instrument Variables

See (4.2.4.2.3).

4.3.4.3 processing Group

4.3.4.3.1 processing Attributes

See (4.2.4.3.1).

4.3.4.3.2 processing Dimensions

No processing dimensions are envisaged.

4.3.4.3.3 processing Variables

See (4.2.4.3.3).

4.3.5 data Group

4.3.5.0.1 data Attributes

No data attributes are envisaged

4.3.5.0.2 data Dimensions

Dimension Name	Comment	Dimension length
n_lines	number of considered lines in the orbit	383
n_for	number of considered acquisition in the BRC	14
n_fov	number of field of view in the field of regard	16
n_ems	number of wavelength for emissivity	12

Table 4.21: data: Dimensions for IAS-02-SFC Product

4.3.5.1 statistical_retrieval Group

4.3.5.1.1 statistical_retrieval Variables

Variables Name	Description	Type	Range or Value	Dimension
surface_temperature	A-priori surface skin temperature	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	A-priori surface skin temperature	—
units	Physical Units	string	K	—
valid_min	Minimum value	float	100	—
valid_max	Maximum value	float	400	—
missing_value	Missing value	float	3.4e+38	—
qi_surface_temperature	Quality indicator for a-priori surface skin temperature	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Quality indicator for a-priori surface skin temperature	—

Variables Name	Description	Type	Range or Value	Dimension
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	25	—
missing_value	Missing value	float	3.4e+38	—
surface_air_pressure	Surface pressure	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Surface pressure	—
units	Physical Units	string	hPa	—
valid_min	Minimum value	float	300	—
valid_max	Maximum value	float	1100	—
missing_value	Missing value	float	3.4e+38	—
qi_surface_air_pressure	Quality indicator for surface pressure	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Quality indicator for surface pressure	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	25	—
missing_value	Missing value	float	3.4e+38	—

Table 4.22: statistical_retrieval: Variables for IAS-02-SFC Product

4.3.5.2 optimal_estimation Group

4.3.5.2.1 optimal_estimation Variables

Variables Name	Description	Type	Range or Value	Dimension
surface_temperature	Surface temperature	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Surface temperature	—
units	Physical Units	string	K	—
valid_min	Minimum value	float	100	—
valid_max	Maximum value	float	400	—
missing_value	Missing value	float	3.4e+38	—
surface_emissivity	Surface emissivity	float	valid_min to valid_max	n_lines n_for n_fov n_ems
long_name	Description of the variables	string	Surface emissivity	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	1	—
missing_value	Missing value	float	3.4e+38	—

Table 4.23: optimal_estimation: Variables for IAS-02-SFC Product

4.3.5.3 I2p_sst Group

4.3.5.3.1 I2p_sst Variables

Variables Name	Description	Type	Range or Value	Dimension
cloud_signal	Predicted window channel Obs minus Calc	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Predicted window channel Obs minus Calc	—
units	Physical Units	string	K	—
missing_value	Missing value	float	3.4e+38	—
dust_indicator	Indicator of Dust (more likely for higher values)	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Indicator of Dust (more likely for higher values)	—
missing_value	Missing value	float	3.4e+38	—
wind_speed	10m wind speed	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	10m wind speed	—
units	Physical Units	string	m/s	—
missing_value	Missing value	float	3.4e+38	—

Table 4.24: I2p_sst: Variables for IAS-02-SFC Product

4.3.5.4 geolocation_information Group

4.3.5.4.1 geolocation_information Variables

Variables Name	Description	Type	Range or Value	Dimension
onboard_utc	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	double	valid_min to valid_max	n_lines n_for
long_name	Description of the variables	string	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	—
units	Physical Units	string	seconds	—
valid_min	Minimum value	double	-1000000000	—
valid_max	Maximum value	double	1000000000	—
missing_value	Missing value	double	-9000000000	—

Variables Name	Description	Type	Range or Value	Dimension
sounder_pixel_latitude	Latitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Latitude at sounder pixel centre	—
units	Physical Units	string	degrees_north	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.002746666	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_longitude	Longitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Longitude at sounder pixel centre	—
units	Physical Units	string	degrees_east	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.005493332	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_zenith	Measurement zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967295	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_azimuth	Measurement azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—
sounder_pixel_sun_zenith	Solar zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—

Variables Name	Description	Type	Range or Value	Dimension
valid_max	Maximum value	uint	4294967294	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_sun_azimuth	Solar azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-9	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—

Table 4.25: geolocation_information: Variables for IAS-02-SFC Product

4.3.5.5 surface_info Group

4.3.5.5.1 surface_info Variables

Variables Name	Description	Type	Range or Value	Dimension
land_fraction	Land fraction	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Land fraction	—
units	Physical Units	string	%	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	100	—
missing_value	Missing value	float	3.4e+38	—
height	Surface elevation	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Surface elevation	—
units	Physical Units	string	m	—
valid_min	Minimum value	float	-418	—
valid_max	Maximum value	float	8848	—
missing_value	Missing value	float	3.4e+38	—
height_std	Standard deviation of surface elevation	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Standard deviation of surface elevation	—
units	Physical Units	string	m	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	999	—

Variables Name	Description	Type	Range or Value	Dimension
missing_value	Missing value	float	3.4e+38	—
ice_fraction	Fraction of IFOV covered by sea ice	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Fraction of IFOV covered by sea ice	—
units	Physical Units	string	%	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	100	—
missing_value	Missing value	float	3.4e+38	—

Table 4.26: surface_info: Variables for IAS-02-SFC Product

4.3.5.6 processing_flags Group

4.3.5.6.1 processing_flags Variables

Variables Name	Description	Type	Range or Value	Dimension
flg_cldnes	Cloudiness assessment summary	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Cloudiness assessment summary	—
missing_value	Missing value	ubyte	255	—
flg_cldtst	Details of cloud tests executed and their results	ushort	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Details of cloud tests executed and their results	—
missing_value	Missing value	ushort	65535	—
flg_fgcheck	Check that geophysical parameters from the first guess are within bounds	ushort	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Check that geophysical parameters from the first guess are within bounds	—
missing_value	Missing value	ushort	65535	—
flg_iasibad	Availability and quality of IASI L1 measurements	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of IASI L1 measurements	—
missing_value	Missing value	ubyte	255	—

Variables Name	Description	Type	Range or Value	Dimension
flg_itrcld	Convergence and acceptance of the OEM cloud retrieval	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM cloud retrieval	–
missing_value	Missing value	ubyte	255	–
flg_itrems	Convergence and acceptance of the OEM surface emissivity retrieval	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM surface emissivity retrieval	–
missing_value	Missing value	ubyte	255	–
flg_itrlwp	Convergence and acceptance of the OEM cloud liquid water path retrieval	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM cloud liquid water path retrieval	–
missing_value	Missing value	ubyte	255	–
flg_itrtwo	Convergence and acceptance of the OEM simultaneous Temperature Humidity and Ozone retrievals	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM simultaneous Temperature Humidity and Ozone retrievals	–
missing_value	Missing value	ubyte	255	–
flg_metimbad	Availability and quality of MetImage measurements	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of MetImage measurements	–
missing_value	Missing value	ubyte	255	–
flg_mwsbad	Availability and quality of MWS measurements	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of MWS measurements	–

Variables Name	Description	Type	Range or Value	Dimension
missing_value	Missing value	ubyte	255	—
flg_nwpbad	Availability and quality of NWP data	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of NWP data	—
missing_value	Missing value	ubyte	255	—
flg_physcheck	Check for physical conditions in profiles	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Check for physical conditions in profiles	—
missing_value	Missing value	ubyte	255	—
flg_retcheck	Check that geophysical parameters from the OEM are within bounds	ushort	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Check that geophysical parameters from the OEM are within bounds	—
missing_value	Missing value	ushort	65535	—
flg_sunglnt	Identification of sun glint	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Identification of sun glint	—
missing_value	Missing value	ubyte	255	—

Table 4.27: processing_flags: Variables for IAS-02-SFC Product

4.3.6 quality Group

4.3.6.0.1 quality Attributes

See (4.2.6.0.1).

4.3.6.0.2 quality Dimensions

See (4.2.6.0.2).

4.3.6.0.3 quality Variables

See (4.2.6.0.3)

4.4 IAS-02-CLD

This section describes the detailed content of the NetCDF file, including groups, attributes, variables and dimensions applicable to the IAS-02-CLD product.

4.4.1 Product Summary Sheet

The table provides a summary for the IASI-NG Level 02 CLD product.

Filename	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-CLD_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N R]____.nc
Product ID	IAS-02-CLD
Product Description	"Cloud detection and fractional coverage from VII and IAS; Cloud top phase; Cloud top height /pressure; Cloud drop effective radius at cloud top (by-product) and Cloud liquid water path from MWS and IAS"
Format	netCDF-4
Size (MBytes/orbit)	see Appendix A
Duration	TBD

Table 4.28: IAS-02-CLD Product Summary Sheet

4.4.2 Overall Group Structure

The overall structure of the IASI-NG Level 02 CLD product is in accordance with [GPFS] and is shown in the figure 4.3.

Group dimensions, variables and attributes complement each subgroups in accordance with the NetCDF 4 model described in [GPFS].

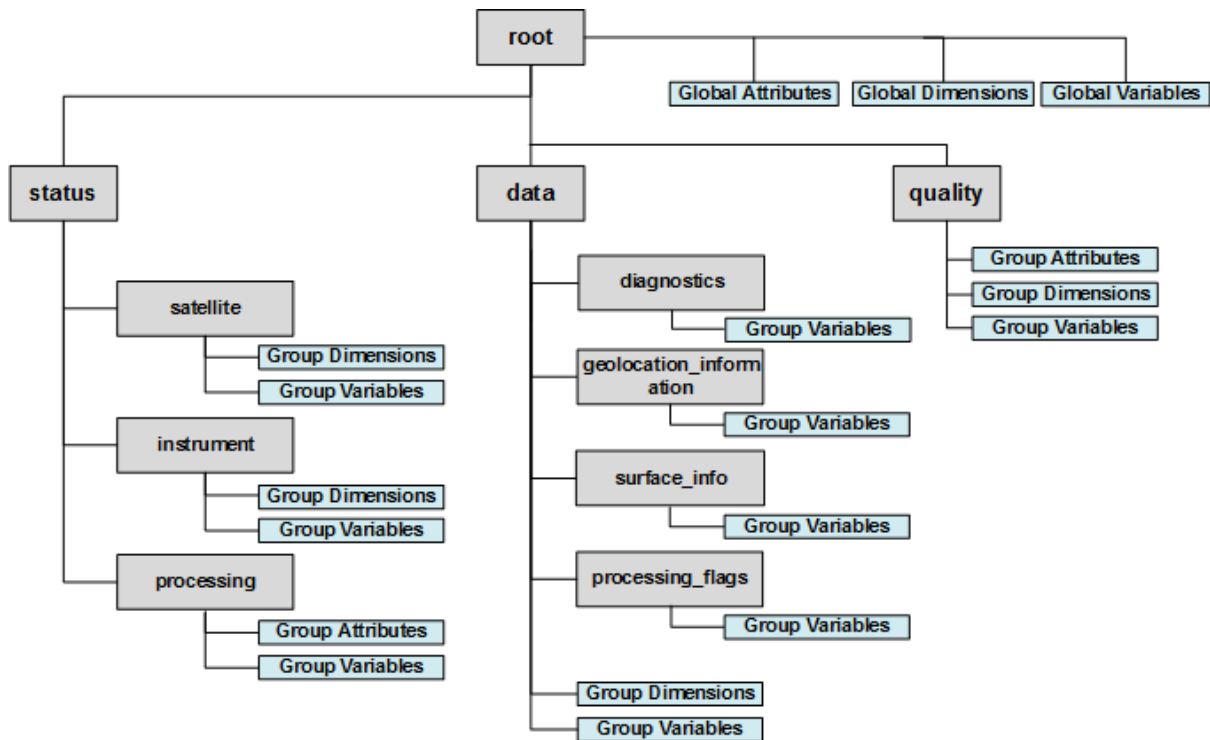


Figure 4.3: Overview of the groups in the IAS-02-CLD product

4.4.3 root

4.4.3.0.1 Attributes (global)

Attribute Name	Data Type	Meaning and/or Value
Conventions	string	CF-1.6
metadata_conventions	string	Unidata Dataset Discovery v1.0
product_name	string	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-CLD_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N R]_.nc
title	string	IAS Level 2 CLD
summary	string	The CLD product contains cloud detection from VII and IAS; Cloud fractional coverage from VII and IAS; Cloud top phase; Cloud top height /pressure; Cloud drop effective radius at cloud top (by-product) and Cloud liquid water path from MWS and IAS.
doi	string	
keywords	string	IASI-NG; EPS-SG; Level 2; Infrared; Cloud
history	string	(original generated product aggregated product sub-setted product)
institution	string	EUMETSAT
spacecraft	string	Metop-SG A satellites:(SGA[1-3])
instrument	string	IAS
product_level	string	2
type	string	CLD

Attribute Name	Data Type	Meaning and/or Value
mission_type	string	(Global Regional Local)
disposition_mode	string	(Test Commissioning Operational Validation)
sensing_start_time_utc	string	YYYYMMDDhhmmss.ddd
sensing_end_time_utc	string	YYYYMMDDhhmmss.ddd
environment	string	(Operational Validation)
references	string	www.eumetsat.int
orbit_start	uint	Absolute orbit number at sensing_start_time_utc
orbit_end	uint	Absolute orbit number at sensing_end_time_utc

Table 4.29: Global Dimensions for IAS-02-CLD Product

4.4.3.0.2 Dimensions (global)

No global dimensions are envisaged.

4.4.3.0.3 Variables (global)

No global variables are envisaged.

4.4.4 status Group

4.4.4.1 satellite Group

4.4.4.1.1 satellite Attributes

No satellite attributes are envisaged.

4.4.4.1.2 satellite Dimensions

See (4.2.4.1.2).

4.4.4.1.3 satellite Variables

See (4.2.4.1.3).

4.4.4.2 instrument Group

4.4.4.2.1 instrument Attributes

No instrument attributes are envisaged.

4.4.4.2.2 instrument Dimensions

See (4.2.4.2.2).

4.4.4.2.3 instrument Variables

See (4.2.4.2.3).

4.4.4.3 processing Group

4.4.4.3.1 processing Attributes

See (4.2.4.3.1).

4.4.4.3.2 processing Dimensions

No processing dimensions are envisaged.

4.4.4.3.3 processing Variables

See (4.2.4.3.3).

4.4.5 data Group

4.4.5.0.1 data Attributes

No data attributes are envisaged

4.4.5.0.2 data Dimensions

Dimension Name	Comment	Dimension length
n_lines	number of considered lines in the orbit	383
n_for	number of considered acquisition in the BRC	14
n_fov	number of field of view in the field of regard	16
n_cld	number of clouds	2
n_clevels	number of vertical levels for cloud liquid water vapour amount	1

Table 4.30: data: Dimensions for IAS-02-CLD Product

4.4.5.0.3 data Variables

Variables Name	Description	Type	Range or Value	Dimension
effective_cloud_fraction	Fractional cloud cover	float	valid_min to valid_max	n_lines n_for n_fov n_cld
long_name	Description of the variables	string	Fractional cloud cover	–
units	Physical Units	string	%	–
valid_min	Minimum value	float	0	–
valid_max	Maximum value	float	100	–
missing_value	Missing value	float	3.4e+38	–
air_temperature_at_cloud_top	Cloud top temperature	float	valid_min to valid_max	n_lines n_for n_fov n_cld
long_name	Description of the variables	string	Cloud top temperature	–
units	Physical Units	string	K	–
valid_min	Minimum value	float	100	–
valid_max	Maximum value	float	400	–
missing_value	Missing value	float	3.4e+38	–
air_pressure_at_cloud_top	Cloud top pressure	float	valid_min to valid_max	n_lines n_for n_fov n_cld
long_name	Description of the variables	string	Cloud top pressure	–
units	Physical Units	string	Pa	–
valid_min	Minimum value	float	2000	–
valid_max	Maximum value	float	110000	–
missing_value	Missing value	float	3.4e+38	–
thermodynamic_phase_of_cloud_water_particles_at_cloud_top	Cloud Phase (1=liquid 2 = ice 3 = mixed 0 = clear_sky 4 = super_cooled_liquid_water)	ubyte	valid_min to valid_max	n_lines n_for n_fov n_cld
long_name	Description of the variables	string	Cloud Phase (1=liquid 2 = ice 3 = mixed 0 = clear_sky 4 = super_cooled_liquid_water)	–
valid_min	Minimum value	ubyte	0	–
valid_max	Maximum value	ubyte	4	–
missing_value	Missing value	ubyte	255	–
atmosphere_mass_content_of_cloud_liquid	Cloud liquid water amount	float	valid_min to valid_max	n_lines n_for n_fov n_levels

Variables Name	Description	Type	Range or Value	Dimension
long_name	Description of the variables	string	Cloud liquid water amount	—
units	Physical Units	string	g m^{-2}	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	5	—
missing_value	Missing value	float	3.4e+38	—
atmosphere_mass_content_of_cloud_ice	Cloud ice amount (by product)	float	valid_min to valid_max	n_lines n_for n_fov n_levels
long_name	Description of the variables	string	Cloud ice amount (by product)	—
units	Physical Units	string	g m^{-2}	—
missing_value	Missing value	float	3.4e+38	—
effective_radius_of_cloud_condensed_water_particles_at_cloud_top	Cloud drop effective radius at cloud top	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Cloud drop effective radius at cloud top	—
units	Physical Units	string	m	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	0.0001	—
missing_value	Missing value	float	3.4e+38	—
dust_indicator	Indicator of dust (more likely for higher values)	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Indicator of dust (more likely for higher values)	—
missing_value	Missing value	float	3.4e+38	—

Table 4.31: data: Variables for IAS-02-CLD Product

4.4.5.1 diagnostics Group

4.4.5.1.1 diagnostics Variables

Variables Name	Description	Type	Range or Value	Dimension
cloud_signal	Predicted window channel Obs minus Calc	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Predicted window channel Obs minus Calc	—
units	Physical Units	string	K	—
missing_value	Missing value	float	3.4e+38	—

Variables Name	Description	Type	Range or Value	Dimension
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Table 4.32: diagnostics: Variables for IAS-02-CLD Product

4.4.5.2 geolocation_information Group

4.4.5.2.1 geolocation_information Variables

Variables Name	Description	Type	Range or Value	Dimension
onboard_utc	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	double	valid_min to valid_max	n_lines n_for
long_name	Description of the variables	string	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	—
units	Physical Units	string	seconds	—
valid_min	Minimum value	double	-1000000000	—
valid_max	Maximum value	double	1000000000	—
missing_value	Missing value	double	-9000000000	—
sounder_pixel_latitude	Latitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Latitude at sounder pixel centre	—
units	Physical Units	string	degrees_north	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.002746666	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_longitude	Longitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Longitude at sounder pixel centre	—
units	Physical Units	string	degrees_east	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.005493332	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_zenith	Measurement zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967295	—

Variables Name	Description	Type	Range or Value	Dimension
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_azimuth	Measurement azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—
sounder_pixel_sun_zenith	Solar zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967294	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_sun_azimuth	Solar azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-9	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—

Table 4.33: geolocation_information: Variables for IAS-02-CLD Product

4.4.5.3 surface_info Group

4.4.5.3.1 surface_info Variables

Variables Name	Description	Type	Range or Value	Dimension
land_fraction	Land fraction	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Land fraction	—
units	Physical Units	string	%	—

Variables Name	Description	Type	Range or Value	Dimension
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	100	—
missing_value	Missing value	float	3.4e+38	—
height	Surface elevation	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Surface elevation	—
units	Physical Units	string	m	—
valid_min	Minimum value	float	-418	—
valid_max	Maximum value	float	8848	—
missing_value	Missing value	float	3.4e+38	—
height_std	Standard deviation of surface elevation	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Standard deviation of surface elevation	—
units	Physical Units	string	m	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	999	—
missing_value	Missing value	float	3.4e+38	—
ice_fraction	Fraction of IFOV covered by sea ice	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Fraction of IFOV covered by sea ice	—
units	Physical Units	string	%	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	100	—
missing_value	Missing value	float	3.4e+38	—

Table 4.34: surface_info: Variables for IAS-02-CLD Product

4.4.5.4 processing_flags Group

4.4.5.4.1 processing_flags Variables

Variables Name	Description	Type	Range or Value	Dimension
flg_cldnes	Cloudiness assessment summary	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Cloudiness assessment summary	—
missing_value	Missing value	ubyte	255	—
flg_cldtst	Details of cloud tests executed and their results	ushort	valid_min to valid_max	n_lines n_for n_fov

Variables Name	Description	Type	Range or Value	Dimension
long_name	Description of the variables	string	Details of cloud tests executed and their results	–
missing_value	Missing value	ushort	65535	–
flg_fgcheck	Check that geophysical parameters from the first guess are within bounds	ushort	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Check that geophysical parameters from the first guess are within bounds	–
missing_value	Missing value	ushort	65535	–
flg_iasibad	Availability and quality of IASI L1 measurements	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of IASI L1 measurements	–
missing_value	Missing value	ubyte	255	–
flg_itrclid	Convergence and acceptance of the OEM cloud retrieval	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM cloud retrieval	–
missing_value	Missing value	ubyte	255	–
flg_itrems	Convergence and acceptance of the OEM surface emissivity retrieval	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM surface emissivity retrieval	–
missing_value	Missing value	ubyte	255	–
flg_itrlwp	Convergence and acceptance of the OEM cloud liquid water path retrieval	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM cloud liquid water path retrieval	–
missing_value	Missing value	ubyte	255	–

Variables Name	Description	Type	Range or Value	Dimension
flg_itrtwo	Convergence and acceptance of the OEM simultaneous Temperature Humidity and Ozone retrievals	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM simultaneous Temperature Humidity and Ozone retrievals	—
missing_value	Missing value	ubyte	255	—
flg_metimbad	Availability and quality of MetImage measurements	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of MetImage measurements	—
missing_value	Missing value	ubyte	255	—
flg_mwsbad	Availability and quality of MWS measurements	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of MWS measurements	—
missing_value	Missing value	ubyte	255	—
flg_nwpbad	Availability and quality of NWP data	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of NWP data	—
missing_value	Missing value	ubyte	255	—
flg_physcheck	Check for physical conditions in profiles	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Check for physical conditions in profiles	—
missing_value	Missing value	ubyte	255	—
flg_retcheck	Check that geophysical parameters from the OEM are within bounds	ushort	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Check that geophysical parameters from the OEM are within bounds	—
missing_value	Missing value	ushort	65535	—

Variables Name	Description	Type	Range or Value	Dimension
flg_sunglnt	Identification of sun glint	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Identification of sun glint	—
missing_value	Missing value	ubyte	255	—

Table 4.35: processing_flags: Variables for IAS-02-CLD Product

4.4.6 quality Group

4.4.6.0.1 quality Attributes

See (4.2.6.0.1).

4.4.6.0.2 quality Dimensions

See (4.2.6.0.2).

4.4.6.0.3 quality Variables

See (4.2.6.0.3)

4.5 IAS-02-O3_

This section describes the detailed content of the NetCDF file, including groups, attributes, variables and dimensions applicable to the IAS-02-O3_ product.

4.5.1 Product Summary Sheet

The table provides a summary for the IASI-NG Level 02 O3_ product.

Filename	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-O3__C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N IR]_.nc
Product ID	IAS-02-O3_
Product Description	Ozone profile and Ozone total column
Format	netCDF-4
Size (MBytes/orbit)	see Appendix A
Duration	TBD

Table 4.36: IAS-02-O3_ Product Summary Sheet

4.5.2 Overall Group Structure

The overall structure of the IASI-NG Level 02 O3_ product is in accordance with [GPFS] and is shown in the figure 4.4.

Group dimensions, variables and attributes complement each subgroup as in accordance with the NetCDF 4 model described in [GPFS].

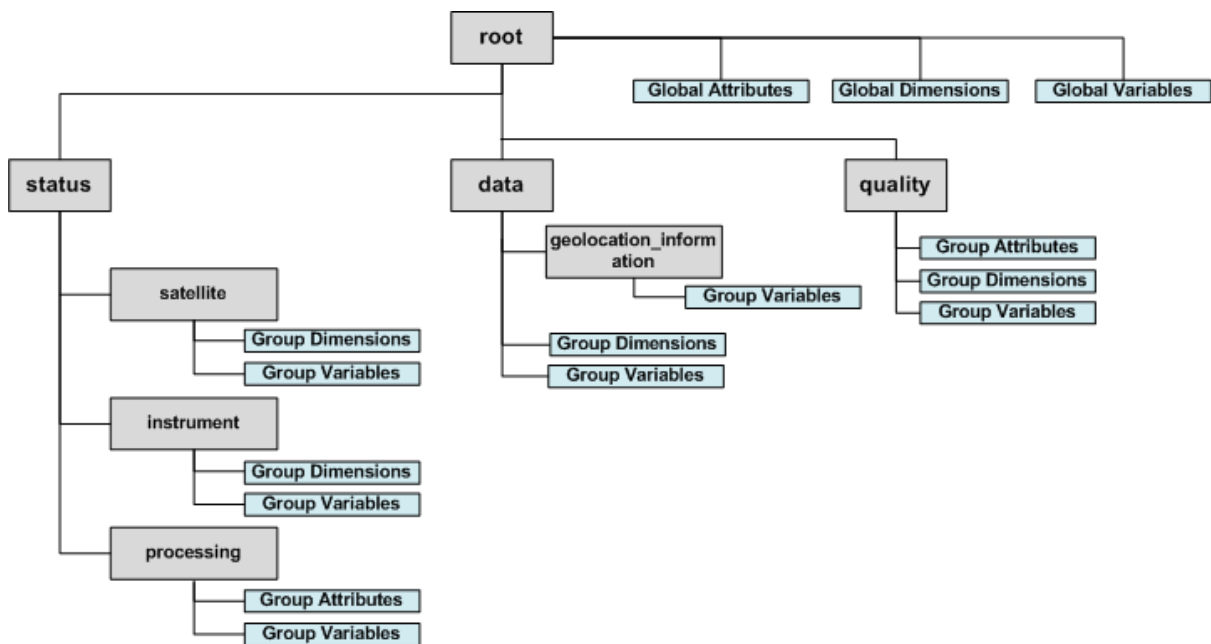


Figure 4.4: Overview of the groups in the IAS-02-O3_ product

4.5.3 root

4.5.3.0.1 Attributes (global)

Attribute Name	Data Type	Meaning and/or Value
Conventions	string	CF-1.6
metadata_conventions	string	Unidata Dataset Discovery v1.0
product_name	string	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-O3_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N IR]__.nc
title	string	IAS Level 2 O3_
summary	string	The O3_ product contains Ozone profile and Ozone total column informations.
doi	string	
keywords	string	IASI-NG; EPS-SG; Level 2; Infrared; Ozone
history	string	(original generated product aggregated product sub-setted product)
institution	string	EUMETSAT
spacecraft	string	Metop-SG A satellites: (SGA[1-3])
instrument	string	IAS
product_level	string	2
type	string	O3_
mission_type	string	(Global Regional Local)
disposition_mode	string	(Test Commissioning Operational Validation)
sensing_start_time_utc	string	YYYYMMDDhhmmss.ddd
sensing_end_time_utc	string	YYYYMMDDhhmmss.ddd
environment	string	(Operational Validation)
references	string	www.eumetsat.int
orbit_start	uint	Absolute orbit number at sensing_start_time_utc
orbit_end	uint	Absolute orbit number at sensing_end_time_utc

Table 4.37: Global Dimensions for IAS-02-O3_ Product

4.5.3.0.2 Dimensions (global)

No global dimensions are envisaged.

4.5.3.0.3 Variables (global)

No global variables are envisaged.

4.5.4 status Group

4.5.4.1 satellite Group

4.5.4.1.1 satellite Attributes

No satellite attributes are envisaged.

4.5.4.1.2 satellite Dimensions

See (4.2.4.1.2).

4.5.4.1.3 satellite Variables

See (4.2.4.1.3).

4.5.4.2 instrument Group

4.5.4.2.1 instrument Attributes

No instrument attributes are envisaged.

4.5.4.2.2 instrument Dimensions

See (4.2.4.2.2).

4.5.4.2.3 instrument Variables

See (4.2.4.2.3).

4.5.4.3 processing Group

4.5.4.3.1 processing Attributes

See (4.2.4.3.1).

4.5.4.3.2 processing Dimensions

No processing dimensions are envisaged.

4.5.4.3.3 processing Variables

See (4.2.4.3.3).

4.5.5 data Group

4.5.5.0.1 data Attributes

No data attributes are envisaged

4.5.5.0.2 data Dimensions

Dimension Name	Comment	Dimension length
n_lines	number of considered lines in the orbit	383
n_for	number of considered acquisition in the BRC	14
n_fov	number of field of view in the field of regard	16
nl_o3	number of partial layers for O3	<60
n_o3	number of O3 retrievals in granule	≤85792
nev_o3	maximum number of elements in the O3 sensitivity matrix eigenvectors	≤1800

Table 4.38: data: Dimensions for IAS-02-O3_Product

4.5.5.0.3 data Variables

Variables Name	Description	Type	Range or Value	Dimension
surface_z	Altitude of surface	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Altitude of surface	–
units	Physical Units	string	m	–
valid_min	Minimum value	float	-700	–
valid_max	Maximum value	float	9000	–
missing_value	Missing value	float	3.4e+38	–
o3_qflag	General retrieval quality flag	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	General retrieval quality flag	–
missing_value	Missing value	ubyte	255	–
o3_bdiv	Retrieval flags	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Retrieval flags	–
missing_value	Missing value	uint		–
o3_nzca	Number of vectors describing the characterization matrices	byte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Number of vectors describing the characterization matrices	–
valid_min	Minimum value	byte	0	–
valid_max	Maximum value	byte	100	–
missing_value	Missing value	byte	127	–
o3_nfitlayers	Number of layers actually retrieved	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Number of layers actually retrieved	–
valid_min	Minimum value	ubyte	0	–
valid_max	Maximum value	ubyte	100	–
missing_value	Missing value	ubyte	255	–
o3_nbr	Number of O3 profiles retrieved in scan-line	ubyte	valid_min to valid_max	n_lines
long_name	Description of the variables	string	Number of O3 profiles retrieved in scan-line	–
valid_min	Minimum value	ubyte	0	–
valid_max	Maximum value	ubyte	120	–

Variables Name	Description	Type	Range or Value	Dimension
missing_value	Missing value	ubyte	255	—
o3_pc_air	Air partial columns on each retrieved layer	float	valid_min to valid_max	n_o3 nl_o3
long_name	Description of the variables	string	Air partial columns on each retrieved layer	—
units	Physical Units	string	molecules/cm ²	—
valid_min	Minimum value	float	1e+19	—
valid_max	Maximum value	float	1e+27	—
missing_value	Missing value	float	3.4e+38	—
o3_pc_o3_a	A-priori partial columns for O3 en each retrieved layer	float	valid_min to valid_max	n_o3 nl_o3
long_name	Description of the variables	string	A-priori partial columns for O3 en each retrieved layer	—
units	Physical Units	string	molecules/cm ²	—
valid_min	Minimum value	float	1e+14	—
valid_max	Maximum value	float	1e+20	—
missing_value	Missing value	float	3.4e+38	—
o3_x_o3	Scaling vector multiplying the a-priori O3 vector in order to define the retrieved O3 vector.	float	valid_min to valid_max	n_o3 nl_o3
long_name	Description of the variables	string	Scaling vector multiplying the a-priori O3 vector in order to define the retrieved O3 vector.	—
valid_min	Minimum value	float	0.01	—
valid_max	Maximum value	float	100	—
missing_value	Missing value	float	3.4e+38	—
o3_h_eigenvectors	Main eigenvectors of the sensitivity matrix	float	valid_min to valid_max	n_o3 nev_o3
long_name	Description of the variables	string	Main eigenvectors of the sensitivity matrix	—
missing_value	Missing value	float	3.4e+38	—
atmosphere_mass_content_of_ozone	Integrated ozone	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Integrated ozone	—
units	Physical Units	string	kg.m ⁻²	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	11	—
missing_value	Missing value	float	3.4e+38	—

Variables Name	Description	Type	Range or Value	Dimension
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Table 4.39: data: Variables for IAS-02-O3_ Product

4.5.5.1 geolocation_information Group

4.5.5.1.1 geolocation_information Variables

Variables Name	Description	Type	Range or Value	Dimension
onboard_utc	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	double	valid_min to valid_max	n_lines n_for
long_name	Description of the variables	string	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	—
units	Physical Units	string	seconds	—
valid_min	Minimum value	double	-1000000000	—
valid_max	Maximum value	double	1000000000	—
missing_value	Missing value	double	-9000000000	—
sounder_pixel_latitude	Latitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Latitude at sounder pixel centre	—
units	Physical Units	string	degrees_north	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.002746666	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_longitude	Longitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Longitude at sounder pixel centre	—
units	Physical Units	string	degrees_east	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.005493332	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_zenith	Measurement zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967295	—

Variables Name	Description	Type	Range or Value	Dimension
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_azimuth	Measurement azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—
sounder_pixel_sun_zenith	Solar zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967294	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_sun_azimuth	Solar azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-9	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—

Table 4.40: geolocation_information: Variables for IAS-02-O3_Product

4.5.6 quality Group

4.5.6.0.1 quality Attributes

See (4.2.6.0.1).

4.5.6.0.2 quality Dimensions

See (4.2.6.0.2).

4.5.6.0.3 quality Variables

See (4.2.6.0.3)

4.6 IAS-02-CO_

This section describes the detailed content of the NetCDF file, including groups, attributes, variables and dimensions applicable to the IAS-02-CO_ product.

4.6.1 Product Summary Sheet

The table provides a summary for the IASI-NG Level 02 CO_ product.

Filename	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-CO_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_[T C O V]_[N IR]_.nc
Product ID	IAS-02-CO_
Product Description	Carbon monoxide profile and carbon monoxide partial column
Format	netCDF-4
Size (MBytes/orbit)	see Appendix A
Duration	TBD

Table 4.41: IAS-02-CO_ Product Summary Sheet

4.6.2 Overall Group Structure

The overall structure of the IASI-NG Level 02 CO_ product is in accordance with [GPFS] and is shown in the figure 4.5.

Group dimensions, variables and attributes complement each subgroup as in accordance with the NetCDF 4 model described in [GPFS].

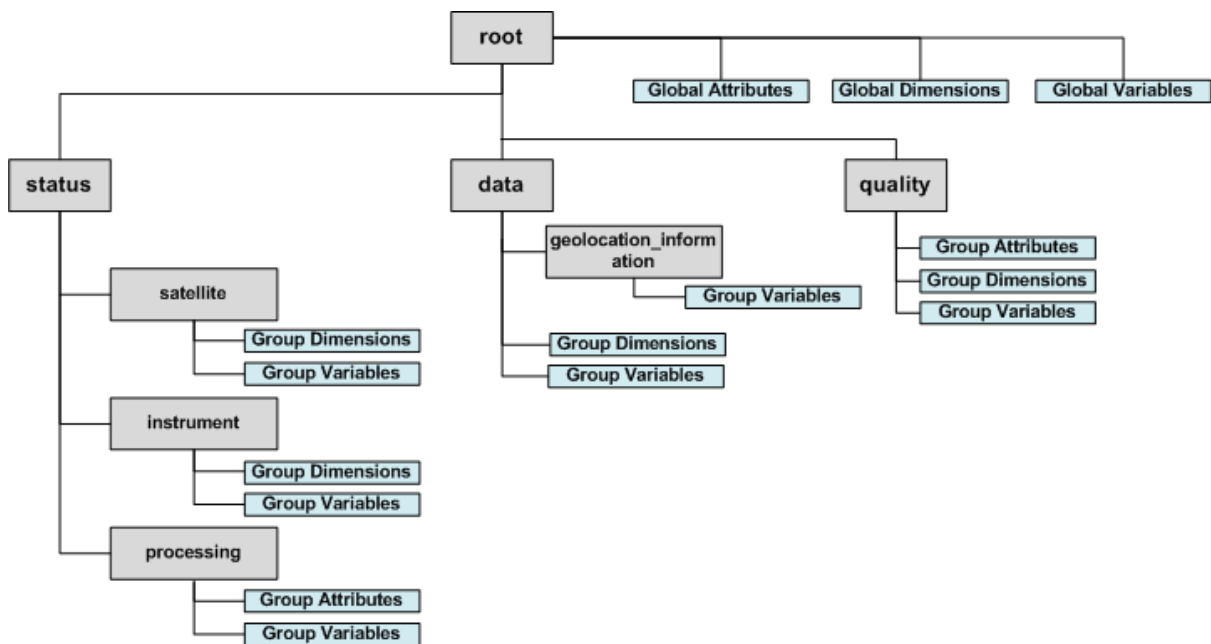


Figure 4.5: Overview of the groups in the IAS-02-CO_ product

4.6.3 root

4.6.3.0.1 Attributes (global)

Attribute Name	Data Type	Meaning and/or Value
Conventions	string	CF-1.6
metadata_conventions	string	Unidata Dataset Discovery v1.0
product_name	string	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-CO_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N R]_.nc
title	string	IAS Level CO_
summary	string	The CO_ product contains carbon monoxide informations.
doi	string	digital object identifier
keywords	string	IASI-NG; EPS-SG; Level 2; Infrared; Carbon Monoxide
history	string	(original generated product aggregated product sub-setted product)
institution	string	EUMETSAT
spacecraft	string	Metop-SG A satellites:(SGA[1-3])
instrument	string	IAS
product_level	string	2
type	string	CO_
mission_type	string	(Global Regionall Local)
disposition_mode	string	(Test Commissioning Operational Validation)
sensing_start_time_utc	string	YYYYMMDDhhmmss.ddd
sensing_end_time_utc	string	YYYYMMDDhhmmss.ddd
environment	string	(Operational Validation)
references	string	www.eumetsat.int
orbit_start	uint	Absolute orbit number at sensing_start_time_utc
orbit_end	uint	Absolute orbit number at sensing_end_time_utc

Table 4.42: Global Dimensions for IAS-02-CO_ Product

4.6.3.0.2 Dimensions (global)

No global dimensions are envisaged.

4.6.3.0.3 Variables (global)

No global variables are envisaged.

4.6.4 status Group

4.6.4.1 satellite Group

4.6.4.1.1 satellite Attributes

No satellite attributes are envisaged.

4.6.4.1.2 satellite Dimensions

See (4.2.4.1.2).

4.6.4.1.3 satellite Variables

See (4.2.4.1.3).

4.6.4.2 instrument Group

4.6.4.2.1 instrument Attributes

No instrument attributes are envisaged.

4.6.4.2.2 instrument Dimensions

See (4.2.4.2.2).

4.6.4.2.3 instrument Variables

See (4.2.4.2.3).

4.6.4.3 processing Group

4.6.4.3.1 processing Attributes

See (4.2.4.3.1).

4.6.4.3.2 processing Dimensions

No processing dimensions are envisaged.

4.6.4.3.3 processing Variables

See (4.2.4.3.3).

4.6.5 data Group

4.6.5.0.1 data Attributes

No data attributes are envisaged

4.6.5.0.2 data Dimensions

Dimension Name	Comment	Dimension length
n_lines	number of considered lines in the orbit	383
n_for	number of considered acquisition in the BRC	14
n_fov	number of field of view in the field of regard	16
nl_co	number of partial layers for CO	<30
n_co	number of CO retrievals in granule	≤85792
nev_co	maximum number of elements in the CO sensitivity matrix eigenvectors	≤450

Table 4.43: data: Dimensions for IAS-02-CO_ Product

4.6.5.0.3 data Variables

Variables Name	Description	Type	Range or Value	Dimension
surface_z	Altitude of surface	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Altitude of surface	–
units	Physical Units	string	m	–
valid_min	Minimum value	float	-700	–
valid_max	Maximum value	float	9000	–
missing_value	Missing value	float	3.4e+38	–
co_qflag	General retrieval quality flag	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	General retrieval quality flag	–
missing_value	Missing value	ubyte	255	–
co_bdiv	Retrieval flags	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Retrieval flags	–
missing_value	Missing value	uint	4294967295	–
co_npca	Number of vectors describing the characterization matrices	byte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Number of vectors describing the characterization matrices	–
valid_min	Minimum value	byte	0	–
valid_max	Maximum value	byte	100	–
missing_value	Missing value	byte	127	–
co_nftlayers	Number of layers actually retrieved	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Number of layers actually retrieved	–
valid_min	Minimum value	ubyte	0	–
valid_max	Maximum value	ubyte	100	–
missing_value	Missing value	ubyte	255	–
co_nbr	Number of CO profiles retrieved in scan-line	ubyte	valid_min to valid_max	n_lines
long_name	Description of the variables	string	Number of CO profiles retrieved in scan-line	–
valid_min	Minimum value	ubyte	0	–
valid_max	Maximum value	ubyte	120	–

Variables Name	Description	Type	Range or Value	Dimension
missing_value	Missing value	ubyte	255	—
co_pc_air	Air partial columns on each retrieved layer	float	valid_min to valid_max	n_co nl_co
long_name	Description of the variables	string	Air partial columns on each retrieved layer	—
units	Physical Units	string	molecules/ cm ²	—
valid_min	Minimum value	float	1e+19	—
valid_max	Maximum value	float	1e+27	—
missing_value	Missing value	float	3.4e+38	—
co_pc_co_a	A-priori partial columns for CO on each retrieved layer	float	valid_min to valid_max	n_co nl_co
long_name	Description of the variables	string	A-priori partial columns for CO on each retrieved layer	—
units	Physical Units	string	molecules/cm ²	—
valid_min	Minimum value	float	1e+14	—
valid_max	Maximum value	float	1e+20	—
missing_value	Missing value	float	3.4e+38	—
co_x_co	Scaling vector multiplying the a-priori CO vector in order to define the retrieved CO vector.	float	valid_min to valid_max	n_co nl_co
long_name	Description of the variables	string	Scaling vector multiplying the a-priori CO vector in order to define the retrieved CO vector.	—
valid_min	Minimum value	float	0.01	—
valid_max	Maximum value	float	100	—
missing_value	Missing value	float	3.4e+38	—
co_h_eigenvectors	Main eigenvectors of the sensitivity matrix	float	valid_min to valid_max	n_co nev_co
long_name	Description of the variables	string	Main eigenvectors of the sensitivity matrix	—
valid_min	Minimum value	float	-999	—
valid_max	Maximum value	float	999	—
missing_value	Missing value	float	3.4e+38	—
atmosphere_mass_content_of_carbon_monoxide	Integrated CO	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Integrated CO	—
units	Physical Units	string	kg.m ⁻²	—
valid_min	Minimum value	float	0	—

Variables Name	Description	Type	Range or Value	Dimension
valid_max	Maximum value	float	11	—
missing_value	Missing value	float	3.4e+38	—

Table 4.44: data: Variables for IAS-02-CO_ Product

4.6.5.1 geolocation_information Group

4.6.5.1.1 geolocation_information Variables

Variables Name	Description	Type	Range or Value	Dimension
onboard_utc	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	double	valid_min to valid_max	n_lines n_for
long_name	Description of the variables	string	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	—
units	Physical Units	string	seconds	—
valid_min	Minimum value	double	-1000000000	—
valid_max	Maximum value	double	1000000000	—
missing_value	Missing value	double	-9000000000	—
sounder_pixel_latitude	Latitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Latitude at sounder pixel centre	—
units	Physical Units	string	degrees_north	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.002746666	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_longitude	Longitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Longitude at sounder pixel centre	—
units	Physical Units	string	degrees_east	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.005493332	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_zenith	Measurement zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement zenith angle at sounder pixel centre	—

Variables Name	Description	Type	Range or Value	Dimension
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967295	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_azimuth	Measurement azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—
sounder_pixel_sun_zenith	Solar zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967294	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_sun_azimuth	Solar azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-9	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—

Table 4.45: geolocation_information: Variables for IAS-02-CO_Product

4.6.6 quality Group

4.6.6.0.1 quality Attributes

See (4.2.6.0.1).

4.6.6.0.2 quality Dimensions

See (4.2.6.0.2).

4.6.6.0.3 quality Variables

See (4.2.6.0.3)

4.7 IAS-02-SO2

This section describes the detailed content of the NetCDF file, including groups, attributes, variables and dimensions applicable to the IAS-02-SO2 product.

4.7.1 Product Summary Sheet

The table provides a summary for the IASI-NG Level 02 SO2 product.

Filename	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-SO2_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N IR]_.nc
Product ID	IAS-02-SO2
Product Description	Sulphur Dioxide total column
Format	netCDF-4
Size (MBytes/orbit)	see Appendix A
Duration	TBD

Table 4.46: IAS-02-SO2 Product Summary Sheet

4.7.2 Overall Group Structure

The overall structure of the IASI-NG Level 02 SO2 product is in accordance with [GPFS] and is shown in the figure 4.6.

Group dimensions, variables and attributes complement each subgroups in accordance with the NetCDF 4 model described in [GPFS].

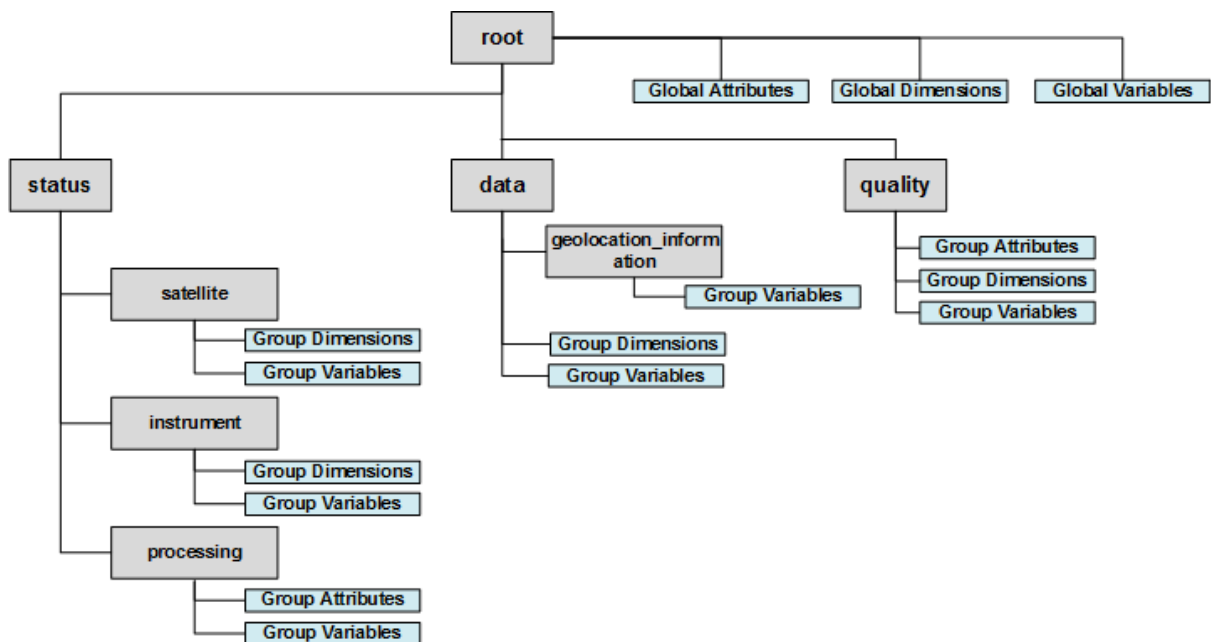


Figure 4.6: Overview of the groups in the IAS-02-SO2 product

4.7.3 root

4.7.3.0.1 Attributes (global)

Attribute Name	Data Type	Meaning and/or Value
Conventions	string	CF-1.6
metadata_conventions	string	Unidata Dataset Discovery v1.0
product_name	string	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-SO2_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N R]__.nc
title	string	IAS Level 2 SO2
summary	string	The SO2 product contains sulphur dioxide informations.
doi	string	digital object identifier
keywords	string	IASI-NG; EPS-SG; Level 2; Infrared; Sulphur dioxide
history	string	(original generated product aggregated product sub-setted product)
institution	string	EUMETSAT
spacecraft	string	Metop-SG A satellites:(SGA[1-3])
instrument	string	IAS
product_level	string	2
type	string	SO2
mission_type	string	(Global Regional Local)
disposition_mode	string	(Test Commissioning Operational Validation)
sensing_start_time_utc	string	YYYYMMDDhhmmss.ddd
sensing_end_time_utc	string	YYYYMMDDhhmmss.ddd
environment	string	(Operational Validation)
references	string	www.eumetsat.int
orbit_start	uint	Absolute orbit number at sensing_start_time_utc
orbit_end	uint	Absolute orbit number at sensing_end_time_utc

Table 4.47: Global Dimensions for IAS-02-SO2 Product

4.7.3.0.2 Dimensions (global)

No global dimensions are envisaged.

4.7.3.0.3 Variables (global)

No global variables are envisaged.

4.7.4 status Group

4.7.4.1 satellite Group

4.7.4.1.1 satellite Attributes

No satellite attributes are envisaged.

4.7.4.1.2 satellite Dimensions

See (4.2.4.1.2).

4.7.4.1.3 satellite Variables

See (4.2.4.1.3).

4.7.4.2 instrument Group

4.7.4.2.1 instrument Attributes

No instrument attributes are envisaged.

4.7.4.2.2 instrument Dimensions

See (4.2.4.2.2).

4.7.4.2.3 instrument Variables

See (4.2.4.2.3).

4.7.4.3 processing Group

4.7.4.3.1 processing Attributes

See (4.2.4.3.1).

4.7.4.3.2 processing Dimensions

No processing dimensions are envisaged.

4.7.4.3.3 processing Variables

See (4.2.4.3.3).

4.7.5 data Group

4.7.5.0.1 data Attributes

No data attributes are envisaged

4.7.5.0.2 data Dimensions

Dimension Name	Comment	Dimension length
n_lines	number of considered lines in the orbit	383
n_for	number of considered acquisition in the BRC	14
n_fov	number of field of view in the field of regard	16
n_alt	number of estimated SO2 plume height	5

Table 4.48: data: Dimensions for IAS-02-SO2 Product

4.7.5.0.3 data Variables

Variables Name	Description	Type	Range or Value	Dimension
so2_qflag	General retrieval quality flag	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	General retrieval quality flag	–
missing_value	Missing value	ubyte		–
so2_col_at_altitudes	SO2 column for a plume at different estimated altitudes	float	valid_min to valid_max	n_lines n_for n_fov n_alt
long_name	Description of the variables	string	SO2 column for a plume at different estimated altitudes	–
units	Physical Units	string	DU	–
valid_min	Minimum value	float	0	–
valid_max	Maximum value	float	500	–
missing_value	Missing value	float	3.4e+38	–
so2_altitude	Retrieved plume altitude	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Retrieved plume altitude	–
units	Physical Units	string	m	–
valid_min	Minimum value	float	0	–
valid_max	Maximum value	float	20000	–
missing_value	Missing value	float	3.4e+38	–
so2_col	SO2 column at the retrieved plume altitude from an OEM approach	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	SO2 column at the retrieved plume altitude from an OEM approach	–
units	Physical Units	string	DU	–
valid_min	Minimum value	float	0	–
valid_max	Maximum value	float	500	–
missing_value	Missing value	float	3.4e+38	–
so2_bt_difference	Indicative brightness temperature difference	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Indicative brightness temperature difference	–
units	Physical Units	string	K	–
valid_min	Minimum value	float	-100	–
valid_max	Maximum value	float	100	–

Variables Name	Description	Type	Range or Value	Dimension
missing_value	Missing value	float	3.4e+38	—

Table 4.49: data: Variables for IAS-02-SO2 Product

4.7.5.1 geolocation_information Group

4.7.5.1.1 geolocation_information Variables

Variables Name	Description	Type	Range or Value	Dimension
onboard_utc	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	double	valid_min to valid_max	n_lines n_for
long_name	Description of the variables	string	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	—
units	Physical Units	string	seconds	—
valid_min	Minimum value	double	-1000000000	—
valid_max	Maximum value	double	1000000000	—
missing_value	Missing value	double	-9000000000	—
sounder_pixel_latitude	Latitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Latitude at sounder pixel centre	—
units	Physical Units	string	degrees_north	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.002746666	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_longitude	Longitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Longitude at sounder pixel centre	—
units	Physical Units	string	degrees_east	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.005493332	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_zenith	Measurement zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—

Variables Name	Description	Type	Range or Value	Dimension
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967295	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_azimuth	Measurement azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—
sounder_pixel_sun_zenith	Solar zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967294	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_sun_azimuth	Solar azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-9	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—

Table 4.50: geolocation_information: Variables for IAS-02-SO2 Product

4.7.6 quality Group

4.7.6.0.1 quality Attributes

See (4.2.6.0.1).

4.7.6.0.2 quality Dimensions

See (4.2.6.0.2).

4.7.6.0.3 quality Variables

See (4.2.6.0.3)

4.8 IAS-02-NAC

This section describes the detailed content of the NetCDF file, including groups, attributes, variables and dimensions applicable to the IAS-02-NAC product.

4.8.1 Product Summary Sheet

The table provides a summary for the IASI-NG Level 02 NAC product.

Filename	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-NAC_C_EUMT_YYYYMMDDhhmmss_[G IR L]_[O V IID E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N IR]_...nc
Product ID	IAS-02-NAC
Product Description	Nitric acid partial column
Format	netCDF-4
Size (MBytes/orbit)	see Appendix A
Duration	TBD

Table 4.51: IAS-02-NAC Product Summary Sheet

4.8.2 Overall Group Structure

The overall structure of the IASI-NG Level 02 NAC product is in accordance with [GPFS] and is shown in the figure 4.7.

Group dimensions, variables and attributes complement each subgroup as in accordance with the NetCDF 4 model described in [GPFS].

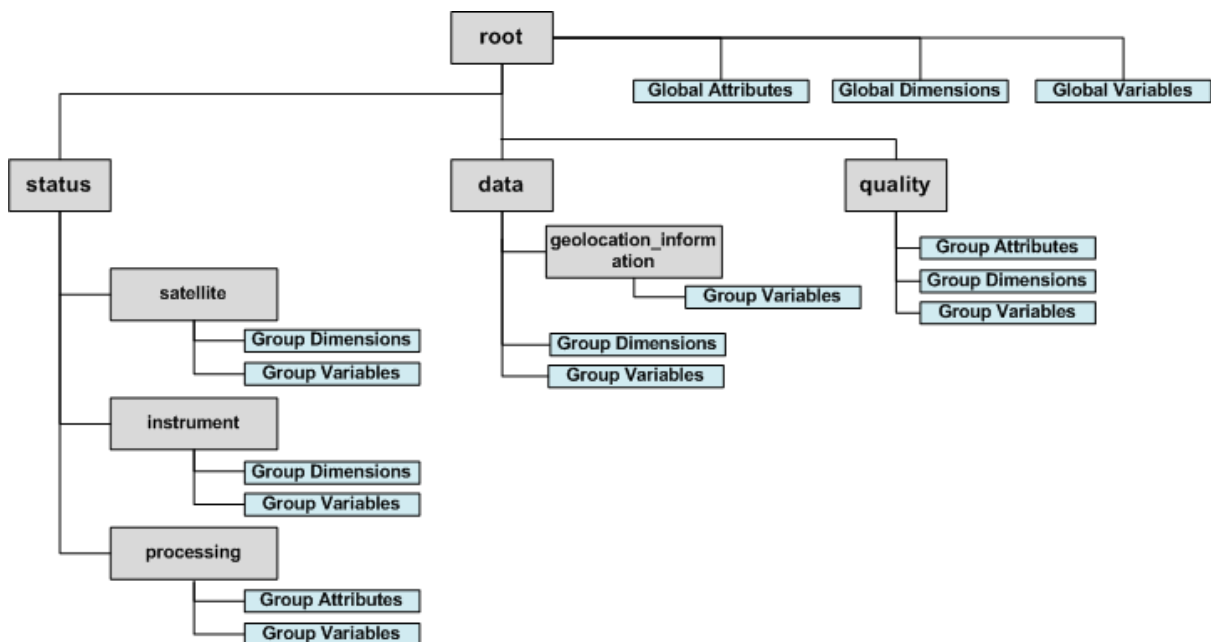


Figure 4.7: Overview of the groups in the IAS-02-NAC product

4.8.3 root

4.8.3.0.1 Attributes (global)

Attribute Name	Data Type	Meaning and/or Value
Conventions	string	CF-1.6
metadata_conventions	string	Unidata Dataset Discovery v1.0
product_name	string	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-NAC_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N R]_.nc
title	string	IAS Level 2 NAC
summary	string	The NAC product contains nitric acid partial column informations.
doi	string	digital object identifier
keywords	string	IASI-NG; EPS-SG; Level 2; Infrared; Nitric acid
history	string	(original generated product aggregated product sub-setted product)
institution	string	EUMETSAT
spacecraft	string	Metop-SG A satellites:(SGA[1-3])
instrument	string	IAS
product_level	string	2
type	string	NAC
mission_type	string	(Global Regional Local)
disposition_mode	string	(Test Commissioning Operational Validation)
sensing_start_time_utc	string	YYYYMMDDhhmmss.ddd
sensing_end_time_utc	string	YYYYMMDDhhmmss.ddd
environment	string	(Operational Validation)
references	string	www.eumetsat.int
orbit_start	uint	Absolute orbit number at sensing_start_time_utc
orbit_end	uint	Absolute orbit number at sensing_end_time_utc

Table 4.52: Global Dimensions for IAS-02-NAC Product

4.8.3.0.2 Dimensions (global)

No global dimensions are envisaged.

4.8.3.0.3 Variables (global)

No global variables are envisaged.

4.8.4 status Group

4.8.4.1 satellite Group

4.8.4.1.1 satellite Attributes

No satellite attributes are envisaged.

4.8.4.1.2 satellite Dimensions

See (4.2.4.1.2).

4.8.4.1.3 satellite Variables

See (4.2.4.1.3).

4.8.4.2 instrument Group

4.8.4.2.1 instrument Attributes

No instrument attributes are envisaged.

4.8.4.2.2 instrument Dimensions

See (4.2.4.2.2).

4.8.4.2.3 instrument Variables

See (4.2.4.2.3).

4.8.4.3 processing Group

4.8.4.3.1 processing Attributes

See (4.2.4.3.1).

4.8.4.3.2 processing Dimensions

No processing dimensions are envisaged.

4.8.4.3.3 processing Variables

See (4.2.4.3.3).

4.8.5 data Group

4.8.5.0.1 data Attributes

No data attributes are envisaged

4.8.5.0.2 data Dimensions

Dimension Name	Comment	Dimension length
n_lines	number of considered lines in the orbit	383
n_for	number of considered acquisition in the BRC	14
n_fov	number of field of view in the field of regard	16
nl_hno3	number of partial layers for HNO3	<60
n_hno3	number of HNO3 retrievals in granule	≤85792
nev_hno3	maximum number of elements in the HNO3 sensitivity matrix eigenvectors	≤1800

Table 4.53: data: Dimensions for IAS-02-NAC Product

4.8.5.0.3 data Variables

Variables Name	Description	Type	Range or Value	Dimension
surface_z	Altitude of surface	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Altitude of surface	—
units	Physical Units	string	m	—
valid_min	Minimum value	float	-700	—
valid_max	Maximum value	float	9000	—
missing_value	Missing value	float	3.4e+38	—
hno3_qflag	General retrieval quality flag	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	General retrieval quality flag	—
missing_value	Missing value	ubyte	255	—
hno3_bdiv	Retrieval flags	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Retrieval flags	—
missing_value	Missing value	uint		—
hno3_npca	Number of vectors describing the characterization matrices	byte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Number of vectors describing the characterization matrices	—
valid_min	Minimum value	byte	0	—
valid_max	Maximum value	byte	100	—
missing_value	Missing value	byte	127	—
hno3_nftlayers	Number of layers actually retrieved	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Number of layers actually retrieved	—
valid_min	Minimum value	ubyte	0	—
valid_max	Maximum value	ubyte	100	—
missing_value	Missing value	ubyte	255	—
hno3_nbr	Number of HNO3 profiles retrieved in scanline	ubyte	valid_min to valid_max	n_lines
long_name	Description of the variables	string	Number of HNO3 profiles retrieved in scanline	—
valid_min	Minimum value	ubyte	0	—
valid_max	Maximum value	ubyte	120	—

Variables Name	Description	Type	Range or Value	Dimension
missing_value	Missing value	ubyte	255	—
hno3_pc_air	Air partial columns on each retrieved layer	float	valid_min to valid_max	n_hno3 nl_hno3
long_name	Description of the variables	string	Air partial columns on each retrieved layer	—
units	Physical Units	string	molecules/cm ²	—
valid_min	Minimum value	float	1e+19	—
valid_max	Maximum value	float	1e+27	—
missing_value	Missing value	float	3.4e+38	—
hno3_pc_hno3_a	A-priori partial columns for HNO3 in each retrieved layer	float	valid_min to valid_max	n_hno3 nl_hno3
long_name	Description of the variables	string	A-priori partial columns for HNO3 in each retrieved layer	—
units	Physical Units	string	molecules/cm ²	—
valid_min	Minimum value	float	1e+10	—
valid_max	Maximum value	float	1e+17	—
missing_value	Missing value	float	3.4e+38	—
hno3_x_hno3	Scaling vector multiplying the a-priori HNO3 vector in order to define the retrieved HNO3 vector.	float	valid_min to valid_max	n_hno3 nl_hno3
long_name	Description of the variables	string	Scaling vector multiplying the a-priori HNO3 vector in order to define the retrieved HNO3 vector.	—
valid_min	Minimum value	float	0.01	—
valid_max	Maximum value	float	100	—
missing_value	Missing value	float	3.4e+38	—
hno3_h_eigenvectors	Main eigenvectors of the sensitivity matrix	float	valid_min to valid_max	n_hno3 nev_hno3
long_name	Description of the variables	string	Main eigenvectors of the sensitivity matrix	—
valid_min	Minimum value	float	-999	—
valid_max	Maximum value	float	999	—
missing_value	Missing value	float	3.4e+38	—
atmosphere_mass_content_of_ammonia	Integrated NH3	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Integrated NH3	—
units	Physical Units	string	kg.m ⁻²	—
valid_min	Minimum value	float	0	—

Variables Name	Description	Type	Range or Value	Dimension
valid_max	Maximum value	float	11	—
missing_value	Missing value	float	3.4e+38	—

Table 4.54: data: Variables for IAS-02-NAC Product

4.8.5.1 geolocation_information Group

4.8.5.1.1 geolocation_information Variables

Variables Name	Description	Type	Range or Value	Dimension
onboard_utc	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	double	valid_min to valid_max	n_lines n_for
long_name	Description of the variables	string	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	—
units	Physical Units	string	seconds	—
valid_min	Minimum value	double	-1000000000	—
valid_max	Maximum value	double	1000000000	—
missing_value	Missing value	double	-9000000000	—
sounder_pixel_latitude	Latitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Latitude at sounder pixel centre	—
units	Physical Units	string	degrees_north	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.002746666	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_longitude	Longitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Longitude at sounder pixel centre	—
units	Physical Units	string	degrees_east	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.005493332	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_zenith	Measurement zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement zenith angle at sounder pixel centre	—

Variables Name	Description	Type	Range or Value	Dimension
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967295	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_azimuth	Measurement azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—
sounder_pixel_sun_zenith	Solar zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967294	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_sun_azimuth	Solar azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-9	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—

Table 4.55: geolocation_information: Variables for IAS-02-NAC Product

4.8.6 quality Group

4.8.6.0.1 quality Attributes

See (4.2.6.0.1).

4.8.6.0.2 quality Dimensions

See (4.2.6.0.2).

4.8.6.0.3 quality Variables

See (4.2.6.0.3)

4.9 IAS-02-GHG

This section describes the detailed content of the NetCDF file, including groups, attributes, variables and dimensions applicable to the IAS-02-GHG product.

4.9.1 Product Summary Sheet

The table provides a summary for the IASI-NG Level 02 GHG product.

Filename	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-GHG_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N R]_..nc
Product ID	IAS-02-GHG
Product Description	Methane partial column and Nitrous oxide total column
Format	netCDF-4
Size (MBytes/orbit)	see Appendix A
Duration	TBD

Table 4.56: IAS-02-GHG Product Summary Sheet

4.9.2 Overall Group Structure

The overall structure of the IASI-NG Level 02 GHG product is in accordance with [GPFS] and is shown in the figure 4.8.

Group dimensions, variables and attributes complement each subgroup as in accordance with the NetCDF 4 model described in [GPFS].

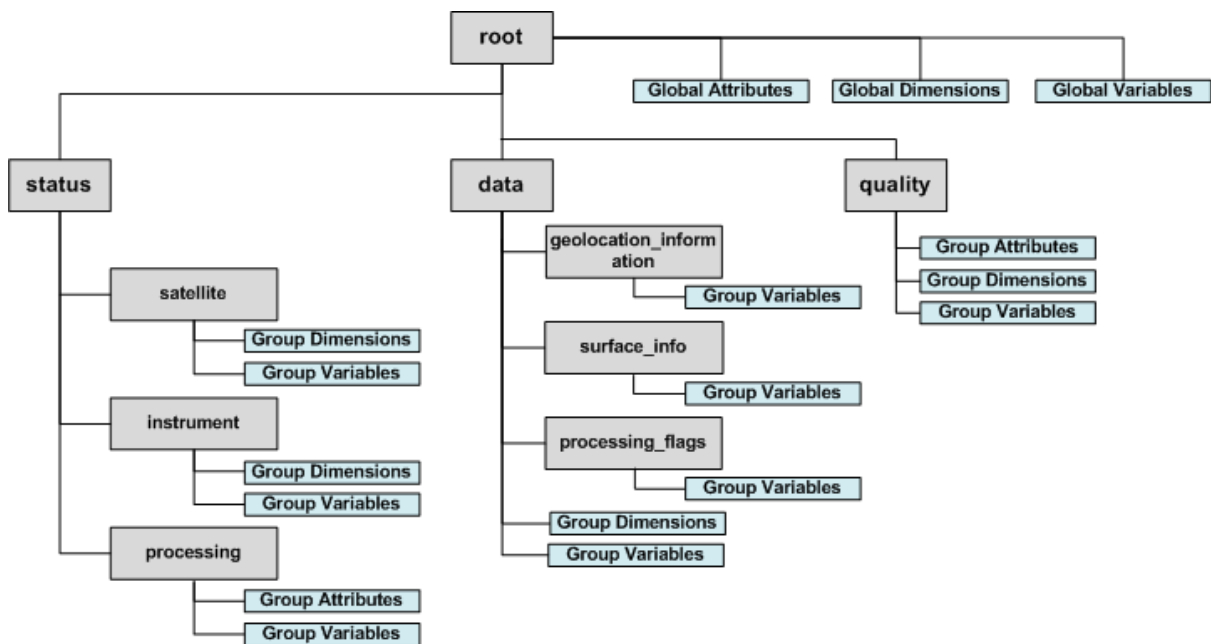


Figure 4.8: Overview of the groups in the IAS-02-GHG product

4.9.3 root

4.9.3.0.1 Attributes (global)

Attribute Name	Data Type	Meaning and/or Value
Conventions	string	CF-1.6
metadata_conventions	string	Unidata Dataset Discovery v1.0
product_name	string	W_xx-eumetsat-darmstadt,SAT,SGA[1-3]-IAS-02-GHG_C_EUMT_YYYYMMDDhhmmss_[G R L]_[O V I D E]_YYYYMMDDhhmmss_YYYYMMDDhhmmss_[T C O V]_[N I R]__.nc
title	string	IAS Level 2 GHG
summary	string	The GHG product contains Green-house gas columns for Methane partial column and Nitrous oxide total column informations.
doi	string	
keywords	string	IASI-NG; EPS-SG; Level 2; Infrared; Green-house gas
history	string	(original generated product aggregated product sub-setted product)
institution	string	EUMETSAT
spacecraft	string	Metop-SG A satellites: (SGA[1-3])
instrument	string	IAS
product_level	string	2
type	string	GHG
mission_type	string	(Global Regional Local)
disposition_mode	string	(Test Commissioning Operational Validation)
sensing_start_time_utc	string	YYYYMMDDhhmmss.ddd
sensing_end_time_utc	string	YYYYMMDDhhmmss.ddd
environment	string	(Operational Validation)
references	string	www.eumetsat.int
orbit_start	uint	Absolute orbit number at sensing_start_time_utc
orbit_end	uint	Absolute orbit number at sensing_end_time_utc

Table 4.57: Global Dimensions for IAS-02-GHG Product

4.9.3.0.2 Dimensions (global)

No global dimensions are envisaged.

4.9.3.0.3 Variables (global)

No global variables are envisaged.

4.9.4 status Group

4.9.4.1 satellite Group

4.9.4.1.1 satellite Attributes

No satellite attributes are envisaged.

4.9.4.1.2 satellite Dimensions

See (4.2.4.1.2).

4.9.4.1.3 satellite Variables

See (4.2.4.1.3).

4.9.4.2 instrument Group

4.9.4.2.1 instrument Attributes

No instrument attributes are envisaged.

4.9.4.2.2 instrument Dimensions

See (4.2.4.2.2).

4.9.4.2.3 instrument Variables

See (4.2.4.2.3).

4.9.4.3 processing Group

4.9.4.3.1 processing Attributes

See (4.2.4.3.1).

4.9.4.3.2 processing Dimensions

No processing dimensions are envisaged.

4.9.4.3.3 processing Variables

See (4.2.4.3.3).

4.9.5 data Group

4.9.5.0.1 data Attributes

No data attributes are envisaged

4.9.5.0.2 data Dimensions

Dimension Name	Comment	Dimension length
n_lines	number of considered lines in the orbit	383
n_for	number of considered acquisition in the BRC	14
n_fov	number of field of view in the field of regard	16
n_n2o	number of levels for nitrous oxide	≤ 5
n_ch4	number of levels for methane	≤ 5
n_co2	number of levels for carbon dioxide	≤ 5

Table 4.58: data: Dimensions for IAS-02-GHG Product

4.9.5.0.3 data Variables

Variables Name	Description	Type	Range or Value	Dimension
atmosphere_mass_content_of_nitrous_oxide	Coarse N2O profile	float	valid_min to valid_max	n_lines n_for n_fov n_n2o
long_name	Description of the variables	string	Coarse N2O profile	–
units	Physical Units	string	kg.m ⁻²	–
valid_min	Minimum value	float	0	–
valid_max	Maximum value	float	25	–
missing_value	Missing value	float	3.4e+38	–
atmosphere_mass_content_of_methane	Coarse CH4 profile	float	valid_min to valid_max	n_lines n_for n_fov n_ch4
long_name	Description of the variables	string	Coarse CH4 profile	–
units	Physical Units	string	kg.m ⁻²	–
valid_min	Minimum value	float	0	–
valid_max	Maximum value	float	25	–
missing_value	Missing value	float	3.4e+38	–
atmosphere_mass_content_of_carbon_dioxide	Coarse CO2 profile	float	valid_min to valid_max	n_lines n_for n_fov n_co2
long_name	Description of the variables	string	Coarse CO2 profile	–
units	Physical Units	string	kg.m ⁻²	–
valid_min	Minimum value	float	0	–
valid_max	Maximum value	float	25	–
missing_value	Missing value	float	3.4e+38	–

Table 4.59: data: Variables for IAS-02-GHG Product

4.9.5.1 geolocation_information Group

4.9.5.1.1 geolocation_information Variables

Variables Name	Description	Type	Range or Value	Dimension
onboard_utc	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	double	valid_min to valid_max	n_lines n_for
long_name	Description of the variables	string	On-board time in UTC since 2020-01-01 00:00:00 for each FOR within BRC	–

Variables Name	Description	Type	Range or Value	Dimension
units	Physical Units	string	seconds	—
valid_min	Minimum value	double	-1000000000	—
valid_max	Maximum value	double	1000000000	—
missing_value	Missing value	double	-9000000000	—
sounder_pixel _latitude	Latitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Latitude at sounder pixel centre	—
units	Physical Units	string	degrees_north	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.002746666	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel _longitude	Longitude at sounder pixel centre	short	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Longitude at sounder pixel centre	—
units	Physical Units	string	degrees_east	—
valid_min	Minimum value	short	-32767	—
valid_max	Maximum value	short	32767	—
scale_factor	Scale factor	float	0.005493332	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	short	-32768	—
sounder_pixel_zenith	Measurement zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967295	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel _azimuth	Measurement azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Measurement azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—

Variables Name	Description	Type	Range or Value	Dimension
sounder_pixel_sun_zenith	Solar zenith angle at sounder pixel centre	uint	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar zenith angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	uint	0	—
valid_max	Maximum value	uint	4294967294	—
scale_factor	Scale factor	float	2.09548e-8	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	uint	4294967295	—
sounder_pixel_sun_azimuth	Solar azimuth angle at sounder pixel centre	int	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Solar azimuth angle at sounder pixel centre	—
units	Physical Units	string	degrees	—
valid_min	Minimum value	int	-2147483647	—
valid_max	Maximum value	int	2147483647	—
scale_factor	Scale factor	float	8.3819e-9	—
add_offset	Offset	float	0.0	—
missing_value	Missing value	int	-2147483648	—

Table 4.60: geolocation_information: Variables for IAS-02-GHG Product

4.9.5.2 surface_info Group

4.9.5.2.1 surface_info Variables

Variables Name	Description	Type	Range or Value	Dimension
land_fraction	Land fraction	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Land fraction	—
units	Physical Units	string	%	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	100	—
missing_value	Missing value	float	3.4e+38	—
height	Surface elevation	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Surface elevation	—
units	Physical Units	string	m	—
valid_min	Minimum value	float	-418	—
valid_max	Maximum value	float	8848	—
missing_value	Missing value	float	3.4e+38	—

Variables Name	Description	Type	Range or Value	Dimension
height_std	Standard deviation of surface elevation	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Standard deviation of surface elevation	—
units	Physical Units	string	m	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	999	—
missing_value	Missing value	float	3.4e+38	—
ice_fraction	Fraction of IFOV covered by sea ice	float	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Fraction of IFOV covered by sea ice	—
units	Physical Units	string	%	—
valid_min	Minimum value	float	0	—
valid_max	Maximum value	float	100	—
missing_value	Missing value	float	3.4e+38	—

Table 4.61: surface_info: Variables for IAS-02-GHG Product

4.9.5.3 processing_flags Group

4.9.5.3.1 processing_flags Variables

Variables Name	Description	Type	Range or Value	Dimension
flg_cldnes	Cloudiness assessment summary	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Cloudiness assessment summary	—
missing_value	Missing value	ubyte	255	—
flg_cldtst	Details of cloud tests executed and their results	ushort	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Details of cloud tests executed and their results	—
missing_value	Missing value	ushort	65535	—
flg_fgcheck	Check that geophysical parameters from the first guess are within bounds	ushort	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Check that geophysical parameters from the first guess are within bounds	—

Variables Name	Description	Type	Range or Value	Dimension
missing_value	Missing value	ushort	65535	–
flg_iasibad	Availability and quality of IASI L1 measurements	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of IASI L1 measurements	–
missing_value	Missing value	ubyte	255	–
flg_itrcld	Convergence and acceptance of the OEM cloud retrieval	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM cloud retrieval	–
missing_value	Missing value	ubyte	255	–
flg_itrems	Convergence and acceptance of the OEM surface emissivity retrieval	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM surface emissivity retrieval	–
missing_value	Missing value	ubyte	255	–
flg_itrlwp	Convergence and acceptance of the OEM cloud liquid water path retrieval	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM cloud liquid water path retrieval	–
missing_value	Missing value	ubyte	255	–
flg_itrtwo	Convergence and acceptance of the OEM simultaneous Temperature Humidity and Ozone retrievals	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Convergence and acceptance of the OEM simultaneous Temperature Humidity and Ozone retrievals	–
missing_value	Missing value	ubyte	255	–
flg_metimbad	Availability and quality of MetImage measurements	ubyte	valid_min to valid_max	n_lines n_for n_fov

Variables Name	Description	Type	Range or Value	Dimension
long_name	Description of the variables	string	Availability and quality of MetImage measurements	–
missing_value	Missing value	ubyte	255	–
flg_mwsbad	Availability and quality of MWS measurements	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of MWS measurements	–
missing_value	Missing value	ubyte	255	–
flg_nwpbad	Availability and quality of NWP data	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Availability and quality of NWP data	–
missing_value	Missing value	ubyte	255	–
flg_physcheck	Check for physical conditions in profiles	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Check for physical conditions in profiles	–
missing_value	Missing value	ubyte	255	–
flg_retcheck	Check that geophysical parameters from the OEM are within bounds	ushort	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Check that geophysical parameters from the OEM are within bounds	–
missing_value	Missing value	ushort	65535	–
flg_sunglint	Identification of sun glint	ubyte	valid_min to valid_max	n_lines n_for n_fov
long_name	Description of the variables	string	Identification of sun glint	–
missing_value	Missing value	ubyte	255	–

Table 4.62: processing_flags: Variables for IAS-02-GHG Product

4.9.6 quality Group

4.9.6.0.1 quality Attributes

See (4.2.6.0.1).

4.9.6.0.2 quality Dimensions

See (4.2.6.0.2).

4.9.6.0.3 quality Variables

See (4.2.6.0.3)

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5 PRODUCT FORMAT VERSION CONTROL

This section provides Product Format Version Control Numbers for each IAS product defined within this document. This version is reflected in the following global attribute present in each EPS-SG mission product centrally generated as described in the [GPFS].

5.1 IAS-02-TWV Format Version Control

Product ID	Product Format Version Control Number (format_version)	Product Format Specification Issue (pfs_reference_and_version)	Generic Product Format Specification Issue (gpfs_reference_and_version)
IAS-02-TWV	0.0	1C	1E
IAS-02-TWV	1.0	2C	1H
IAS-02-TWV	2.0	2H	2A
IAS-02-TWV	3.0	3A	3B
IAS-02-TWV	3.1	3B	3B
IAS-02-TWV	4.0	3C	3C

5.2 IAS-02-SFC Format Version Control

Product ID	Product Format Version Control Number (format_version)	Product Format Specification Issue (pfs_reference_and_version)	Generic Product Format Specification Issue (gpfs_reference_and_version)
IAS-02-SFC	0.0	1C	1E
IAS-02-SFC	1.0	2C	1H
IAS-02-SFC	2.0	2H	2A
IAS-02-SFC	3.0	3A	3B
IAS-02-SFC	3.1	3B	3B
IAS-02-SFC	4.0	3C	3C

5.3 IAS-02-CLD Format Version Control

Product ID	Product Format Version Control Number (format_version)	Product Format Specification Issue (pfs_reference_and_version)	Generic Product Format Specification Issue (gpfs_reference_and_version)
IAS-02-CLD	0.0	1C	1E
IAS-02-CLD	1.0	2C	1H
IAS-02-CLD	2.0	2H	2A
IAS-02-CLD	3.0	3A	3B
IAS-02-CLD	3.1	3B	3B
IAS-02-CLD	4.0	3C	3C

5.4 IAS-02-O3_ Format Version Control

Product ID	Product Format Version Control Number (format_version)	Product Format Specification Issue (pfs_reference_and_version)	Generic Product Format Specification Issue (gpfs_reference_and_version)
IAS-02-O3_	0.0	1C	1E
IAS-02-O3_	1.0	2C	1H
IAS-02-O3_	2.0	2H	2A
IAS-02-O3_	3.0	3A	3B
IAS-02-O3_	3.1	3B	3B
IAS-02-O3_	4.0	3C	3C

5.5 IAS-02-CO_ Format Version Control

Product ID	Product Format Version Control Number (format_version)	Product Format Specification Issue (pfs_reference_and_version)	Generic Product Format Specification Issue (gpfs_reference_and_version)
IAS-02-CO_	0.0	1C	1E
IAS-02-CO_	1.0	2C	1H
IAS-02-CO_	2.0	2H	2A
IAS-02-CO_	3.0	3A	3B
IAS-02-CO_	3.1	3B	3B
IAS-02-CO_	4.0	3C	3C

5.6 IAS-02-SO2 Format Version Control

Product ID	Product Format Version Control Number (format_version)	Product Format Specification Issue (pfs_reference_and_version)	Generic Product Format Specification Issue (gpfs_reference_and_version)
IAS-02-SO2	0.0	1C	1E
IAS-02-SO2	1.0	2C	1H
IAS-02-SO2	2.0	2H	2A
IAS-02-SO2	3.0	3A	3B
IAS-02-SO2	3.1	3B	3B
IAS-02-SO2	4.0	3C	3C

5.7 IAS-02-NAC Format Version Control

Product ID	Product Format Version Control Number (format_version)	Product Format Specification Issue (pfs_reference_and_version)	Generic Product Format Specification Issue (gpfs_reference_and_version)
IAS-02-NAC	0.0	1C	1E
IAS-02-NAC	1.0	2C	1H
IAS-02-NAC	2.0	2H	2A
IAS-02-NAC	3.0	3A	3B
IAS-02-NAC	3.1	3B	3B
IAS-02-NAC	4.0	3C	3C

5.8 IAS-02-GHG Format Version Control

Product ID	Product Format Version Control Number (format_version)	Product Format Specification Issue (pfs_reference_and_version)	Generic Product Format Specification Issue (gpfs_reference_and_version)
IAS-02-GHG	0.0	1C	1E
IAS-02-GHG	1.0	2C	1H
IAS-02-GHG	2.0	2H	2A
IAS-02-GHG	3.0	3A	3B
IAS-02-GHG	3.1	3B	3B
IAS-02-GHG	4.0	3C	3C

A SIZE OF EPS-SG IASI-NG LEVEL 2 PRODUCTS

Note that some products fields (in the TWV, O3, CO and NAC products) are for clear sky only and that therefore their sizes depend on the fraction of clear sky FOVs within the orbit. For these size computations, we have assumed 25% of clear sky FOVs.

Product ID	Product Description	size(MB/Orbit)
IAS-02-TWV	Temperature profile, Water vapour profile and water vapour total column from IAS and MWS	313
IAS-02-SFC	Surface temperature (sea), Surface temperature (land and ice) and Land and ice surface emissivity	12
IAS-02-CLD	Cloud detection and fractional coverage from VII and IAS, cloud top phase, cloud top height/pressure, cloud drop effective radius at cloud top (by-product), cloud liquid water path from MWS and IAS	8
IAS-02-O3_	Ozone profile and Ozone total column	167
IAS-02-CO_	Carbone Monoxide profile and Carbon monoxide partial column	49
IAS-02-SO2	Sulphur Dioxide total column	6
IAS-02-NAC	Nitric Acid partial column	167
IAS-02-GHG	Methane partial column and Nitrous oxide total column	11
	TOTAL	733

B XML DESCRIPTION OF EPS-SG IASI-NG LEVEL 2 PRODUCTS

The XML format is in the following files:

C BUFR FORMAT DESCRIPTION OF EPS-SG IASI-NG LEVEL 2 PRODUCTS

This section includes the BUFR specification of the 8 different IASI-NG L2 products.

C.1 IAS-02-TWV

References	Element	Variable(s) from NetCDF	Notes
Identification			
301005	Originating centre /sub-centre	254, 0	
001007	SATELLITE IDENTIFIER	/spacecraft	
002019	SATELLITE INSTRUMENTS	IASI-NG	
002020	SATELLITE CLASSIFICATION	EUMETSAT Second Generation Programme (EPS-SG)	
025060	SOFTWARE IDENTIFICATION	/status/processing /processor-_name,version,mode	
301011	Year, month, day	/data/geolocation/onboard-_utc	
301013	Hour, minute, second	/data/geolocation/onboard-_utc	
005040	ORBIT NUMBER	/orbit_start	Change to orbit_end as needed, BUFR is pixel-sharp
Viewing geometry			
201133	Change width		
005041	SCAN LINE NUMBER	/data/n_lines	
201000	Cancel		
005045	Field of regard number	/data/n_for	
005043	Field of view number	/data/n_fov	
301021	Lat/lon (high accuracy)	/data/geolocation/sounder-_pixel_lat,longitude	
202126	CHANGE SCALE		
007001	HEIGHT OF STATION	Convert from /satellite orbital elements to height over ground	
202000	CANCEL		
007024	SATELLITE ZENITH ANGLE	/data/geolocation/sounder-_pixel_zenith	
005021	BEARING OR AZIMUTH (DEGREE TRUE)	/data/geolocation/sounder-_pixel_azimuth	
007025	SOLAR ZENITH ANGLE	/data/geolocation/sounder-_pixel_sun_zenith	
005022	SOLAR AZIMUTH (DEGREE TRUE)	/data/geolocation/sounder-_pixel_sun_azimuth	
Processing			

040052	Indication of super-adiabatic and super-saturation in final retrieval	/data/processing_flags /flg_physcheck	
040047	Validation flag for IASI or IASI-NG level 1 product	/data/processing_flags /flg_iasibad	
008065	SUN-GLINT INDICATOR	/data/processing_flags /flg_sungInt	
002019	SATELLITE INSTRUMENTS	MetImage	To signify contributing instruments
033095	Ancillary data	/data/processing_flags /flg_metimbad	0 - Present, good, collocated 1 - Available but of degraded quality and not used 2 - No spatiotemporally collocated measurements available for processing
002019	SATELLITE INSTRUMENTS	MWS	
033095	Ancillary data	/data/processing_flags /flg_mwsbad	
002019	SATELLITE INSTRUMENTS	IASI-NG	Return to IASI-NG
001030	Numerical model identifier	ECMWF	Or other appropriate identifier for ECMWF forecast used (see PGS)
033095	Ancillary data	/data/processing_flags /flg_nwpbad	
001030	Numerical model identifier	Missing	Cancel
040046	CLOUDINESS SUMMARY	/data/processing_flags /flg_cldness	
033XXX	Quantity out of configured bounds	/data/processing_flags /flg_retcheck	
0 40 051	Convergence of the iterative retrieval	& & of /data/processing_flags/flg_itrcld,ems,lwp,two	Previous product did not provide this level of detail, we do same
0 40 043	SATELLITE MANOEUVRE INDICATOR	Compute from /status/satellite/manoeuvre_*time_utc and /quality/gap_*	
Quality addendum			
0 40 053	NUMBER OF ITERATION USED FOR RETRIEVAL	/data/diagnostics/nbr_iteration	
0 40 066	QUALITY INDICATOR FOR ATMOSPHERIC TEMPERATURE	/data/optimal_estimation/humidity_error_data	
0 40 067	QUALITY INDICATOR FOR ATMOSPHERIC WATER_VAPOUR	/data/optimal_estimation/temperature_error_data	
Surface info			

008003	VERTICAL SIGNIFICANCE (SATELLITE OBSERVATIONS)		Set to 0 (surface)
0 21 166	land fraction	/data/surface_info/land_fraction	
0 22 046	Sea ice fraction	/data/surface_info/ice_fraction	
0 10 001	height	/data/surface_info/height	
0 08 023	First-order statistics		10 (std)
0 10 001	height	/data/surface_info/height_std	
0 08 023	First-order statistics		missing (cancel)
008003	VERTICAL SIGNIFICANCE (SATELLITE OBSERVATIONS)		missing (cancel)
Atmospheric profile			
0 13 098	Integrated water vapour (column)	/data/optimal_estimation/atmosphere_mass_content_of_water	
108000	Delayed replication of 8 descriptors		
031001	Delayed descriptor replication factor		
202131	Change scale		
201138	Change width		
007004	PRESSURE	/data/n_levels	Range - lowest pressure in layer
007004	PRESSURE	/data/n_levels	Range - highest pressure in layer
201000	Cancel		
202000	Cancel		
0 12 101	Air temperature	/data/optimal_estimation/air_temperature	
0 13 001	Specific humidity	/data/optimal_estimation/specific_humidity	

An estimate of the size of the BUFR format of IAS-02-TWV is 87.585972 MB/orbit.

C.2 IAS-02-SFC

References	Element	Variable(s) from NetCDF	Notes
Identification: as in IAS-02-TWV			
Viewing geometry: as in IAS-02-TWV			
Processing: as in IAS-02-TWV			
Surface info: as in IAS-02-TWV			
Product payload			

0 08 003	Vertical significance (satellite observations)		0 (surface)
0 12 001	Temperature / air temperature	/data/optimal_estimation /surface_temperature	
102000	Delayed replication of 2 descriptors		
031001	Delayed descriptor replication factor		
0 02 155	Satellite channel wavelength	/data/n_ems	
0 14 050	Emissivity	/data/optimal_estimation /surface_emissivity	

An estimate of the size of the BUFR format of IAS-02-SFC is 5.98629 MB/orbit.

C.3 IAS-02-CLD

References	Element	Variable(s) from NetCDF	Notes
Identification			
301005	Originating centre /sub-centre	254, 0	
001007	SATELLITE IDENTIFIER	/spacecraft	
002019	SATELLITE INSTRUMENTS	IASI-NG	
002020	SATELLITE CLASSIFICATION	EUMETSAT Second Generation Programme (EPS-SG)	
025060	SOFTWARE IDENTIFICATION	/processing/processor-_name,version,mode	
301011	Year, month, day	/data/geolocation/onboard-_utc	
301013	Hour, minute, second	/data/geolocation/onboard-_utc	
005040	ORBIT NUMBER	/orbit_start	Change to orbit_end as needed, BUFR is pixel-sharp
Viewing geometry			
201133	Change width		
005041	SCAN LINE NUMBER	/data/n_lines	
201000	Cancel		
005045	Field of regard number	/data/n_for	
005043	Field of view number	/data/n_fov	
301021	Lat/lon (high accuracy)	/data/geolocation/sounder-_pixel_lat,longitude	
202126	CHANGE SCALE		
007001	HEIGHT OF STATION	Convert from /satellite orbital elements to height over ground	

202000	CANCEL		
007024	SATELLITE ZENITH ANGLE	/data/geolocation/sounder-_pixel_zenith	
005021	BEARING OR AZIMUTH (DEGREE TRUE)	/data/geolocation/sounder-_pixel_azimuth	
007025	SOLAR ZENITH ANGLE	/data/geolocation/sounder-_pixel_sun_zenith	
005022	SOLAR AZIMUTH (DEGREE TRUE)	/data/geolocation/sounder-_pixel_sun_azimuth	
Processing			
040052	Indication of super-adiabatic and super-saturation in final retrieval	/data/processing_flags /flg_physcheck	
040047	VALIDATION FLAG FOR IASI or IASI-NG Level 1 PRODUCT	/data/processing_flags /flg_iasibad	
008065	SUN-GLINT INDICATOR	/data/processing_flags /flg_sungInt	
002019	SATELLITE INSTRUMENTS	MetImage	To signify contributing instruments
033095	Ancillary data	/data/processing_flags /flg_metimbad	0 - Present, good, collocated 1 - Available but of degraded quality and not used 2 - No spatiotemporally collocated measurements available for processing
002019	SATELLITE INSTRUMENTS	MWS	
033095	Ancillary data	/data/processing_flags /flg_mwsbad	
002019	SATELLITE INSTRUMENTS	IASI-NG	Return to IASI-NG
001030	Numerical model identifier	ECMWF	Or other appropriate identifier for ECMWF forecast used (see PGS)
033095	Ancillary data	/data/processing_flags /flg_nwpbad	
001030	Numerical model identifier	Missing	Cancel
040046	CLOUDINESS SUMMARY	/data/processing_flags /flg_cldness	
033096	Quantity out of configured bounds	/data/processing_flags /flg_retcheck	
0 40 051	Convergence of the iterative retrieval	& & of /data/processing_flags/flg-_itrcl,ems,lwp,two	Previous product did not provide this level of detail, we do same
0 40 043	SATELLITE MANOEUVRE INDICATOR	Compute from /status/satellite/manoeuvre_*time-_utc and /quality/gap_*	
Surface info			

008003	VERTICAL SIGNIFICANCE (SATELLITE OBSERVATIONS)		Set to 0 (surface)
0 21 166	land fraction	/data/surface_info/land_fraction	
0 22 046	Sea ice fraction	/data/surface_info/ice_fraction	
0 10 001	height	/data/surface_info/height	
0 08 023	First-order statistics		10 (std)
0 10 001	height	/data/surface_info/height_std	
0 08 023	First-order statistics		missing (cancel)
008003	VERTICAL SIGNIFICANCE (SATELLITE OBSERVATIONS)		missing (cancel)
Atmospheric profile			
0 08 043	Atmospheric chemical or physical constituent type		30 (generic dust)
0 08 XXX	Likelihood of observed phenomenon	/data/dust_indicator	
0 08 XXX	Likelihood of observed phenomenon		missing (cancel)
0 08 043	Atmospheric chemical or physical constituent type		missing (cancel)
0 08 003	Vertical significance (satellite observations)		2 (cloud top)
109000	Delayed replication of 9 descriptors		
031001	Delayed descriptor replication factor		
202131	Change scale		
201138	Change width		
007004	PRESSURE	/data/air_pressure_at_cloud_top	
201000	Cancel		
202000	Cancel		
0 12 101	Air temperature	/data/air_temperature_at_cloud_top	
0 20 081	cloud amount in segment	/data/effective_cloud_fraction	
0 20 056	cloud phase	/data/thermodynamic_phase_of_cloud_water_particles_at_cloud_top	
0 20 131	effective radius of cloud hydrometeors	/data/effective_radius_of_cloud_condensed_water_particle_at_cloud_top	
107000	Delayed replication of 7 descriptors		

031001	Delayed descriptor replication factor		
202131	Change scale		
201138	Change width		
007004	PRESSURE	/data/n_levels	Range - lowest pressure in layer
007004	PRESSURE	/data/n_levels	Range - highest pressure in layer
201000	Cancel		
202000	Cancel		
0 20 132	cloud liquid water content	/data/atmosphere_mass-content_of_cloud_liquid-water	

An estimate of the size of the BUFR format of IAS-02-CLD is 4.455056 MB/orbit.

C.4 IAS-02-O3_

References	Element	Variable(s) from NetCDF	Notes
001007	SATELLITE IDENTIFIER	/spacecraft	
0 01 031	Identification of originating/generating centre	/institution	
0 25 060	Software identification		603 in current products - meaning to be asked from producer
0 02 019	Satellite instruments	/instrument	
0 02 020	Satellite classification		e.g. 383 EPS-SG
0 04 001	Year	e.g. /data/measurement_data/geolocation/onboard_utc	
0 04 002	Month		
0 04 003	Day		
0 04 004	Hour		
0 04 005	Minute		
0 04 006	Second		
0 05 040	Orbit number	/orbit_start	
2 01 133	Change data width	Add 5 to width	
0 05 041	Scan line number	Index of /data/measurement_data/n_lines	
2 01 000	Change data width	Cancel	
0 05 001	Latitude (high accuracy)	/data/measurement_data/geolocation/sounder_pixel_latitude	
0 06 001	Longitude (high accuracy)	/data/measurement_data/geolocation/sounder_pixel_longitude	
0 05 043	Field of view number	/data/measurement_data/geolocation/fov_index	

0 07 024	Satellite zenith angle	/data/measurement_data /geolocation/sounder_pixel- _zenith	
0 05 021	Bearing or azimuth	/data/measurement_data /geolocation/sounder_pixel- _azimuth	
0 07 025	Solar zenith angle	/data/measurement_data /geolocation/sounder_pixel- _sun_zenith	
0 05 022	Solar azimuth	/data/measurement_data /geolocation/sounder_pixel- _sun_azimuth	
0 07 007	Height	/data/surface_z	
0 08 043	Atmospheric chemical or physical constituent type		0 (O3)
0 40 242	General retrieval quality flag	/data/o3_qflag	
0 40 244	Number of vectors describing the char. matrices	/data/o3_npc	
0 40 245	Number of layers actually retrieved	/data/o3_nfitlayers	
0 40 246	Number of profiles retrieved in scanline	/data/o3_nbr	
0 40 252/253	Retrieval flags part 1 processing and inputs potential errors /Retrieval flags part 1 diagnostics on the retrieval	/data/o3_bdiv	
1 03 019	Delayed replication of 3 descriptors		
0 31 001	Delayed descriptor replication factor		
0 40 247	Air partial columns on each retrieved layer	/data/o3_cp_air	
0 40 248	A-priori partial columns for each retrieved layer	/data/o3_cp_o3_a	
0 40 249	Scal. Vec. Mult. A-pri. vec. Def. Retr. Co vec.	/data/o3_x_o3	
1 01 190	Repeat 1 descriptor 190 times		
0 31 002	Extended delayed descriptor replication factor		
0 40 251	Main eigenvectors of the sensitivity matrix	/data/o3_h_eigenvectors	Eigenvalues were in former product, no longer needed

An estimate of the size of the BUFR format of IAS-02-O3 is 206.823064 MB/orbit.

C.5 IAS-02-CO_

References	Element	Variable(s) from NetCDF	Notes
001007	SATELLITE IDENTIFIER	/spacecraft	
0 01 031	Identification of originating/generating centre	/institution	
0 25 060	Software identification		603 in current products - meaning to be asked from producer
0 02 019	Satellite instruments	/instrument	
0 02 020	Satellite classification		e.g. 383 EPS-SG
0 04 001	Year	e.g. /data/measurement_data /geolocation/onboard_utc	
0 04 002	Month		
0 04 003	Day		
0 04 004	Hour		
0 04 005	Minute		
0 04 006	Second		
0 05 040	Orbit number	/orbit_start	
2 01 133	Change data width	Add 5 to width	
0 05 041	Scan line number	Index of /data/measurement_data/n_lines	
2 01 000	Change data width	Cancel	
0 05 001	Latitude (high accuracy)	/data/measurement_data /geolocation/sounder_pixel_latitude	
0 06 001	Longitude (high accuracy)	/data/measurement_data /geolocation/sounder_pixel_longitude	
0 05 043	Field of view number	/data/measurement_data /geolocation/fov_index	
0 07 024	Satellite zenith angle	/data/measurement_data /geolocation/sounder_pixel_zenith	
0 05 021	Bearing or azimuth	/data/measurement_data /geolocation/sounder_pixel_azimuth	
0 07 025	Solar zenith angle	/data/measurement_data /geolocation/sounder_pixel_sun_zenith	
0 05 022	Solar azimuth	/data/measurement_data /geolocation/sounder_pixel_sun_azimuth	
0 07 007	Height	/data/surface_z	
0 08 043	Atmospheric chemical or physical constituent type		4 (carbon monoxide)
0 40 242	General retrieval quality flag	/data/co_qflag	

0 40 244	Number of vectors describing the char. matrices	/data/co_npca	
0 40 245	Number of layers actually retrieved	/data/co_nfitlayers	
0 40 246	Number of profiles retrieved in scanline	/data/co_nbr	
0 40 252/253	Retrieval flags part 1 processing and inputs potential errors /Retrieval flags part 1 diagnostics on the retrieval	/data/co_bdiv	
1 03 019	Delayed replication of 3 descriptors		
0 31 001	Delayed descriptor replication factor		
0 40 247	Air partial columns on each retrieved layer	/data/co_cp_air	
0 40 248	A-priori partial columns for each retrieved layer	/data/co_cp_co_a	
0 40 249	Scal. Vec. Mult. A-pri. vec. Def. Retr. Co vec.	/data/co_x_co	
1 01 190	Repeat 1 descriptor 190 times		
0 31 002	Extended delayed descriptor replication factor		
0 40 251	Main eigenvectors of the sensitivity matrix	/data/co_h_eigenvectors	Eigenvalues were in former product, no longer needed

An estimate of the size of the BUFR format of IAS-02-CO is 76.011712 MB/orbit.

C.6 IAS-02-SO2

References	Element	Variable(s) from NetCDF	Notes
Identification: as in IAS-02-TWV			
Viewing geometry: as in IAS-02-TWV			
Product payload			
0 40 242	General retrieval quality flag	/data/so2_qflag	
0 08 043	Atmospheric chemical or physical constituent type	8 (Sulphur dioxide)	
1 06 005	Repeat 6 descriptor 5 times		

2 02 131	Change scale		
2 01 138	Change width		
0 07 004	Pressure		
2 02 000	Cancel		
2 01 000	Cancel		
0 15 XXX	Column for a plume	/data/so2_col_at_altitudes	DU is allowed (see C-6)
0 07 004	Pressure	MISSING (cancel)	
0 07 XXX	Height of plume (m)	/data/so2_altitude	
0 15 XXX	Column for a plume	/data/so2_col	DU is allowed (see C-6)
0 06 029	Wave number		Encode channels used for channel difference
0 06 029	Wave number		
0 08 024	Difference statistics		Difference between first and second channel
0 12 063	Brightness temperature	/data/so2_bt_difference	

An estimate of the size of the BUFR format of IAS-02-SO2 is 2.861776 MB/orbit.

C.7 IAS-02-NAC

References	Element	Variable(s) from NetCDF	Notes
001007	SATELLITE IDENTIFIER	/spacecraft	
0 01 031	Identification of originating/generating centre	/institution	
0 25 060	Software identification		603 in current products - meaning to be asked from producer
0 02 019	Satellite instruments	/instrument	
0 02 020	Satellite classification		e.g. 383 EPS-SG
0 04 001	Year	e.g. /data/measurement_data/geolocation/onboard_utc	
0 04 002	Month		
0 04 003	Day		
0 04 004	Hour		
0 04 005	Minute		
0 04 006	Second		
0 05 040	Orbit number	/orbit_start	
2 01 133	Change data width	Add 5 to width	
0 05 041	Scan line number	Index of /data/measurement_data/n_lines	
2 01 000	Change data width	Cancel	
0 05 001	Latitude (high accuracy)	/data/measurement_data/geolocation/sounder_pixel_latitude	
0 06 001	Longitude (high accuracy)	/data/measurement_data/geolocation/sounder_pixel_longitude	

0 05 043	Field of view number	/data/measurement_data /geolocation/fov_index	
0 07 024	Satellite zenith angle	/data/measurement_data /geolocation/sounder_pixel- _zenith	
0 05 021	Bearing or azimuth	/data/measurement_data /geolocation/sounder_pixel- _azimuth	
0 07 025	Solar zenith angle	/data/measurement_data /geolocation/sounder_pixel- _sun_zenith	
0 05 022	Solar azimuth	/data/measurement_data /geolocation/sounder_pixel- _sun_azimuth	
0 07 007	Height	/data/surface_z	
0 08 043	Atmospheric chemical or physical constituent type		4 (HNO3)
0 40 242	General retrieval quality flag	/data/hno3_qflag	
0 40 244	Number of vectors describing the char. matrices	/data/hno3_npca	
0 40 245	Number of layers actually retrieved	/data/hno3_nfitlayers	
0 40 246	Number of profiles retrieved in scanline	/data/hno3_nbr	
0 40 252/253	Retrieval flags part 1 processing and inputs potential errors /Retrieval flags part 1 diagnostics on the retrieval	/data/hno3_bdiv	
1 03 019	Delayed replication of 3 descriptors		
0 31 001	Delayed descriptor replication factor		
0 40 247	Air partial columns on each retrieved layer	/data/hno3_cp_air	
0 40 248	A-priori partial columns for each retrieved layer	/data/hno3_cp_hno3_a	
0 40 249	Scal. Vec. Mult. A-pri. vec. Def. Retr. Co vec.	/data/hno3_x_hno3	
1 01 190	Repeat 1 descriptor 190 times		
0 31 002	Extended delayed descriptor replication factor		
0 40 251	Main eigenvectors of the sensitivity matrix	/data/hno3_h_eigenvectors	Eigenvalues were in former product, no longer needed

An estimate of the size of the BUFR format of IAS-02-NAC is 206.823064 MB/orbit.

C.8 IAS-02-GHG

References	Element	Variable(s) from NetCDF	Notes
Identification: as in IAS-02-TWV			
Viewing geometry: as in IAS-02-TWV			
Processing: as in IAS-02-TWV			
Surface info: as in IAS-02-TWV			
Product payload			
109003	Replicate 9 descriptors 3 times		Iterate over atmospheric constituents
108000	Delayed replication of 8 descriptors		Iterate over all retrieval layers
031001	Delayed descriptor replication factor		
2 02 131	Change scale		
2 01 138	Change width		
0 07 004	Pressure		Range - lowest pressure in layer
0 07 004	Pressure		Range - highest pressure in layer
2 02 000	Cancel		
2 01 000	Cancel		
0 08 043	Atmospheric chemical or physical constituent type	N2O, CH4, CO2 (depending on what is encoded in following descriptor)	
0 15 021	Integrated mass density	/data/atmosphere_mass_content_of_nitrous_oxide, methane, carbon_dioxide	

An estimate of the size of the BUFR format of IAS-02-GHG is 15.678105 MB/orbit.

TBD/TBC**TBD**

ID	Section	Title	Text
TBD-01	4.2.1	Duration of IAS-02-TWV product	This TBD is to be defined by the PDAP Contractor.
TBD-02	4.3.1	Duration of IAS-02-SFC product	This TBD is to be defined by the PDAP Contractor.
TBD-03	4.4.1	Duration of IAS-02-CLD product	This TBD is to be defined by the PDAP Contractor.
TBD-04	4.5.1	Duration of IAS-02-O3_ product	This TBD is to be defined by the PDAP Contractor.
TBD-05	4.6.1	Duration of IAS-02-CO_ product	This TBD is to be defined by the PDAP Contractor.
TBD-06	4.7.1	Duration of IAS-02-SO2 product	This TBD is to be defined by the PDAP Contractor.
TBD-07	4.8.1	Duration of IAS-02-NAC product	This TBD is to be defined by the PDAP Contractor.
TBD-08	4.9.1	Duration of IAS-02-GHG product	This TBD is to be defined by the PDAP Contractor.