

SCIAMACHY Level 2 netCDF Product User Guide

Level 1b-2 Processing

Issue 1.0



DLR

**Deutsches Zentrum
für Luft- und Raumfahrt e.V.**

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		13	Extended explanation of flag mask values
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		21	Clarified the explanation for slant column variable name
		22, 23	Corrected stratospheric column to troposheric column
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1 Introduction

1.1 Purpose and Scope of the Document

SCIAMACHY (SCanning Imaging Absorption SpectroMeter for Atmospheric CHartographY) was one of the Earth observation research instruments which was part of the payload of the ENVISAT platform of ESA (European Space Agency) which had been launched on March 1st, 2002. The ENVISAT mission ended on April 8th 2012, following the unexpected loss of contact with the satellite.

The main scientific objective of SCIAMACHY was to measure distributions of a number of chemically important atmospheric trace gas species on a global basis. SCIAMACHY had a spectrometer and telescope system designed to observe light transmitted through, reflected by and scattered from the Earth's atmosphere over a spectral range from 240 to 2400 nm. It had an alternating limb and nadir viewing capability, and was able to perform solar and lunar occultation measurements.

Nadir UV/visible measurements provide global column distributions of O₃, NO₂, BrO, SO₂, OClO, HCHO, CHO-CHO and H₂O, as well as cloud and aerosol parameters. Nadir infrared measurements are used to generate column distributions of CO and CH₄. Limb observations provide vertical stratospheric profiles of O₃, NO₂ and BrO for UV/visible wavelength range. By combining limb and nadir measurements tropospheric NO₂ columns are retrieved. Tropospheric columns are also available for BrO.

This document provides the specification of the level 2 off-line product as generated by version 7.00 of the level 1b to 2 off-line processor. For this version the product format was changed from the ENVISAT binary format to netCDF V4.

The document is not intended to give background on the retrieval algorithms, for this the user should consult the ATBD [5].

The main advantages of the new format are:

- NetCDF is a standard, widely used, self-describing format that ensures that the data can be read in the future.
- All results are easily accessible via a dedicated variable. Inconveniences of the old format, such as appending results to additional diagnostics that required complicated index operations for read access, are now fixed.
- Geolocation is now available per species (taken from level 1b product). Previously only geolocations for the shortest integration time were contained in the level 2 product and the user was responsible for calculating the coordinates for a given species on his own.
- Obsolete parameters were removed from the product.

1.2 Documents

1.2.1 Applicable Documents

The following documents are applicable for this document

1.2.2 References

- [1] Inspire Dtm. "INSPIRE Metadata Implementing Rules: Technical Guidelines based on EN ISO 19115 and EN ISO 19119". In: *INSPIRE Drafting Team Metadata and European Commission Joint Research, MD_IR_and_ISO_20090218* (2009).
- [2] *Earth Explorer Ground Segment File Format Standard, PE-TN-ESA-GS-0001*. issue 2. ESA. Mar. 2012.
- [3] Brian Eaton et al. *NetCDF Climate and Forecast (CF) Metadata Conventions V1.6*. Tech. rep. available at <http://cfconventions.org/cf-conventions/v1.6.0/cf-conventions.html>. NCAR et al., Dec. 2011.
- [4] ISO. *ISO 19156:2011(E): Geographic Information – Observations and measurements*. 2011.
- [5] G. Lichtenberg and S. Gretschan. *SCIAMACHY Offline Processor Level1b-2 ATBD Algorithm Theoretical Baseline Document (SGP OL Version 7), ENV-ATB-QWG-SCIA-0085*. Tech. rep. issue 3. DLR, 2018.

1.3 Abbreviations and Documents

AAI	Absorbing Aerosol Index
AAIA	Absorbing Aerosol Index Algorithm
ADS	Annotation Data Set
AMC DOAS	Air Mass Corrected Differential Optical Absorption Spectroscopy
AMF	Air Mass Factor
BIRRA	Beer Infrared Retrieval
CF	Climate Forecast
CIR	Color Index Ratio
DLR	Deutsches Zentrum für Luft- und Raumfahrt e.V. (German Aerospace Centre)
DOAS	Differential Optical Absorption Spectroscopy
ENVISAT	Environmental Satellite
ESA	European Space Agency
EOP	Earth Observation Product
GADS	Global Annotation Dataset
ISO	International Standards Organisation
MDS	Measurement Data Set
netCDF	network Common Data Format
NLX	Noctilucent Clouds
PMD	Polarisation Measurement Device
PSC	Polar Stratospheric Cloud
RMS	Root Mean Square
SCD	Slant Column Density
SCIAMACHY	Scanning Imaging Absorption Spectrometer for Atmospheric Chartography
SACURA	Semi-Analytical Cloud Retrieval Algorithm
SZA	Solar Zenith Angle
TOA	Top of Atmosphere
VCD	Vertical Column Density

1.4 Document Overview

Section 2 explains the overall structure of the format and gives additional explanations for specific entries. In order to make the migration from the ENVISAT format to the netCDF format easier, in Section 3 we give tables that show the correspondence between the old product variable names and the netCDF names. Sections 4 to 9 contain information for all netCDF entries in tabular form. The tables are directly extracted from a Level 2 netCDF file generated by the operational processor. This ensures that the variable names and attributes in this document exactly match those in the operational products. Thus, in cases where we show values for attributes or variables, these are those from the file chosen for the generation of the tables. They are only shown for illustration purposes and can be different for other products.

The global file attributes are listed in section 4. The following sections contain the data entries for the product. In section 10 we have one table for each group of metadata (EOP, ESA and ISO). The metadata are separated into many sublevels. For each sublevel we add a "/" to the name of the group in the first column of the table. Rows where a new group starts are coloured in light cyan. For example "/gmd:contact" is a subgroup of the ISO metadata group. Below that another subgroup "/gmd:contactInfo" exists and so on.

For the other data a less compact (and easier to navigate) document structure was chosen, since here we do not have as many levels as for the metadata. The description of the variables and the group attributes are structured along the groups in the netCDF file like this:

- *Top Group*: Section
 - *Subgroup*: Subsection
 - *Subgroup of Subgroup*: Subsubsection

and so on. The section names are simply the group names. Every group has one table for the group attributes (if any) and one table for the variables (if any). The tables for the group attributes contain the attribute's name and the value. We give no description because the names are self-explanatory and the value (like "used wavelength range") are more useful for the reader. The tables for the variables contain

1. Name of the variable
2. The description
3. The unit
4. The data type
5. The number of dimensions, if the data are organised in arrays

and are all taken directly from an operational product.

With this information the user can quickly extract data of interest by using standard S/W and the names of the variables.

Since the geographical data are the same for all Nadir and all Limb data, we do not repeat their description for each measurement data set but we describe them one time in Section 5 (Nadir) and 6 (Limb).

In this document we use the following convention: Internal document links are marked in dark green and can be clicked to navigate through the document. External links are marked in red and can be clicked to access the corresponding URL with your standard internet browser.

1.5 Quick Look-Up

The table below gives quick links per product to find the following information quickly:

Flag description Flags used in the MDS for the product are described in these sections

Correspondence to old product names (old/new)

If you migrate from the old ENVISAT format, look up the indicated sections

Geolocation description (Geo)

Geolocation is described in these sections

MDS description (MDS)

The measurement data variables are described in these sections.

In the electronic version of the document you can click on the links in the table to jump to the correct location

Table 1: Quick links to important information per product.

Product	Flags	old/new	Geo	MDS
Limb Cloud	2.8.1.2	3.9	6	9.1
Limb BrO	-	3.8	6	9.2
Limb NO ₂	-	3.8	6	9.3
Limb O ₃	-	3.8	6	9.4
Nadir AAI	2.8.1.1	3.6	5	9.5
Nadir Clouds	2.8.1.1	3.6	5	9.5
Nadir CH ₄	2.8.3.2	3.7.5	5	9.6
Nadir CO	2.8.3.2	3.7.6	5	9.7
Nadir BrO (total & tropospheric)	2.8.4.1	3.7.2	5	9.8
Nadir CHOCHO	2.8.2.1	3.7	5	9.9
Nadir HCHO	2.8.2.1	3.7	5	9.10
Nadir H ₂ O	2.8.2.1	3.7.4	5	9.11
Nadir NO ₂ (total & tropospheric)	2.8.2.1	3.7.1	5	9.12
Nadir O ₃	2.8.2.1	3.7	5	9.13
Nadir OCIO	2.8.2.1	3.7	5	9.14
Nadir SO ₂ (anthropogenic & volcanic)	2.8.2.1	3.7, 3.7.3	5	9.15

Information about the not MDS linked entries can be found in the first subsections of Sections 2, 3. Global attributes (e.g. reference time) are found in Section 4. Annotation data can be found in sections 7 and 8. Metadata tables are in section 10.

2 File Structure and Additional Information

2.1 Measurement Times

Measurement times are expressed as difference in seconds to the reference time of midnight of the day of measurements. The reference time can be found in the global attribute *time_reference*, see Section 4.

2.2 Units

Wherever reasonable, SI units are used for the file variables. Group attributes are strings. Latitudes and longitudes are expressed in degrees:

- Latitude -90° ... 90°
- Longitude -180° ... 180°

2.3 Fill Values

In cases where the retrieval did not converge or came to an unphysical solution or data are missing for some other reason, *fill values* are used. The definition of the fill values is part of the netCDF group and will be recognised by various netCDF readers (e.g. in python one will obtain a masked array where the entries containing a fill value are masked).

2.4 Metadata

The following metadata were added to the netCDF file for cataloguing, discoverability and compatibility with Sentinel data:

1. EOP metadata: INSPIRE Metadata Implementing Rules, Technical Guidelines [1]
2. ESA metadata: Earth Observation Ground Segment File Format Standard [2]
3. ISO metadata: Geographic Information – Observations and measurements [4]

Note that some information is repeated in the different metadata groups, since the definitions partially overlap.

2.5 Global File Attributes

The global attributes (tables in Section 4) contain information about the format of the file, the used conventions, and the source of the data. The coverage in time and the processor version are also listed.

2.6 Annotation Data

The Annotation Data contain the geolocations for all nadir and limb observations (Sections 7.2 and 7.1) for the shortest integration time of the orbit. Note that the geolocations for specific atmospheric products are contained in the measurement data set groups themselves.

The States geolocation group (Section 7.3) contains the state IDs, integration time and corner coordinates of the area covered by the state.

The Global Annotation Data (Section 8.1) contains only one string parameter, *xml_text_initialisation_file*. The string contains the processor configuration file used for processing. It is intended for tracing the configuration and is of possible use of expert users.

2.7 Flagging

In the CF standard [3] all flags have the attribute *flag_meanings* and then one or both of the attributes *flag_values* and *flag_masks*. We follow this standard. *flag_meanings* are implemented as comma separated string. *flag_values* can be anything (number, string). *flag_masks* typically are numbers. Each element of the flag meanings has an associated *flag_values* or *flag_masks* element.

Example:

flag_meanings "laser gun, sword"

flag_values ["Han", "Luke"]

means that if you encounter "Han" as flag value, the corresponding flag meaning is "laser gun". The same association can be made with flag mask values (then usually with bit values).

In the Level 2 product we use flags that have either flag values or flag masks. The variable names of flags usually end with "_flag", so they can be easily identified. Exception to these rules:

cloud_diagnostics The diagnostics of the Limb Cloud MDS are implemented as a flag

Flags for the individual measurements will be explained in section 2.8.

2.7.1 Flags with values

Flags with values can be evaluated by direct comparison. The value of the variable can only be one of the values in the attribute *flag_values* (or the fill value). One example is the backscan flag:

Table 2: Example for value flags.

Flag Meaning	Flag Value
forward_scan	0
backward_scan	1

Thus if you want to exclude backscans from your analysis, you can use a construct like

```
Loop over scans:
  if (backscan_flag == 1) then continue
  else
    do something
  end loop
```

2.7.2 Flags with mask values

The definition of flag mask values follows the CF standard V1.6 ([3], see section 3.5 therein), Flags that have masks associated indicate which of a number of conditions are fulfilled. They are used when more than one state is possible at the same time. They have to be evaluated bit-wise.

The number of bytes for a flag varies according to the number of conditions they are representing.

The most significant bit is always associated with the *first* statement in flag meanings. Note that not always all bits carry meaning. The lowest number of the flag_mask stands for the last bit that carries a meaning. All bits lower are irrelevant.¹

Example for a 16bit variable:

Table 3: Example for mask flags.

Flag Meaning	Flag mask
convergence reached	32768
sza lower than limit	16384
residual norm lower than limit	8192

We see the following:

1. Only the first 3 bits carry meanings, all other bits are irrelevant
2. If the most significant bit of the variable value is set the condition in the flag meaning is true, i.e. convergence was reached. If the bit is not set, convergence was not reached. . .
3. . . and the same for the other flag meanings

The value of the variable in the netCDF is the *sum* of those flag mask values where the condition is true. For the above example:

Table 4: Possible flag values.

Convergence	sza lower	residual lower	Value
Y	N	N	32768
N	Y	N	16384
N	N	Y	8192
Y	Y	N	49152
N	Y	Y	24576

Continued on next page

¹Contrary to the old ENVISAT format, which was a byte stream, the endianness of the platform is not important: The attributes of the flags contain all information one needs to determine if a certain condition is fulfilled or if it isn't.

Continued from previous page

Convergence	sza lower	residual lower	Value
Y	N	Y	40960
Y	Y	Y	57344
N	N	N	0

The values are read as an integer value which then can be used to evaluate the flags with a bit-wise AND operation, e.g.

```
# Check SZA:
sza_is_lower = flag (bit-wise AND) 16384
```

Combinations of flags set can be checked in a similar way by constructing a mask to be matched from the flag mask values (by using the sums) or by iterating through all possible conditions:

```
# Check SZA & Residual Norm
sza_is_lower = flag (bit-wise AND) 16384
res_norm = flag (bit-wise AND) 8192
#
both_set = (sza_is_lower > 0 and res_norm > 0)
```

2.8 Measurement Data

The measurement data (Section 9) are arranged along observation modes (limb or nadir) and species. The naming scheme of the groups follows the convention of the previous ENVISAT format:

(observation mode)_(wavelength region)_(species)

For cloud products the wavelength range is omitted, since the retrievals use multiple wavelength regions.

All groups that contain results of trace gas retrievals have attributes that describe the wavelengths range of the retrieval window, the observation geometry, the main species fitted as well as additional info were deemed necessary.

Note that not all MDS contain all types of entries. If a value is not calculated for a given trace gas, it is omitted from the netCDF group. This happens, e.g. for some error types which are not calculated in all algorithms.

Also, if a certain product for a species cannot be retrieved for a given orbit, the whole measurement data group for this product is omitted from the product. Therefore, before reading data, one should check if the group exists in the data file to avoid program crashes.

Recommended settings for flags will be published in a README document that accompanies each product release. Since the settings may change after product evaluation they are not stated here. The README file will always be updated to reflect the latest status and current product knowledge.

2.8.1 Cloud Data

Cloud data for nadir and limb can be found in Sections 9.5 and 9.1. Nadir cloud parameters are cloud top height, cloud optical depth and cloud fraction. In addition the nadir cloud data set also contains the AAI.

The limb cloud group contains types of clouds (PSC, water cloud, ice cloud, NLC) and their heights and auxiliary information such as the color index ratio (CIR) used to identify clouds and the maximum altitude of the cloud.

2.8.1.1 Nadir Cloud & AAI Flags

The nadir cloud & AAI MDS has the following flags

Table 5: Flag meanings for cloud_flag for the cloud calculations. When the bit is set the italic condition is true.

Flag Meaning	Flag Mask
source of cloud fraction <i>PMD</i> or fitting	128
source of cloud-top pressure <i>in VCD algorithm</i> or ISCCP	64
source of cloud-top height fitting - SACURA: <i>no convergence</i>	32
source of cloud-top height fitting - SACURA: <i>number of iterations exceeded</i>	16
source of cloud-top height fitting - SACURA: <i>average of neighboured values taken</i>	8
source of cloud-top height fitting - SACURA: <i>cloud layer size set to constraint</i>	4
source of cloud-top height fitting - SACURA: <i>cloud-bottom height set to constraint</i>	2

Note that SACURA provides a sophisticated flagging at output which mirrors if a constraint is set for a quantity during the fitting. This may happen if cloud-bottom height, cloud-top height, or cloud layer size exceed pre-defined constraints. In that case, each quantity can be individually set to the constraint value. In case SACURA exceeds the number of iterations, the arithmetic average of the neighbour values is taken. If cloud-clear condition is reflected from the PMD algorithm, cloud-top height and cloud optical thickness are set to 0. In case of SACURA, an error of 0.25 km can be expected for full convergence; otherwise 0.5 km.

Table 6: Flag meanings for absorbing_aerosol_indicator_flag. If the bit is set, the condition is true.

Flag Meaning	Flag Mask
Rayleigh scattering correction successful	128
AAIA computation successfully ended	64

In case AAI values are not computed, but just copied from observations with longer integration times, AAI flags remain unset.

Table 7: Flag meanings for backscan_flag.

Flag Meaning	Flag Value
forward scan	0
backward scan	1

2.8.1.2 Limb Cloud Flags

The Limb cloud MDS has the following flags

Table 8: Flag meanings for water_cloud_flag

Flag Meaning	Flag Value
no clouds	0
partially cloudy	1
fully cloudy	2
bad data or cloud top height too high	3
threshold exceeded two times	4
threshold exceeded multiple times	5

Table 9: Flag meanings for ice_cloud_flag

Flag Meaning	Flag Value
water cloud	0
ice cloud	1
bad data (MAXHEIGHT_ICL is greater than the warning tangent height , warn_th)	2
strange case (MAXVAL_ICL is greater than the upper bound for the CIR, upper_bound_cir)	9

Table 10: Flag meanings for polar_stratospheric_cloud_flag

Flag Meaning	Flag Value
no PSC	0
PSC	1

Table 11: Flag meanings for noctilucent_cloud_flag

Flag Meaning	Flag Value
no NLC	0
NLC criterion 1 fulfilled (radiance increase with height)	1
NLC criterion 2 fulfilled (radiance ratios above threshold)	2
both NLC criteria fulfilled	3

Table 12: Flag meanings for cloud_diagnostics describing the status of the cloud algorithm.

Flag Meaning	Mask Value
water/ice/aerosol cloud retrieval succeeded	128
ice/water cloud retrieval succeeded	64
polar stratospheric cloud retrieval succeeded	32
noctilucent cloud retrieval succeeded	16

2.8.2 Nadir DOAS Retrievals

The DOAS retrievals contain slant and vertical column density (SCD, VCD), air mass factors, errors and other fit parameters and the geolocation of the measurements. For SO₂ there are anthropogenic and volcanic VCDs available.

2.8.2.1 Flags

The Nadir MDS for the DOAS retrievals has the following flags

Table 13: Flag meanings for vertical_column_density_flag describing the VCD calculation.

Flag Meaning	Flag Mask
extended field-of-view calculation	32768
maximum SZA reached	16384
no weighting of AMFs over footprint	8192
linear weighting of AMFs over footprint	4096
parabolic weighting of AMFs over footprint	2048

Table 14: Flag meanings for fitting_flag used for SCD fitting.

Flag Meaning	Flag Mask
smoothing of measurements	32768
error weighting of fitting	16384
use of ratioed measurements	8192
use of pre-convoluted cross-sections	4096
convolution of cross-sections	2048
convolution on measurement grid	1024
SCIAMACHY cross-sections used	512
non-linear fitting (if not set linear fitting is used)	256
use of background correction	128
bit 6-4: quality, to be interpreted as 3 bit integer, 0 lowest quality, 7 highest quality	112

Table 15: *Flag meanings for air_mass_factor_flag used in the AMF look-up scheme. Italic values are true, if the bit is set.*

Flag Meaning	Flag Mask
clear or <i>clear & cloud look-up</i>	128
one AMF value or <i>extended field-of-view</i>	64
continental or <i>maritime aerosol present</i>	32
<i>maximum SZA exceeded</i>	16

Table 16: *Flag meanings for backscan_flag*

Flag Meaning	Flag Value
forward scan	0
backward scan	1

2.8.3 Nadir Direct Retrievals

Water vapour (AMC DOAS algorithm, see Section 2.8.3.1), CO and CH₄ (both BIRRA algorithm, see Section 2.8.3.2) use direct retrieval schemes. They do not have slant columns but only vertical columns. The errors and fit parameters also differ partially from DOAS retrievals.

2.8.3.1 AMC DOAS Flags

The AMC DOAS MDS for water vapour has the following flags

Table 17: *Flag meanings for backscan_flag*

Flag Meaning	Flag Value
forward scan	0
backward scan	1

2.8.3.2 BIRRA Flags

The MDS for CO and CH₄ have the following flags

Table 18: *Flag meanings for vertical_column_density_flag for the calculation of the VCD.*

Flag Meaning	Flag Mask
convergence reached	32768
sza lower than limit	16384
residual norm lower than limit	8192
maximum absolute value of residual lower than limit	4096
α between bounds for first gas	2048
absolute α error less than limit for first gas	1024
α between bounds for second gas	512
absolute α error less than limit for second gas	256
α between bounds for third gas	128
absolute α error less than limit for third gas	64
α between bounds for fourth gas	32
absolute α error less than limit for fourth gas	16

α is the fitted scaling factor used in the retrieval.

Table 19: *Flag meanings for backscan_flag*

Flag Meaning	Flag Value
forward scan	0
backward scan	1

2.8.4 Tropospheric Columns

For BrO and NO₂ we also calculate a tropospheric column. The results of these retrievals can be found in the nadir retrieval groups of the species (Sections 9.8 and 9.12).

2.8.4.1 Flags

The NO₂ MDS has the same flags and flag meanings as the Nadir DOAS flags (see Sect. 2.8.2.1)

The BrO product has only a subset of flags of the DOAS retrievals defined, since the VCD calculation is not done with the standard DOAS scheme.

Table 20: *Flag meanings for fitting_flag used for the BrO SCD fitting.*

Flag Meaning	Flag Mask
smoothing of measurements	32768
error weighting of fitting	16384
use of ratioed measurements	8192
use of pre-convoluted cross-sections	4096
convolution of cross-sections	2048
convolution on measurement grid	1024
SCIAMACHY cross-sections used	512
non-linear fitting	256
use of background correction	128
bit 6-4: quality, to be interpreted as 3 bit integer, 0 lowest quality, 7 highest quality	112

Table 21: *Flag meanings for backscan_flag*

Flag Meaning	Flag Value
forward scan	0
backward scan	1

2.8.5 Limb Retrievals

The limb retrieval groups contain profiles in number density as well as volume mixing ratios (the latter being calculated from the number densities). Temperature and pressure grids used for the retrieval, error and the averaging kernels are also part of the data. The new format has the advantage that all parameters now have their own variable and are easier accessible than in the previous format (where some of the data were just stored in a large array and had to be accessed via complicated index operations).

Note that the number of values for a profile can vary with time for a given trace gas. The reason is that the retrieval always starts at the lowest cloud free altitude. This altitude is determined by the Limb Cloud algorithm. In the presence of cloud above the minimum altitude for the retrieval, the altitude step is skipped and the concerned profile has less values than in the cloud free case.

3 Correspondence between Variables in ENVISAT Format and netCDF

This section contains tables that show the change of the variables in the new format from the names in the ENVISAT format. We also indicate which variables were deleted. Reasons for deletion of a variable were that

they are no longer needed in the new format (e.g. entry length in bytes) or that they were placeholders and never calculated. For each ENVISAT element we list the name of the ENVISAT field and the corresponding netCDF variable.

The following cases are highlighted in the tables:

- not needed** Entry is no longer needed in the netCDF, this marked in **light gray**
- not calculated** Entry was never calculated in the processor and was thus removed from the new format, this is marked in **very light gray**
- Split of variables** In some cases parameters were "hidden" in one variable in the old format. In the netCDF this is never the case. This is marked in **light cyan**.

The sections below are structured according to the ENVISAT file structure, i.e. for each ADS or MDS type there is a subsection. Since the nadir MDS contains several subtypes, this subsection has subsections on its own.

3.1 Geolocation of the state ADS

Description	ENVISAT Entry	netCDF Entry
time offset in seconds from midnight	STARTTIME	delta_time
attach flag	ATTACHED	not needed
corner latitudes of the ground scene which is covered by the state	CORNERS	corner_latitudes
corner longitudes of the ground scene which is covered by the state	CORNERS	corner_longitudes

3.2 Static Parameter GADS

Description	ENVISAT Entry	netCDF Entry
XML text of the initialization file which covers the complete range of static parameters	XMLPARAMS	xml_text_initialization_file

3.3 States of the Product ADS

Description	ENVISAT Entry	netCDF Entry
time offset in seconds from midnight	STARTTIME	delta_time
attach flag	ATTACHED	not needed
state ID	STATEID	state_id
longest integration time	LONGEST	longest_integration_time
shortest integration time	SHORTEST	shortest_integration_time
duration of scan phase of the state	DURATION	duration
number of geolocation records for this state	NOOFOBS	number_observations

3.4 Nadir Geolocation ADS

Description	ENVISAT Entry	netCDF Entry
time offset in seconds from midnight	STARTTIME	delta_time
attach flag	ATTACHED	not needed
integration time of measurement	INTTIME	integration_time
solar zenith angles of the start, middle and end of the integration time at TOA	SOLARZEN	solar_zenith_angles

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Description	ENVISAT Entry	netCDF Entry
line-of-sight nadir angles of the start, middle and end of the integration time at TOA	LOSZEN	line_of_sight_angles
relative azimuth angles of the start, middle and end of the integration time at TOA	RELAZI	relative_azimuth_angles
satellite geodetic height at the middle of the integration time	HEIGHT	satellite_height
earth curvature radius at the middle of the integration time	RADIUS	earth_curvature_radius
latitudes of sub-satellite points at the middle of the integration time	SUBSAT_LAT	sub_satellite_latitude
longitudes of sub-satellite points at the middle of the integration time	SUBSAT_LON	sub_satellite_longitude
latitudes of nadir ground pixel corners	CORNERS_LAT	corner_latitudes
longitudes of nadir ground pixel corners	CORNERS_LON	corner_longitudes
latitudes of nadir ground pixel centers	CENTER_LON	center_latitude
longitudes of nadir ground pixel centers	CENTER_LAT	center_longitude

3.5 Limb Geolocation ADS

Description	ENVISAT Entry	netCDF Entry
time offset in seconds from midnight	STARTTIME	delta_time
attach flag	ATTACHED	not needed
integration time of measurement	INTTIME	integration_time
solar zenith angles of the start, middle and end of the integration time at TOA	SOLARZEN	solar_zenith_angles
line-of-sight nadir angles of the start, middle and end of the integration time at TOA	LOSZEN	line_of_sight_angles
relative azimuth angles of the start, middle and end of the integration time at TOA	RELAZI	relative_azimuth_angles
satellite geodetic height at the middle of the integration time	HEIGHT	satellite_height
earth curvature radius at the middle of the integration time	RADIUS	earth_curvature_radius
latitudes of sub-satellite points at the middle of the integration time	SUBSAT_LAT	sub_satellite_latitude
longitudes of sub-satellite points at the middle of the integration time	SUBSAT_LON	sub_satellite_longitude
latitudes of tangent ground points at the start, middle and end of integration time	TANGGRD_LAT	tangent_ground_latitudes
longitudes of tangent ground points at the start, middle and end of integration time	TANGGRD_LON	tangent_ground_longitudes
tangent height at the start, middle and end of integration time	TANGHEIGHT	tangent_height

3.6 Cloud & Aerosol MDS

Description	ENVISAT Entry	netCDF Entry
Start time of the clouds and aerosol record	STARTTIME	delta_time
Data set record length (DSR)	DSRLLEN	not needed
Quality indicator (-1 if DSR is empty)	QUALITY	not needed
Integration Time of DSR	INTTIME	integration_time
Surface Pressure	SURFPRESS	not calculated

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Description	ENVISAT Entry	netCDF Entry
Cloud Fraction	CLOUDFRAC	cloud_fraction
Error on cloud Fraction	ERRCLDFRAC	not calculated
Number of PMD sub-pixels for this DSR	NUMPMDPIX	number_pmd_sub_pixels
Number of PMD sub-pixels determined to be totally cloudy or totally cloud-free	FULLFREE	number_totally_cloud_free_pmd_sub_pixels number_totally_cloudy_pmd_sub_pixels
Cloud-top height	TOPHEIGHT	cloud_top_height
Error on cloud-top height (currently set to -99.99), see product disclaimer	ERRTOPHEIGHT	not calculated
Cloud optical depth	CLDOPTDEPTH	cloud_optical_depth
Error on cloud optical depth (currently set -99.99), see disclaimer	ERRCLDOPTDEP	not calculated
Cloud type	CLOUDTYPE	not calculated
Cloud-top bi-directional reflectance	CLOUDBRDF	not calculated
Error on cloud-top bi-directional reflectance	ERRCLOUDBRDF	not calculated
Effective Lambertian surface reflectance	EFFSURFREFL	not calculated
Error on Effective Lambertian surface reflectance	ERREFFSREFL	not calculated
Flag describing the cloud parameter out-put	CLOUDFLAG	cloud_flag
Absorbing aerosol indicator	AAI	absorbing_aerosol_indicator
Diagnostic of the absorbing aerosol indicator	AAIDIAG	not calculated
Flag describing the absorbing aerosol indicator output	AAIFLAG	absorbing_aerosol_indicator_flag
Number of additional aerosol parameters	NUMAEROPARS	not needed
Additional aerosol parameters	AEROPARS	absorbing_aerosol_indicator_residue absorbing_aerosol_indicator_ground_height absorbing_aerosol_indicator_surface_albedo

3.7 Nadir/Limb-Nadir Matching MDS

Description	ENVISAT Entry	netCDF Entry
Start time of the nadir record	STARTTIME	delta_time
Data set record length (DSR)	DSRLEN	not needed
Quality indicator (-1 if DSR is empty)	QUALITY	not needed
Integration Time of DSR	INTTIME	integration_time
Number of vertical column densities	NUMOFVCD	not needed
Vertical column density (VCD) of the main parameter	VCD	vertical_column_density
Error on the vertical column density	ERRVCD	vertical_column_density_error
Flag describing the VCD output	VCDFLAG	vertical_column_density_flag
Effective slant column (ESC) density of the main parameter	ESC	(effective)_slant_column_density
Error on the effective slant column (ESC) density above	ERRESC	(effective)_slant_column_density_error
Number of linear fitted parameters	NUMLINFITP	not needed
Number of non-linear fitted parameters	NUMNLINFITP	not needed
Linear fitted parameters	LINPARS	linear_fitted_parameters
Error on the linear fitted parameters	ERRLINPARS	linear_fitted_parameters_errors
Cross-correlation matrix entries of the linear fit	LINCORRM	linear_fit_correlation_matrix
Non-linear fitted parameters	NLINPARS	non_linear_fitted_parameters
Error on the non-linear fitted parameters	ERRNLINPARS	non_linear_fitted_parameters_error
Cross-correlation matrix entries of the non-linear fit	NLINCORRM	non_linear_fit_correlation_matrix
RMS of the fit	RMS	root_mean_square
Chi-square of the fit	CHI2	chi_square
Goodness of the fit	GOODNESS	not calculated

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Description	ENVISAT Entry	netCDF Entry
Number of iterations for the non-linear fit	NUMITER	number_iterations
Fitting output flag	FITFLAG	fitting_flag
AMF to ground	AMFGRD	air_mass_factor_ground
Error on the AMF to ground	ERRAMFGRD	air_mass_factor_ground_error
AMF to cloud-top	AMFCLD	air_mass_factor_cloud
Error on the AMF to cloud-top	ERRAMFCLD	air_mass_factor_cloud_error
AMF output flag	AMFFLAG	air_mass_factor_flag
Temperature of reference spectrum	TEMPERATURE	temperature_of_reference_spectrum (group attribute)

For Ozone an *effective* slant column is retrieved, therefore the variable for the slant column is named *effective_slant_column*. For other trace gases the name of the netCDF entry is *slant_column_density*.

3.7.1 Nadir NO₂

Two NO₂ retrievals are combined in the netCDF group /MEASUREMENT_DATA/NADIR_UV_NO2: The retrieval of the total column and the retrieval of the tropospheric column. In the ENVISAT format the retrievals are in separate MDS's. The relation for the total column is

Description	ENVISAT Entry	Name
time offset in seconds from midnight	STARTTIME	delta_time
Data set record length (DSR)	DSRLEN	not needed
Quality indicator (-1 if DSR is empty)	QUALITY	not needed
integration time of measurement	INTTIME	integration_time
Number of vertical column densities	NUMOFVCD	not needed
total vertical column density	VCD	total_vertical_column_density
error on the total vertical column density	ERRVCD	total_vertical_column_density_error
extended field-of-view calculation, maximum SZA reached, no weighting of AMFs over footprint, linear weighting of AMFs over footprint, parabolic weighting of AMFs over footprint	VCDFLAG	vertical_column_density_flag
slant column density	ESC	slant_column_density
error on the slant column density	ERRESC	slant_column_density_error
Number of linear fitted parameters	NUMLINFITP	not needed
Number of non-linear fitted parameters	NUMNLFITP	not needed
linear fitted parameters	LINPARS	linear_fitted_parameters
error on linear fitted parameters	ERRLINPARS	linear_fitted_parameters_errors
cross-correlation matrix entries of the linear fit	LINCORRM	linear_fit_correlation_matrix
non-linear fitted parameters	NLINPARS	non_linear_fitted_parameters
error on non-linear fitted parameters	ERRNLINPARS	non_linear_fitted_parameters_error
cross-correlation matrix entries of the non-linear fit	NLINCORRM	non_linear_fit_correlation_matrix
RMS of the fit	RMS	root_mean_square
chi-square of the fit	CHI2	chi_square
Goodness of the fit	GOODNESS	not calculated
number of iterations for the non-linear fit	NUMITER	number_iterations
smoothing of measurements, error weighting of fitting, use of ratioed measurements, use of pre-convoluted cross-sections, convolution of cross-sections,	FITFLAG	fitting_flag

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Description	ENVISAT Entry	Name
convolution on measurement grid, SCIAMACHY cross-sections used, non-linear fitting, use of background correction, bit 6-4: quality, to be interpreted as 3 bit integer, 0 lowest quality, 7 highest quality		
AMF to ground	AMFGRD	air_mass_factor_ground
error on the AMF to ground	ERRAMFGRD	air_mass_factor_ground_error
AMF to cloud-top	AMFCLD	air_mass_factor_cloud
error on the AMF to cloud-top	ERRAMFCLD	air_mass_factor_cloud_error
clear & cloud look-up, extended field-of-view, maritime aerosol present, maximum SZA exceeded	AMFFLAG	air_mass_factor_flag
forward scan, backward scan	-	backscan_flag
Temperature of reference spectrum	TEMPERATURE	temperature_of_reference_spectrum (group attribute)

For the tropospheric product the entries are

Description	ENVISAT Entry	Name
tropospheric vertical column density	VCD	tropospheric_vertical_column_density
uncorrected tropospheric vertical column density	VCD	uncorrected_tropospheric_slant_column_density
corrected stratospheric slant column density	VCD	corrected_stratospheric_slant_column_density
stratospheric slant column density	VCD	stratospheric_slant_column_density
stratospheric vertical column density	VCD	stratospheric_vertical_column_density
tropospheric slant column density	VCD	tropospheric_slant_column_density
AMF calculated for completely cloud-free pixels	AMFGRD	tropospheric_air_mass_factor

3.7.2 Nadir BrO

Two BrO retrievals are combined in the netCDF group /MEASUREMENT_DATA/NADIR_UV_BrO: The retrieval of the total column and the retrieval of the tropospheric column. In the ENVISAT format the retrievals are in separate MDS's. The relation for the total column is

Description	ENVISAT Entry	netCDF Entry
time offset in seconds from midnight	STARTTIME	delta_time
Data set record length (DSR)	DSRLEN	not needed
Quality indicator (-1 if DSR is empty)	QUALITY	not needed
integration time of measurement	INTTIME	integration_time
Number of vertical column densities	NUMOFVCD	not needed
slant column density	ESC	slant_column_density
error on the slant column density	ERRESC	slant_column_density_error
Number of linear fitted parameters	NUMLINFITP	not needed
Number of non-linear fitted parameters	NUMNLINFITP	not needed
linear fitted parameters	LINPARS	linear_fitted_parameters
error on linear fitted parameters	ERRLINPARS	linear_fitted_parameters_errors
cross-correlation matrix entries of the linear fit	LINCORRM	linear_fit_correlation_matrix
non-linear fitted parameters	NLINPARS	non_linear_fitted_parameters
error on non-linear fitted parameters	ERRNLINPARS	non_linear_fitted_parameters_error
cross-correlation matrix entries of the non-linear fit	NLINCORRM	non_linear_fit_correlation_matrix
RMS of the fit	RMS	root_mean_square
chi-square of the fit	CHI2	chi_square

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Description	ENVISAT Entry	netCDF Entry
Goodness of the fit	GOODNESS	not calculated
number of iterations for the non-linear fit	NUMITER	number_iterations
smoothing of measurements, error weighting of fitting, use of ratioed measurements, use of pre-convoluted cross-sections, convolution of cross-sections, convolution on measurement grid, SCIAMACHY cross-sections used, non-linear fitting, use of background correction, bit 6-4: quality, to be interpreted as 3 bit integer, 0 lowest quality, 7 highest quality	FITFLAG	fitting_flag
forward scan, backward scan		backscan_flag

The total column was removed from the ENVISAT MDS, in the ENVISAT product there is only one total column from the tropospheric retrieval available. For the tropospheric MDS the entries are

Description	Type	ENVISAT Entry	netCDF Entry
tropospheric vertical column density	F	VCD	tropospheric_vertical_column_density
stratospheric slant column density	F	VCD	stratospheric_slant_column_density
stratospheric vertical column density	F	VCD	stratospheric_vertical_column_density
total vertical column density	F	VCD	total_vertical_column_density
tropospheric slant column density	F	VCD	tropospheric_slant_column_density
tropospheric AMF	F	AMFGRD	tropospheric_air_mass_factor
stratospheric AMF	F	AMFCLD	stratospheric_air_mass_factor

3.7.3 Nadir SO2

For this product again two ENVISAT format MDS were merged: the one for the anthropogenic column and the one for the volcanic column. The difference for the two calculations is the SO_2 profile peak position. The netCDF file thus contains the following entries

Description	ENVISAT Entry	Name
vertical column density for anthropogenic SO2	VCD	vertical_column_density_anthropogenic
vertical column density for volcanic SO2	VCD	vertical_column_density_volcanic
error on the vertical column density for anthropogenic SO2	VCD	vertical_column_density_error_anthropogenic
error on the vertical column density for volcanic SO2	VCD	vertical_column_density_error_volcanic
AMF to ground for anthropogenic SO2	AMFGRD	air_mass_factor_anthropogenic
error on the AMF to ground for anthropogenic SO2	ERRAMFGRD	air_mass_factor_error_anthropogenic
AMF to ground for volcanic SO2	AMFGRD	air_mass_factor_volcanic
error on the AMF to ground for volcanic SO2	ERRAMFGRD	air_mass_factor_error_volcanic

3.7.4 Nadir H2O

The water vapour retrieval does not use slant columns and the concerned entries are not filled.

Description	ENVISAT Entry	Name
time offset in seconds from midnight	STARTTIME	delta_time
Data set record length (DSR)	DSRLLEN	not needed

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Description	ENVISAT Entry	Name
Quality indicator (-1 if DSR is empty)	QUALITY	not needed
integration time of measurement	INTTIME	integration_time
Number of vertical column densities	NUMOFVCD	not needed
slant column density	ESC	not calculated
error on the slant column density	ERRESC	not calculated
Number of linear fitted parameters	NUMLINFITP	not needed
Number of non-linear fitted parameters	NUMNLINFITP	not needed
linear fitted parameters	LINPARS	not calculated
error on linear fitted parameters	ERRLINPARS	not calculated
cross-correlation matrix entries of the linear fit	LINCORRM	not calculated
vertical column density	VCD	vertical_column_density
meteorological vertical column density	VCD	meteorological_vertical_column_density
error on the vertical column density	ERRVCD	vertical_column_density_error
non-linear fitted parameters	NLINPARS	non_linear_fitted_parameters
error on non-linear fitted parameters	ERRNLINPARS	non_linear_fitted_parameters_error
cross-correlation matrix entries of the non-linear fit	NLINCOORM	non_linear_fit_correlation_matrix
RMS of the fit	RMS	root_mean_square
number of iterations for the non-linear fit	NUMITER	number_iterations
AMF correction	AMFGRD	air_mass_factor_correction
error on the AMF correction	ERRAMFGRD	air_mass_factor_correction_error
forward scan, backward scan		backscan_flag

3.7.5 Nadir CH4

In the methane retrieval no slant column and no AMF is needed. Two vertical column densities are calculated: xCH₄ (proxy) and CH₄ (no proxy). The proxy retrieval uses the CO₂ parameter that is retrieved together with the methane column to correct for light path effects (see also [5])

Description	ENVISAT Entry	Name
time offset in seconds from midnight	STARTTIME	delta_time
Data set record length (DSR)	DSRLEN	not needed
Quality indicator (-1 if DSR is empty)	QUALITY	not needed
integration time of measurement	INTTIME	integration_time
Number of vertical column densities	NUMOFVCD	not needed
slant column density	ESC	not calculated
error on the slant column density	ERRESC	not calculated
Number of linear fitted parameters	NUMLINFITP	not needed
Number of non-linear fitted parameters	NUMNLINFITP	not needed
linear fitted parameters	LINPARS	linear_fitted_parameters
error on linear fitted parameters	ERRLINPARS	linear_fitted_parameters_errors
cross-correlation matrix entries of the linear fit	LINCORRM	linear_fit_correlation_matrix
vertical column density	VCD	vertical_column_density_ch4
meteorological vertical column density	VCD	vertical_column_density_xch4
error on the vertical column density	ERRVCD	vertical_column_density_error_ch4
error on the vertical column density	ERRVCD	vertical_column_density_error_xch4
Flag describing the VCD output	VCDFLAG	vertical_column_density_flag
non-linear fitted parameters	NLINPARS	non_linear_fitted_parameters
error on non-linear fitted parameters	ERRNLINPARS	non_linear_fitted_parameters_error
cross-correlation matrix entries of the non-linear fit	NLINCOORM	non_linear_fit_correlation_matrix

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Description	ENVISAT Entry	Name
RMS of the fit	RMS	root_mean_square
Chi-square of the fit	CHI2	chi_square
number of iterations for the non-linear fit	NUMITER	number_iterations
AMF correction	AMFGRD	not calculated
error on the AMF correction	ERRAMFGRD	not calculated
forward scan, backward scan		backscan_flag

3.7.6 Nadir CO

The entries are the same as for the methane retrieval (see 3.7.5), only the suffix "_ch4/_xch4" is replaced by "_co/_xco". The CO proxy retrieval uses methane parameters as proxy (see also [5])

3.8 Limb MDS

Description	ENVISAT Entry	netCDF Entry
Start time of the profile record	STARTTIME	delta_time
Data set record length (DSR)	DSRLEN	not needed
Quality indicator (-1 if DSR is empty)	QUALITY	not needed
Integration Time of each individual step in the measurement grid	INTTIME	integration_time
Retrieval method	METHOD	removed
Height of the reference pressure	REFH	removed
Reference pressure for hydrostatic equilibrium	REFP	removed
Reference pressure source	REFPSRC	removed
Number of profile entries	NUM_RLEVEL	number_profile_entries
Number of used measurement levels	NUM_MLEVEL	number_measurement_levels
Number of fitted main gas species	NUM_SPECIES	not needed
Number of fitted closure parameters	NUM_CLOSURE	not needed
Number of fitted other parameters	NUM_OTHER	not needed
Number of fitted scaling parameters for auxiliary gases	NUM_SCALE	not needed
Tangent height at the lower layer boundary	TANGH	tangent_layer_height_lower_layer_boundary
Tangent layer pressure at the lower layer boundary	TANGP	tangent_layer_pressure_lower_layer_boundary
Tangent layer temperature	TANGT	tangent_layer_temperature
Main species which have been fitted on the coarse forward model grid	MAINREC	tangent_layer_volume_mixing_ratio tangent_layer_volume_mixing_ratio_error vertical_column_density_above_lower_layer_boundary vertical_column_density_above_lower_layer_boundary_error
Scaled profiles which have been used for the fit on the coarse forward model grid	SCALEDREC	removed
Measurement Grid	MGRID	measurement_grid_delta_time measurement_grid_tangent_height measurement_grid_tangent_pressure measurement_grid_tangent_temperature measurement_grid_number_windows measurement_grid_minimum_wavelength measurement_grid_maximum_wavelength
State vector size	STVEC_SIZE	not needed
State Vector	STATEVEC	state_vector_value state_vector_error
Correlation matrix size	CMATRIXSIZE	not needed
Correlation matrix of the fit	CORRMATRIX	correlation_matrix

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Description	ENVISAT Entry	netCDF Entry
RMS of the fit	RMS	root_mean_square
chi-square of the fit	CHI2	chi_square
Goodness of the fit	GOODNESS	removed
Number of iterations for the fit	ITERATION	number_iterations
Measurement summary: number of used and rejected wavelengths	SUMMARY	number_used_wavelength number_rejected_wavelength
Convergence criteria	CRITERIA	removed
Residuals size	RESSIZE	not needed
Iteration step state vector residuals	RESIDUALS	removed
Number of additional diagnostics	NUM_ADDDIAG	not needed
Additional diagnostics	ADDDIAG	degree_of_freedom diagonal_of_averaging_kernel number_density_retrieved number_density_initial scaling_factor_volume_mixing_ratio scaling_factor_volume_number_density averaging_kernel

3.9 Limb Cloud MDS

Description	ENVISAT Entry	netCDF Entry
Start time of the profile record	STARTTIME	delta_time
Data set record length (DSR)	DSRLEN	not needed
Quality indicator	QUALITY	not needed
Integration Time of each individual step in the measurement grid	INTTIME	integration_time
Diagnostics of the cloud detection algorithm, details see below	CLOUDDIAG	cloud_diagnostics
Flag for normal water clouds	FLAG_WCL	water_cloud_flag
Maximum value of CIR for normal waterclouds	MAXVAL_WCL	water_cloud_color_index_ratio_maximum_value
Height of maximum value of CIR for normal water clouds	MAXHEIGHT_WCL	water_cloud_height
Height index of maximum value of CIR for normal water clouds	MAXHEIGHTIDX_WCL	water_cloud_height_index
Flag for ice clouds	FLAG_ICL	ice_cloud_flag
Maximum value of CIR for ice clouds	MAXVAL_ICL	ice_cloud_color_index_ratio_maximum_value
Height of maximum value of CIR for normal water clouds	MAXHEIGHT_ICL	ice_cloud_height
Height index of maximum value of CIR for ice clouds	MAXHEIGHTIDX_ICL	ice_cloud_height_index
Flag for polar stratospheric clouds	FLAG_PSC	polar_stratospheric_cloud_flag
Maximum value of CIR for polar stratospheric clouds	MAXVAL_PSC	polar_stratospheric_cloud_color_index_ratio_maximum_value
Height of maximum value of CIR for polar stratospheric clouds	MAXHEIGHT_PSC	polar_stratospheric_cloud_height
Height index of maximum value of CIR for ice clouds	MAXHEIGHTIDX_PSC	polar_stratospheric_cloud_height_index
Flag for noctilucent clouds	FLAG_NLC	noctilucent_cloud_flag
not used at present	MAXVAL_NLC	not needed
Maximum height of strictly monotonically increasing radiances for noctilucent clouds	MAXHEIGHT_NLC	noctilucent_cloud_height
Maximum height index of strictly monotonically increasing radiances for noctilucent clouds	MAXHEIGHTIDX_NLC	noctilucent_cloud_height_index
Number of tangent heights for CIR	NUMTANH	number_tangent_heights
Tangent heights for CIR	TANH	tangent_heights
Number of CIR	NUMCIR	not needed
CIR	CIR	color_index_ratios

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Description	ENVISAT Entry	netCDF Entry
Number of additional limb cloud parameters	NUMCLOUDPARS	not needed
Additional limb cloud parameters	CLOUDPARS	not needed

4 Global File Attributes

Table 38: Global Attributes

Name	Value
Conventions	CF-1.6
product_version	1.00
filename	ENV_RPRO_SCI_L2_____20061013T145245_20061013T163234_24156_01_070000_20180517T112852.nc
time_coverage_start	2006-10-13T14:52:45.748Z
time_coverage_end	2006-10-13T16:32:34.451Z
time_reference	2006-10-13T00:00:00.000Z
history	Processed by scial12
institution	Deutsches Zentrum fuer Luft- und Raumfahrt (DLR)
title	SCIAMACHY Level 2 product
source	satellite observations
platform	ENVISAT
sat_id	EN
sensor	SCIAMACHY
keywords_vocabulary	AGU index terms, http://publications.agu.org/author-resource-center/index-terms/
keywords	0305 Aerosols and particles; 0319 Cloud optics; 0325 Evolution of the atmosphere; 0340 Middle atmosphere, composition and chemistry; 0365 Troposphere, composition and chemistry; 0370 Volcanic effects; 0490 Trace gases; 1610 Atmosphere; 1630 Impacts of global change; 3305 Climate change and variability; 3311 Clouds and aerosols; 3360 Remote sensing
level	L2
processor	SCIA-OL/7.00
temporal	orbital
processor_version	7.00
references	https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/envisat/instruments/sciamachy http://www.sciamachy.org http://atmos.eoc.dlr.de
comment	SCIAMACHY reprocessing 2018
orbit	24156
reference_document	ENV-IODD-DLR-SCIA-0086
product_type	SCI_L2_____
date_created	2018-05-17T11:28:52.356Z
creator_name	SCIAMACHY Quality Working Group (SQWG)

5 Geolocation Group for Nadir Measurements

All Nadir measurements have the following subgroup containing the coordinates for the measurements.

Table 39: Attributes for group GEODATA

Name	Value
top_of_atmosphere	100000m

Table 40: Variables of group GEODATA

Name	Description	Unit	Type	Dimensions
earth_radius	earth radius	m	float32	1
esm_position	elevation scan mirror position	degree	float32	1

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Name	Description	Unit	Type	Dimensions
latitude	center latitude of each observation	degrees north	float32	1
latitude_bounds	corner coordinate latitudes of each observation	degrees north	float32	2
latitude_subsatellite	sub-satellite latitude of each observation	degrees north	float32	1
longitude	center longitude of each observation	degrees east	float32	1
longitude_bounds	corner coordinate longitudes of each observation	degrees east	float32	2
longitude_subsatellite	sub-satellite longitude of each observation	degrees east	float32	1
satellite_altitude	satellite altitude	m	float32	1
solar_azimuth_angle	at top of atmosphere	degree	float32	2
solar_zenith_angle	at top of atmosphere	degree	float32	2
viewing_azimuth_angle	at top of atmosphere	degree	float32	2
viewing_zenith_angle	at top of atmosphere	degree	float32	2

6 Geolocation Group for Limb Measurements

All Limb measurements have the following subgroup containing the coordinates for the measurements.

Table 41: Attributes for group GEODATA

Name	Value
top_of_atmosphere	100000m

Table 42: Variables of group GEODATA

Name	Description	Unit	Type	Dimensions
asm_position	azimuth scan mirror position	degree	float32	1
earth_radius	earth radius	m	float32	1
esm_position	elevation scan mirror position	degree	float32	1
latitude	tangent latitude at start, middle and end of integration	degrees north	float32	2
latitude_subsatellite	sub-satellite latitude of each observation	degrees north	float32	1
longitude	tangent longitude at start, middle and end of integration	degrees east	float32	2
longitude_subsatellite	sub-satellite longitude of each observation	degrees east	float32	1
satellite_altitude	satellite altitude	m	float32	1
solar_azimuth_angle	at top of atmosphere	degree	float32	2
solar_zenith_angle	at top of atmosphere	degree	float32	2
tangent_height	tangent height of each limb observation	m	float32	2
viewing_azimuth_angle	at top of atmosphere	degree	float32	2
viewing_zenith_angle	at top of atmosphere	degree	float32	2

7 ANNOTATION_DATA

7.1 LIMB_GEOLOCATION

Table 43: Attributes for group LIMB_GEOLOCATION

Name	Value
top_of_atmosphere	100000m

Table 44: Variables of group LIMB_GEOLOCATION

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
solar_zenith_angles	solar zenith angles of the start, middle and end of the integration time at TOA	degree	float32	2
line_of_sight_angles	line-of-sight nadir angles of the start, middle and end of the integration time at TOA	degree	float32	2
relative_azimuth_angles	relative azimuth angles of the start, middle and end of the integration time at TOA	degree	float32	2
satellite_height	satellite geodetic height at the middle of the integration time	m	float32	1
earth_curvature_radius	earth curvature radius at the middle of the integration time	m	float32	1
sub_satellite_latitude	latitudes of sub-satellite points at the middle of the integration time	degrees north	float32	1
sub_satellite_longitude	longitudes of sub-satellite points at the middle of the integration time	degrees east	float32	1
tangent_ground_latitudes	latitudes of tangent ground points at the start, middle and end of integration time	degrees north	float32	2
tangent_ground_longitudes	longitudes of tangent ground points at the start, middle and end of integration time	degrees east	float32	2
tangent_height	tangent height at the start, middle and end of integration time	m	float32	2

7.2 NADIR_GEOLOCATION

Table 45: Attributes for group NADIR_GEOLOCATION

Name	Value
top_of_atmosphere	100000m

Table 46: Variables of group NADIR_GEOLOCATION

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
solar_zenith_angles	solar zenith angles of the start, middle and end of the integration time at TOA	degree	float32	2
line_of_sight_angles	line-of-sight nadir angles of the start, middle and end of the integration time at TOA	degree	float32	2
relative_azimuth_angles	relative azimuth angles of the start, middle and end of the integration time at TOA	degree	float32	2
satellite_height	satellite geodetic height at the middle of the integration time	m	float32	1
earth_curvature_radius	earth curvature radius at the middle of the integration time	m	float32	1
sub_satellite_latitude	latitudes of sub-satellite points at the middle of the integration time	degrees north	float32	1
sub_satellite_longitude	longitudes of sub-satellite points at the middle of the integration time	degrees east	float32	1
corner_latitudes	latitudes of nadir ground pixel corners	degrees north	float32	2
corner_longitudes	longitudes of nadir ground pixel corners	degrees east	float32	2
center_latitude	latitudes of nadir ground pixel centers	degrees north	float32	1
center_longitude	longitudes of nadir ground pixel centers	degrees east	float32	1

7.3 STATES

Table 47: Variables of group STATES

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
state_id	state ID	1	uint16	1
duration	duration of scan phase of the state	s	float32	1
longest_integration_time	longest integration time	s	float32	1
shortest_integration_time	shortest integration time	s	float32	1
number_observations	number of geolocation records for this state	1	uint16	1
corner_latitudes	corner latitudes of the ground scene which is covered by the state	degrees north	float32	2
corner_longitudes	corner longitudes of the ground scene which is covered by the state	degrees east	float32	2

8 GLOBAL_ANNOTATION_DATA

8.1 STATIC_PARAMETER

Table 48: Variables of group *STATIC_PARAMETER*

Name	Description	Unit	Type	Dimensions
xml_text_initialization_file	XML text of the initialization file which covers the complete range of static parameters	-	string	0

9 MEASUREMENT_DATA

9.1 LIMB_CLOUD

Table 49: Variables of group *LIMB_CLOUD*

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
cloud_diagnostics	diagnostics of the cloud detection algorithm	-	uint8	1
water_cloud_flag	flag for water/ice/aerosol clouds	-	uint8	1
water_cloud_color_index_ratio_maximum_value	maximum value of CIR for water/ice/aerosol clouds	1	float32	1
water_cloud_height	height of maximum value of CIR for water/ice/aerosol clouds	m	float32	1
water_cloud_height_index	height index of maximum value of CIR for water/ice/aerosol clouds	1	float32	1
ice_cloud_flag	flag for ice clouds	-	uint8	1
ice_cloud_color_index_ratio_maximum_value	maximum value of CIR for ice/water clouds	1	float32	1
ice_cloud_height	height of maximum value of CIR for ice/water clouds	m	float32	1
ice_cloud_height_index	height index of maximum value of CIR for ice/water clouds	1	float32	1
polar_stratospheric_cloud_flag	flag for polar stratospheric clouds	-	uint8	1
polar_stratospheric_cloud_color_index_ratio_maximum_value	maximum value of CIR for polar stratospheric clouds	1	float32	1
polar_stratospheric_cloud_height	height of maximum value of CIR for polar stratospheric clouds	m	float32	1
polar_stratospheric_cloud_height_index	height index of maximum value of CIR for polar stratospheric clouds	1	float32	1
noctilucent_cloud_flag	flag for noctilucent clouds	-	uint8	1
noctilucent_cloud_height	maximum height of strictly monotonically increasing radiances for noctilucent clouds	m	float32	1

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Name	Description	Unit	Type	Dimensions
noctilucent_cloud_height_index	maximum height index of strictly monotonically increasing radi- ances for noctilucent clouds	1	float32	1
number_tangent_heights	number of tangent heights for CIR	1	uint16	1
tangent_heights	tangent heights for CIR	m	float32	2
color_index_ratios	color index ratios	1	float32	3

9.2 LIMB_UV_BRO

Table 50: Attributes for group LIMB_UV_BRO

Name	Value
fit_window	337-357nm
fit_species	BrO
observation_geometry	limb
second_fit_species	O3

Table 51: Variables of group LIMB_UV_BRO

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
number_profile_entries	number of profile entries	1	uint8	1
number_measurement_levels	number of used measurement levels	1	uint8	1
tangent_layer_height_lower_layer_boundary	tangent height at the lower layer boundary	m	float32	1
tangent_layer_pressure_lower_layer_boundary	tangent layer pressure at the lower layer boundary	Pa	float32	2
tangent_layer_temperature	tangent layer temperature (mean)	K	float32	2
tangent_layer_volume_mixing_ratio	tangent layer volume mixing ratio	ppV	float32	3
tangent_layer_volume_mixing_ratio_error	error on tangent layer volume mixing ratio	relative fraction	float32	3
vertical_column_density_above_lower_layer_boundary	vertical column density above lower layer boundary	molecule/cm ²	float32	3
vertical_column_density_above_lower_layer_boundary_error	error on vertical column density above lower layer boundary	relative fraction	float32	3
measurement_grid_tangent_height	mean tangent height of measurement	m	float32	2
measurement_grid_tangent_pressure	pressure at tangent height	Pa	float32	2
measurement_grid_tangent_temperature	temperature at tangent height	K	float32	2
measurement_grid_number_windows	number of fitting windows	1	uint8	2
measurement_grid_minimum_wavelength	minimum wavelength over all fitting windows	nm	float32	2
measurement_grid_maximum_wavelength	maximum wavelength over all fitting windows	nm	float32	2

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Name	Description	Unit	Type	Dimensions
measurement_grid_delta_time	time offset in seconds from midnight	s	float64	2
state_vector_value	value of the state vector entry	1	float32	2
state_vector_error	error of the state vector entry	relative fraction	float32	2
correlation_matrix	correlation matrix of the fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
chi_square	chi-square of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
number_used_wavelength	measurement summary: number of used wavelengths	1	uint16	1
number_rejected_wavelength	measurement summary: number of rejected wavelengths	1	uint16	1
residuals	iteration step state vector residuals	1	float32	3
degree_of_freedom	degree of freedom	1	float32	1
diagonal_of_averaging_kernel	diagonal of averaging kernel	1	float32	2
number_density_retrieved	retrieved profile(s) in number density	molecule/cm ³	float32	3
number_density_initial	initial profile(s) in number density	molecule/cm ³	float32	3
scaling_factor_volume_mixing_ratio	scaling factor multiplied on profile(s) in partial columns to calculate profile(s) in volume mixing ratio	1	float32	2
scaling_factor_volume_number_density	scaling factor multiplied on profile(s) in partial columns to calculate profile(s) in number densities	1	float32	2
averaging_kernel	averaging kernel in partial columns	1	float32	4

9.3 LIMB_UV_NO2

Table 52: Attributes for group LIMB_UV_NO2

Name	Value
fit_window	420-470nm
fit_species	NO2
observation_geometry	limb
second_fit_species	O3

Table 53: Variables of group LIMB_UV_NO2

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
number_profile_entries	number of profile entries	1	uint8	1

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Name	Description	Unit	Type	Dimensions
number_measurement_levels	number of used measurement levels	1	uint8	1
tangent_layer_height_lower_layer_boundary	tangent height at the lower layer boundary	m	float32	1
tangent_layer_pressure_lower_layer_boundary	tangent layer pressure at the lower layer boundary	Pa	float32	2
tangent_layer_temperature	tangent layer temperature (mean)	K	float32	2
tangent_layer_volume_mixing_ratio	tangent layer volume mixing ratio	ppV	float32	3
tangent_layer_volume_mixing_ratio_error	error on tangent layer volume mixing ratio	relative fraction	float32	3
vertical_column_density_above_lower_layer_boundary	vertical column density above lower layer boundary	molecule/cm ²	float32	3
vertical_column_density_above_lower_layer_boundary_error	error on vertical column density above lower layer boundary	relative fraction	float32	3
measurement_grid_tangent_height	mean tangent height of measurement	m	float32	2
measurement_grid_tangent_pressure	pressure at tangent height	Pa	float32	2
measurement_grid_tangent_temperature	temperature at tangent height	K	float32	2
measurement_grid_number_windows	number of fitting windows	1	uint8	2
measurement_grid_minimum_wavelength	minimum wavelength over all fitting windows	nm	float32	2
measurement_grid_maximum_wavelength	maximum wavelength over all fitting windows	nm	float32	2
measurement_grid_delta_time	time offset in seconds from midnight	s	float64	2
state_vector_value	value of the state vector entry	1	float32	2
state_vector_error	error of the state vector entry	relative fraction	float32	2
correlation_matrix	correlation matrix of the fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
chi_square	chi-square of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
number_used_wavelength	measurement summary: number of used wavelengths	1	uint16	1
number_rejected_wavelength	measurement summary: number of rejected wavelengths	1	uint16	1
residuals	iteration step state vector residuals	1	float32	3
degree_of_freedom	degree of freedom	1	float32	1
diagonal_of_averaging_kernel	diagonal of averaging kernel	1	float32	2
number_density_retrieved	retrieved profile(s) in number density	molecule/cm ³	float32	3
number_density_initial	initial profile(s) in number density	molecule/cm ³	float32	3
scaling_factor_volume_mixing_ratio	scaling factor multiplied on profile(s) in partial columns to calculate profile(s) in volume mixing ratio	1	float32	2
scaling_factor_volume_number_density	scaling factor multiplied on profile(s) in partial columns to calculate profile(s) in number densities	1	float32	2
averaging_kernel	averaging kernel in partial columns	1	float32	4

9.4 LIMB_UV_O3

Table 54: Attributes for group LIMB_UV_O3

Name	Value
fit_window	283-590nm
fit_species	O3
observation_geometry	limb
second_fit_species	NO2

Table 55: Variables of group LIMB_UV_O3

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
number_profile_entries	number of profile entries	1	uint8	1
number_measurement_levels	number of used measurement levels	1	uint8	1
tangent_layer_height_lower_layer_boundary	tangent height at the lower layer boundary	m	float32	1
tangent_layer_pressure_lower_layer_boundary	tangent layer pressure at the lower layer boundary	Pa	float32	2
tangent_layer_temperature	tangent layer temperature (mean)	K	float32	2
tangent_layer_volume_mixing_ratio	tangent layer volume mixing ratio	ppV	float32	3
tangent_layer_volume_mixing_ratio_error	error on tangent layer volume mixing ratio	relative fraction	float32	3
vertical_column_density_above_lower_layer_boundary	vertical column density above lower layer boundary	molecule/cm ²	float32	3
vertical_column_density_above_lower_layer_boundary_error	error on vertical column density above lower layer boundary	relative fraction	float32	3
measurement_grid_tangent_height	mean tangent height of measurement	m	float32	2
measurement_grid_tangent_pressure	pressure at tangent height	Pa	float32	2
measurement_grid_tangent_temperature	temperature at tangent height	K	float32	2
measurement_grid_number_windows	number of fitting windows	1	uint8	2
measurement_grid_minimum_wavelength	minimum wavelength over all fitting windows	nm	float32	2
measurement_grid_maximum_wavelength	maximum wavelength over all fitting windows	nm	float32	2
measurement_grid_delta_time	time offset in seconds from midnight	s	float64	2
state_vector_value	value of the state vector entry	1	float32	2
state_vector_error	error of the state vector entry	relative fraction	float32	2
correlation_matrix	correlation matrix of the fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
chi_square	chi-square of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
number_used_wavelength	measurement summary: number of used wavelengths	1	uint16	1
number_rejected_wavelength	measurement summary: number of rejected wavelengths	1	uint16	1
residuals	iteration step state vector residuals	1	float32	3
degree_of_freedom	degree of freedom	1	float32	1
diagonal_of_averaging_kernel	diagonal of averaging kernel	1	float32	2

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Name	Description	Unit	Type	Dimensions
number_density_retrieved	retrieved profile(s) in number density	molecule/cm ³	float32	3
number_density_initial	initial profile(s) in number density	molecule/cm ³	float32	3
scaling_factor_volume_mixing_ratio	scaling factor multiplied on profile(s) in partial columns to calculate profile(s) in volume mixing ratio	1	float32	2
scaling_factor_volume_number_density	scaling factor multiplied on profile(s) in partial columns to calculate profile(s) in number densities	1	float32	2
averaging_kernel	averaging kernel in partial columns	1	float32	4

9.5 NADIR_CLOUD_AEROSOL

Table 56: Variables of group NADIR_CLOUD_AEROSOL

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
cloud_fraction	cloud fraction	1	float32	1
number_pmd_sub_pixels	number of PMD sub-pixels	1	uint16	1
number_totally_cloudy_pmd_sub_pixels	number of totally cloudy PMD sub-pixels	1	uint16	1
number_totally_cloud_free_pmd_sub_pixels	number of totally cloud-free PMD sub-pixels	1	uint16	1
cloud_top_height	cloud-top height	m	float32	1
cloud_optical_depth	cloud optical depth	1	float32	1
cloud_flag	flag describing the cloud parameter output	-	uint8	1
absorbing_aerosol_indicator	absorbing aerosol indicator	1	float32	1
absorbing_aerosol_indicator_flag	flag describing the AAI output	-	uint8	1
absorbing_aerosol_indicator_residue	residue calculated in the AAIA	1	float32	1
absorbing_aerosol_indicator_surface_albedo	retrieved surface albedo at 380 nm	1	float32	1
absorbing_aerosol_indicator_ground_height	ground height used in the AAIA	m	float32	1
backscan_flag	flag indicating a backward scan	-	uint8	1

9.6 NADIR_IR_CH4

Table 57: Attributes for group NADIR_IR_CH4

Name	Value
fit_window	1558-1671nm
fit_species	CH4

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Name	Value
observation_geometry	nadir

Table 58: Variables of group NADIR_IR_CH4

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
vertical_column_density_xch4	vertical column density of XCH4	molecule/cm ²	float32	1
vertical_column_density_ch4	vertical column density of CH4	molecule/cm ²	float32	1
vertical_column_density_error_xch4	error on the vertical column density of XCH4	molecule/cm ²	float32	1
vertical_column_density_error_ch4	error on the vertical column density of CH4	molecule/cm ²	float32	1
vertical_column_density_flag	flag describing the VCD output	-	uint16	1
linear_fitted_parameters	linear fitted parameters	1	float32	2
linear_fitted_parameters_errors	error on linear fitted parameters	relative fraction	float32	2
linear_fit_correlation_matrix	cross-correlation matrix entries of the linear fit	1	float32	2
non_linear_fitted_parameters	non-linear fitted parameters	1	float32	2
non_linear_fitted_parameters_error	error on non-linear fitted parameters	relative fraction	float32	2
non_linear_fit_correlation_matrix	cross-correlation matrix entries of the non-linear fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
chi_square	chi-square of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
backscan_flag	flag indicating a backward scan	-	uint8	1

9.7 NADIR_IR_CO

Table 59: Attributes for group NADIR_IR_CO

Name	Value
fit_window	2324-2335nm
fit_species	CO
observation_geometry	nadir

Table 60: Variables of group NADIR_IR_CO

Name	Description	Unit	Type	Dimensions
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Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
vertical_column_density_xco	vertical column density of XCO	molecule/cm ²	float32	1
vertical_column_density_co	vertical column density of CO	molecule/cm ²	float32	1
vertical_column_density_error_xco	error on the vertical column density of XCO	molecule/cm ²	float32	1
vertical_column_density_error_co	error on the vertical column density of CO	molecule/cm ²	float32	1
vertical_column_density_flag	flag describing the VCD output	-	uint16	1
linear_fitted_parameters	linear fitted parameters	1	float32	2
linear_fitted_parameters_errors	error on linear fitted parameters	relative fraction	float32	2
non_linear_fitted_parameters	non-linear fitted parameters	1	float32	2
non_linear_fitted_parameters_error	error on non-linear fitted parameters	relative fraction	float32	2
non_linear_fit_correlation_matrix	cross-correlation matrix entries of the non-linear fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
chi_square	chi-square of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
backscan_flag	flag indicating a backward scan	-	uint8	1

9.8 NADIR_UV_BRO

Table 61: Attributes for group NADIR_UV_BRO

Name	Value
fit_window	336-351nm
fit_species	BrO
observation_geometry	nadir
temperature_of_reference_spectrum	223K

Table 62: Variables of group NADIR_UV_BRO

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
tropospheric_vertical_column_density	tropospheric vertical column density	molecule/cm ²	float32	1
stratospheric_slant_column_density	stratospheric slant column density	molecule/cm ²	float32	1
stratospheric_vertical_column_density	stratospheric vertical column density	molecule/cm ²	float32	1
total_vertical_column_density	total vertical column density	molecule/cm ²	float32	1

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Name	Description	Unit	Type	Dimensions
tropospheric_slant_column_density	tropospheric slant column density	molecule/cm ²	float32	1
slant_column_density	slant column density	molecule/cm ²	float32	1
slant_column_density_error	error on the slant column density	relative fraction	float32	1
linear_fitted_parameters	linear fitted parameters	1	float32	2
linear_fitted_parameters_errors	error on linear fitted parameters	relative fraction	float32	2
linear_fit_correlation_matrix	cross-correlation matrix entries of the linear fit	1	float32	2
non_linear_fitted_parameters	non-linear fitted parameters	1	float32	2
non_linear_fitted_parameters_error	error on non-linear fitted parameters	relative fraction	float32	2
non_linear_fit_correlation_matrix	cross-correlation matrix entries of the non-linear fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
chi_square	chi-square of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
fitting_flag	fitting output flag	-	uint16	1
tropospheric_air_mass_factor	tropospheric AMF	1	float32	1
stratospheric_air_mass_factor	stratospheric AMF	1	float32	1
backscan_flag	flag indicating a backward scan	-	uint8	1

9.9 NADIR_UV_CHOCHO

Table 63: Attributes for group NADIR_UV_CHOCHO

Name	Value
fit_window	435-457nm
fit_species	CHOCHO
observation_geometry	nadir
temperature_of_reference_spectrum	213K

Table 64: Variables of group NADIR_UV_CHOCHO

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
vertical_column_density	vertical column density	molecule/cm ²	float32	1
vertical_column_density_error	error on the vertical column density	relative fraction	float32	1
vertical_column_density_flag	flag describing the VCD output	-	uint16	1
slant_column_density	slant column density	molecule/cm ²	float32	1

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Name	Description	Unit	Type	Dimensions
slant_column_density_error	error on the slant column density	relative fraction	float32	1
linear_fitted_parameters	linear fitted parameters	1	float32	2
linear_fitted_parameters_errors	error on linear fitted parameters	relative fraction	float32	2
linear_fit_correlation_matrix	cross-correlation matrix entries of the linear fit	1	float32	2
non_linear_fitted_parameters	non-linear fitted parameters	1	float32	2
non_linear_fitted_parameters_error	error on non-linear fitted parameters	relative fraction	float32	2
non_linear_fit_correlation_matrix	cross-correlation matrix entries of the non-linear fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
chi_square	chi-square of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
fitting_flag	fitting output flag	-	uint16	1
air_mass_factor_ground	AMF to ground	1	float32	1
air_mass_factor_ground_error	error on the AMF to ground	relative fraction	float32	1
air_mass_factor_cloud	AMF to cloud-top	1	float32	1
air_mass_factor_cloud_error	error on the AMF to cloud-top	relative fraction	float32	1
air_mass_factor_flag	AMF output flag	-	uint8	1
backscan_flag	flag indicating a backward scan	-	uint8	1

9.10 NADIR_UV_H2CO

Table 65: Attributes for group NADIR_UV_H2CO

Name	Value
fit_window	329-346nm
fit_species	H2CO
observation_geometry	nadir
temperature_of_reference_spectrum	223K

Table 66: Variables of group NADIR_UV_H2CO

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
vertical_column_density	vertical column density	molecule/cm ²	float32	1
vertical_column_density_error	error on the vertical column density	relative fraction	float32	1
vertical_column_density_flag	flag describing the VCD output	-	uint16	1

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Name	Description	Unit	Type	Dimensions
slant_column_density	slant column density	molecule/cm ²	float32	1
slant_column_density_error	error on the slant column density	relative fraction	float32	1
linear_fitted_parameters	linear fitted parameters	1	float32	2
linear_fitted_parameters_errors	error on linear fitted parameters	relative fraction	float32	2
linear_fit_correlation_matrix	cross-correlation matrix entries of the linear fit	1	float32	2
non_linear_fitted_parameters	non-linear fitted parameters	1	float32	2
non_linear_fitted_parameters_error	error on non-linear fitted parameters	relative fraction	float32	2
non_linear_fit_correlation_matrix	cross-correlation matrix entries of the non-linear fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
chi_square	chi-square of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
fitting_flag	fitting output flag	-	uint16	1
air_mass_factor_ground	AMF to ground	1	float32	1
air_mass_factor_ground_error	error on the AMF to ground	relative fraction	float32	1
air_mass_factor_cloud	AMF to cloud-top	1	float32	1
air_mass_factor_cloud_error	error on the AMF to cloud-top	relative fraction	float32	1
air_mass_factor_flag	AMF output flag	-	uint8	1
backscan_flag	flag indicating a backward scan	-	uint8	1

9.11 NADIR_UV_H2O

Table 67: Attributes for group NADIR_UV_H2O

Name	Value
fit_window	688-700nm
fit_species	H2O
observation_geometry	nadir

Table 68: Variables of group NADIR_UV_H2O

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
vertical_column_density	vertical column density	molecule/cm ²	float32	1
meteorological_vertical_column_density	meteorological vertical column density	g/cm ²	float32	1
vertical_column_density_error	error on the vertical column density	relative fraction	float32	1

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Name	Description	Unit	Type	Dimensions
non_linear_fitted_parameters	non-linear fitted parameters	1	float32	2
non_linear_fitted_parameters_error	error on non-linear fitted parameters	relative fraction	float32	2
non_linear_fit_correlation_matrix	cross-correlation matrix entries of the non-linear fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
air_mass_factor_correction	AMF correction	1	float32	1
air_mass_factor_correction_error	error on the AMF correction	relative fraction	float32	1
backscan_flag	flag indicating a backward scan	-	uint8	1

9.12 NADIR_UV_NO2

Table 69: Attributes for group NADIR_UV_NO2

Name	Value
fit_window	427-452nm
fit_species	NO2
observation_geometry	nadir
temperature_of_reference_spectrum	243K

Table 70: Variables of group NADIR_UV_NO2

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
total_vertical_column_density	total vertical column density	molecule/cm ²	float32	1
tropospheric_vertical_column_density	tropospheric vertical column density	molecule/cm ²	float32	1
uncorrected_tropospheric_slant_column_density	uncorrected tropospheric vertical column density	molecule/cm ²	float32	1
corrected_stratospheric_slant_column_density	corrected stratospheric slant column density	molecule/cm ²	float32	1
stratospheric_slant_column_density	stratospheric slant column density	molecule/cm ²	float32	1
stratospheric_vertical_column_density	stratospheric vertical column density	molecule/cm ²	float32	1
tropospheric_slant_column_density	tropospheric slant column density	molecule/cm ²	float32	1
total_vertical_column_density_error	error on the total vertical column density	relative fraction	float32	1
vertical_column_density_flag	flag describing the VCD output	-	uint16	1
slant_column_density	slant column density	molecule/cm ²	float32	1
slant_column_density_error	error on the slant column density	relative fraction	float32	1
linear_fitted_parameters	linear fitted parameters	1	float32	2

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Name	Description	Unit	Type	Dimensions
linear_fitted_parameters_errors	error on linear fitted parameters	relative fraction	float32	2
linear_fit_correlation_matrix	cross-correlation matrix entries of the linear fit	1	float32	2
non_linear_fitted_parameters	non-linear fitted parameters	1	float32	2
non_linear_fitted_parameters_error	error on non-linear fitted parameters	relative fraction	float32	2
non_linear_fit_correlation_matrix	cross-correlation matrix entries of the non-linear fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
chi_square	chi-square of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
fitting_flag	fitting output flag	-	uint16	1
air_mass_factor_ground	AMF to ground	1	float32	1
air_mass_factor_ground_error	error on the AMF to ground	relative fraction	float32	1
air_mass_factor_cloud	AMF to cloud-top	1	float32	1
air_mass_factor_cloud_error	error on the AMF to cloud-top	relative fraction	float32	1
air_mass_factor_flag	AMF output flag	-	uint8	1
tropospheric_air_mass_factor	AMF calculated for completely cloud-free pixels	1	float32	1
backscan_flag	flag indicating a backward scan	-	uint8	1

9.13 NADIR_UV_O3

Table 71: Attributes for group NADIR_UV_O3

Name	Value
fit_window	325-335nm
fit_species	O3
observation_geometry	nadir
temperature_of_reference_spectrum	243K

Table 72: Variables of group NADIR_UV_O3

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
vertical_column_density	vertical column density	molecule/cm ²	float32	1
vertical_column_density_error	error on the vertical column density	relative fraction	float32	1
vertical_column_density_flag	flag describing the VCD output	-	uint16	1
effective_slant_column_density	effective slant column density	molecule/cm ²	float32	1

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Name	Description	Unit	Type	Dimensions
effective_slant_column_density_error	error on the effective slant column density	relative fraction	float32	1
linear_fitted_parameters	linear fitted parameters	1	float32	2
linear_fitted_parameters_errors	error on linear fitted parameters	relative fraction	float32	2
linear_fit_correlation_matrix	cross-correlation matrix entries of the linear fit	1	float32	2
non_linear_fitted_parameters	non-linear fitted parameters	1	float32	2
non_linear_fitted_parameters_error	error on non-linear fitted parameters	relative fraction	float32	2
non_linear_fit_correlation_matrix	cross-correlation matrix entries of the non-linear fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
chi_square	chi-square of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
fitting_flag	fitting output flag	-	uint16	1
air_mass_factor_ground	AMF to ground	1	float32	1
air_mass_factor_ground_error	error on the AMF to ground	relative fraction	float32	1
air_mass_factor_cloud	AMF to cloud-top	1	float32	1
air_mass_factor_cloud_error	error on the AMF to cloud-top	relative fraction	float32	1
air_mass_factor_flag	AMF output flag	-	uint8	1
backscan_flag	flag indicating a backward scan	-	uint8	1

9.14 NADIR_UV_OCLO

Table 73: Attributes for group NADIR_UV_OCLO

Name	Value
fit_window	365-389nm
fit_species	OCIO
observation_geometry	nadir
temperature_of_reference_spectrum	213K

Table 74: Variables of group NADIR_UV_OCLO

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
vertical_column_density	vertical column density	molecule/cm ²	float32	1
vertical_column_density_error	error on the vertical column density	relative fraction	float32	1
vertical_column_density_flag	flag describing the VCD output	-	uint16	1

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Name	Description	Unit	Type	Dimensions
slant_column_density	slant column density	molecule/cm ²	float32	1
slant_column_density_error	error on the slant column density	relative fraction	float32	1
linear_fitted_parameters	linear fitted parameters	1	float32	2
linear_fitted_parameters_errors	error on linear fitted parameters	relative fraction	float32	2
linear_fit_correlation_matrix	cross-correlation matrix entries of the linear fit	1	float32	2
non_linear_fitted_parameters	non-linear fitted parameters	1	float32	2
non_linear_fitted_parameters_error	error on non-linear fitted parameters	relative fraction	float32	2
non_linear_fit_correlation_matrix	cross-correlation matrix entries of the non-linear fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
chi_square	chi-square of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
fitting_flag	fitting output flag	-	uint16	1
air_mass_factor_ground	AMF to ground	1	float32	1
air_mass_factor_ground_error	error on the AMF to ground	relative fraction	float32	1
air_mass_factor_cloud	AMF to cloud-top	1	float32	1
air_mass_factor_cloud_error	error on the AMF to cloud-top	relative fraction	float32	1
air_mass_factor_flag	AMF output flag	-	uint8	1
backscan_flag	flag indicating a backward scan	-	uint8	1

9.15 NADIR_UV_SO2

Table 75: Attributes for group NADIR_UV_SO2

Name	Value
fit_window	315-327nm
fit_species	SO2
observation_geometry	nadir
temperature_of_reference_spectrum	241K

Table 76: Variables of group NADIR_UV_SO2

Name	Description	Unit	Type	Dimensions
delta_time	time offset in seconds from midnight	s	float64	1
integration_time	integration time of measurement	s	float32	1
vertical_column_density_anthropogenic	vertical column density for anthropogenic SO2	molecule/cm ²	float32	1
vertical_column_density_volcanic	vertical column density for volcanic SO2	molecule/cm ²	float32	1

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Name	Description	Unit	Type	Dimensions
vertical_column_density_error_anthropogenic	error on the vertical column density for anthropogenic SO2	relative fraction	float32	1
vertical_column_density_error_volcanic	error on the vertical column density for volcanic SO2	relative fraction	float32	1
vertical_column_density_flag	flag describing the VCD output	-	uint16	1
slant_column_density	slant column density	molecule/cm ²	float32	1
slant_column_density_error	error on the slant column density	relative fraction	float32	1
linear_fitted_parameters	linear fitted parameters	1	float32	2
linear_fitted_parameters_errors	error on linear fitted parameters	relative fraction	float32	2
linear_fit_correlation_matrix	cross-correlation matrix entries of the linear fit	1	float32	2
non_linear_fitted_parameters	non-linear fitted parameters	1	float32	2
non_linear_fitted_parameters_error	error on non-linear fitted parameters	relative fraction	float32	2
non_linear_fit_correlation_matrix	cross-correlation matrix entries of the non-linear fit	1	float32	2
root_mean_square	RMS of the fit	1	float32	1
chi_square	chi-square of the fit	1	float32	1
number_iterations	number of iterations for the non-linear fit	1	uint16	1
fitting_flag	fitting output flag	-	uint16	1
air_mass_factor_anthropogenic	AMF to ground for anthropogenic SO2	1	float32	1
air_mass_factor_error_anthropogenic	error on the AMF to ground for anthropogenic SO2	1	float32	1
air_mass_factor_volcanic	AMF to ground for volcanic SO2	1	float32	1
air_mass_factor_error_volcanic	error on the AMF to ground for volcanic SO2	1	float32	1
air_mass_factor_flag	AMF output flag	-	uint8	1
backscan_flag	flag indicating a backward scan	-	uint8	1

10 METADATA

10.1 EOP_METADATA

Table 77: Metadata attributes for group EOP_METADATA

Group/Name	Value
EOP_METADATA	
gml:id	ENV_RPRO_SCI_L2____20061013T145245_20061013T163234_24156_01_070000_20180517T112852.ID
objectType	atm:EarthObservation
./eop:metaDataProperty	
eop:aquisitionType	NOMINAL
eop:identifier	ENV_RPRO_SCI_L2____20061013T145245_20061013T163234_24156_01_070000_20180517T112852.nc
eop:parentIdentifier	urn:ogc:def:EOP:SCI_L2____

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Group/Name	Value
eop:productType	SCI_L2____
eop:status	ARCHIVED
objectType	eop:EarthObservationMetaData
../eop:archivedIn	
eop:archivingCenter	ESA
eop:archivingDate	NA
objectType	eop:ArchivingInformation
../eop:downloadedTo	
eop:acquisitionDate	2006-10-13
eop:acquisitionStation	PDHS-K
objectType	eop:DownlinkInformation
../eop:processing	
eop:processingCenter	DLR Oberpfaffenhofen
eop:processingDate	2018-05-17
eop:processingLevel	L2
eop:processorName	SCIA_OL
eop:processorVersion	7.00
objectType	eop:ProcessingInformation
./om:featureOfInterest	
objectType	eop:FootPrint
eop:id	ENV_RPRO_SCI_L2____20061013T145245_20061013T163234_24156_01_070000_20180517T112852.nc
../eop:multiExtentOf	
objectType	gml:MultiSurface
../gml:surfaceMembers	
objectType	gml:Polygon
../gml:exterior	
gml:posList	76.0094 339.9630 -76.0933 154.6027
objectType	gml:LinearRing
./om:observedProperty	
nilReason	inapplicable
./om:phenomenonTime	
gml:beginPosition	2006-10-13T14:52:45
gml:endPosition	2006-10-13T16:32:34
objectType	gml:TimePeriod
./om:procedure	
gml:id	ENV_RPRO_SCI_L2____20061013T145245_20061013T163234_24156_01_070000_20180517T112852.EOE
objectType	eop:EarthObservationEquipment

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Group/Name	Value
./eop:acquisitionParameters	
eop:orbitNumber	24156
objectType	eop:Acquisition
./eop:instrument	
eop:shortName	SCIA
objectType	eop:Instrument
./eop:platform	
eop:shortName	ENVISAT
objectType	eop:Platform
./eop:sensor	
eop:sensorType	ATMOSPHERIC
objectType	eop:Sensor
./om:result	
objectType	atm:EarthObservationResult
gml:id	ENV_RPRO_SCI_L2____20061013T145245_20061013T163234_24156_01_070000_20180517T112852.nc
./eop:product	
objectType	eop:ProductInformation
././eop:fileName	
objectType	ows:ServiceReference
ows:RequestMessage	
xlink:href	http://atmos.eoc.dlr.de/sciamachy/
./om:resultTime	
gml:timePosition	2018-05-17T11:28:52
objectType	gml:TimeInstant

10.2 ESA_METADATA

Table 78: Metadata attributes for group ESA_METADATA

Group/Name	Value
ESA_METADATA	
objectType	Earth_Explorer_File
./earth_explorer_header	
objectType	Earth_Explorer_Header
././fixed_header	
File_Class	RPRO
File_Description	SCIAMACHY ENVISAT Level 2 product

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Group/Name	Value
File_Name	ENV_RPRO_SCI_L2_____20061013T145245_20061013T163234_24156_01_070000_20180517T112852.nc
File_Type	SCI_L2_____
File_Version	7.00
Mission	ENVISAT
Notes	SCIAMACHY Reprocessing
objectType	Fixed_Header
../source	
Creation_Date	UTC=2018-05-17T11:28:52
Creator	L2 processor
Creator_Version	SCIA-OL/7.00
System	DLR Oberpfaffenhofen
objectType	Source
../validity_period	
Validity_Start	UTC=2006-10-13T14:52:45
Validity_Stop	UTC=2006-10-13T16:32:34
objectType	Validity_Period

10.3 ISO_METADATA

Table 79: Metadata attributes for group ISO_METADATA

Group/Name	Value
ISO_METADATA	
gmd:dateStamp	2018-05-17
gmd:fileIdentifier	urn:ogc:def:EOP:ESA:ENV.SCIA_L2_UV_VIS_NIR_SWIR
gmd:hierarchyLevelName	EO Product Collection
gmd:metadataStandardName	ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
gmd:metadataStandardVersion	ISO 19115-2:2009(E), SCIAMACHY profile
objectType	gmi:MI_Metadata
./gmd:characterSet	
codeList	http://www.isotc211.org/2005/resources/Codelist/gmxCodeLists.xml#MD_CharacterSetCode
codeListValue	utf8
objectType	gmd:MD_CharacterSetCode
./gmd:contact	
gmd:individualName	DLR
gmd:organisationName	Deutsches Zentrum fuer Luft- und Raumfahrt (DLR)

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Group/Name	Value
gmd:positionName objectType	gmd:CI_ResponsibleParty
../gmd:contactInfo	
objectType	gmd:CI_Contact
../gmd:address	
gmd:electronicMailAddress objectType	eohelp@esa.int gmd:CI_Address
../gmd:role	
codeList codeListValue objectType	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#CI_RoleCode pointOfContact gmd:CI_RoleCode
../gmd:dataQualityInfo	
objectType	gmd:DQ_DataQuality
../gmd:lineage	
objectType gmd:statement	gmd:LI_Lineage L2 dataset produced by IMF from the SCIAMACHY ENVISAT L1b product
../gmd:processStep	
gmd:description objectType	Processing of L1b to L2 data using the SCIA_OL processor gmi:LE_ProcessStep
../gmd:source	
gmd:description objectType gmd:title	SCIAMACHY ENVISAT L1B product gmi:LE_Source ENV_RPRO_SCI_L1B____20061013T145245_20061013T163234_24156_01_090000_20171227T124148.nc
../gmi:processedLevel	
gmd:code objectType	L1B gmd:MD_Identifier
../gmi:output	
gmd:description objectType	SCIAMACHY ENVISAT L2 product gmi:LE_Source
../gmd:sourceCitation	
gmd:title	ENV_RPRO_SCI_L2____20061013T145245_20061013T163234_24156_01_070000_20180517T112852.nc
../gmd:date	
gmd:date objectType	2018-05-17T11:28:52.356Z gmd:CI_Date
../gmd:dateType	
codeList codeListValue	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#CI_DateTypeCode creation

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Group/Name	Value
objectType	gmd:CI_DateTypeCode
../../../../gmd:identifier	
gmd:code objectType	L2 gmd:MD_Identifier
../../../../gmi:processedLevel	
gmd:code objectType	L2 gmd:MD_Identifier
../../../../gmi:processingInformation	
objectType	gmi:LE_Processing
../../../../gmi:documentation_1	
objectType gmd:title	gmd:CI_Citation SCIAMACHY Offline Processor Level 1b-2 ATBD ENV-ATB-QWG-SCIA-0085
../../../../gmd:date	
gmd:date objectType	2018 gmd:CI_Date
../../../../gmd:dateType	
codeList codeListValue objectType	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#CI_DateTypeCode publication gmd:CI_DateTypeCode
../../../../gmi:documentation_2	
gmd:title objectType	SCIAMACHY Level 1b to 2 Off-line Processing Input/Output Data Definition ENV-IODD-DLR-SCIA-0086 gmd:CI_Citation
../../../../gmd:date	
gmd:date objectType	2018 gmd:CI_Date
../../../../gmd:dateType	
codeList codeListValue objectType	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#CI_DateTypeCode publication gmd:CI_DateTypeCode
../../../../gmi:identifier	
gmd:code objectType	DLR L12 processor gmd:MD_Identifier
../../../../gmi:softwareReference	
gmd:title objectType	SCIAMACHY L01 processor description gmd:CI_Citation
../../../../gmd:date	
gmd:date	2018

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Group/Name	Value
objectType	gmd:CI_Date
../../../../gmd:dateType	
codeList	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#CI_DateTypeCode
codeListValue	creation
objectType	gmd:CI_DateTypeCode
../gmi:report	
gmi:description	L1b processed to L2 data using the SCIA_OL processor
gmi:fileType	netCDF
gmi:name	NA (L2 processing report)
objectType	gmi:LE_ProcessStepReport
../gmd:report	
objectType	gmd:DQ_DomainConsistency
../gmd:result	
gmd:pass	true
gmd:explanation	INSPIRE Data specification for orthoimagery is not yet officially published so conformity has not yet been evaluated
objectType	gmd:DQ_ConformanceResult
../gmd:specification	
objectType	gmd:CI_Citation
gmd:title	INSPIRE Data Specification on Orthoimagery - Guidelines, version 3.0rc3
../gmd:date	
gmd:date	2013-02-04
objectType	gmd:CI_Date
../../../../gmd:dateType	
codeList	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#CI_DateTypeCode
codeListValue	publication
objectType	gmd:CI_DateTypeCode
../gmd:scope	
objectType	gmd:DQ_Scope
../gmd:level	
codeList	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#MD_ScopeCode
codeListValue	dataset
objectType	gmd:MD_ScopeCode
./gmd:hierarchyLevel	
codeList	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#MD_ScopeCode
codeListValue	series
objectType	gmd:MD_ScopeCode
./gmd:identificationInfo	
gmd:abstract	SCIAMACHY spectrometer on ENVISAT measurements

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Group/Name	Value
gmd:credit	ESA
gmd:language	eng
gmd:topicCategory	imageryBaseMapsEarthCover
objectType	gmd:MD_DataIdentification
../gmd:characterSet	
codeList	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#MD_CharacterSetCode
codeListValue	utf8
objectType	gmd:MD_CharacterSetCode
../gmd:citation	
gmd:title	SCIAMACHY ENVISAT L2 product
objectType	gmd:CI_Citation
../gmd:date	
gmd:date	2018-05-17
objectType	gmd:CI_Date
../gmd:dateType	
codeList	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#CI_DateTypeCode
codeListValue	creation
objectType	gmd:CI_DateTypeCode
../gmd:identifier	
gmd:code	urn:ogc:def:EOP:ESA:ENV:SCIA_L2_UV_VIS
objectType	gmd:MD_Identifier
../gmd:descriptiveKeywords	
gmd:keyword	orthoimagery
objectType	gmd:MD_Keywords
../gmd:thesaurusName	
gmd:title	GEMET - INSPIRE themes, version 1.0
objectType	gmd:CI_Citation
../gmd:date	
gmd:date	2008-06-01
objectType	gmd:CI_Date
../gmd:dateType	
codeList	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#CI_DateTypeCode
codeListValue	publication
objectType	gmd:CI_DateTypeCode
../gmd:type	
codeList	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#MD_KeywordTypeCode

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Group/Name	Value
codeListValue	theme
objectType	gmd:MD_KeywordTypeCode
../gmd:extent	
objectType	gmd:EX_Extent
../gmd:geographicElement	
gmd:eastBoundLongitude	180.0
gmd:northBoundLatitude	90.0
gmd:southBoundLatitude	-90.0
gmd:westBoundLongitude	-180.0
objectType	gmd:EX_GeographicBoundingBox
../gmd:temporalElement	
objectType	gmd:EX_TemporalExtent
../gmd:extent	
gml:beginPosition	2006-10-13T14:52:45.748Z
gml:endPosition	2006-10-13T16:32:34.451Z
objectType	gml:TimePeriod
../gmd:pointOfContact	
gmd:individualName	eoHelp
gmd:organisationName	ESA
gmd:positionName	Order Desk
objectType	gmd:CI_ResponsibleParty
../gmd:contactInfo	
objectType	gmd:CI_Contact
../gmd:address	
gmd:electronicMailAddress	eohelp@esa.int
objectType	gmd:CI_Address
../gmd:role	
codeList	http://www.isotc211.org/2005/resources/Codelist/gmxCodetables.xml#CI_RoleCode
codeListValue	distributor
objectType	gmd:CI_RoleCode
../gmd:resourceConstraints	
gmd:useLimitation	no conditions apply
objectType	gmd:MD_LegalConstraints
../gmd:accessConstraints	
codeList	http://www.isotc211.org/2005/resources/Codelist/gmxCodetables.xml#MD_RestrictionCode
codeListValue	copyright

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Group/Name	Value
objectType	gmd:MD_RestrictionCode
../gmd:spatialRepresentationType	
codeList	http://www.isotc211.org/2005/resources/Codelist/gmxCodetlists.xml#MD_SpatialRepresentationTypeCode
codeListValue	grid
objectType	gmd:MD_SpatialRepresentationTypeCode
../gmd:spatialResolution	
gmd:distance	240.0
objectType	gmd:MD_Resolution
uom	km
../gmd:language	
codeList	http://www.loc.gov/standards/iso639-2/
codeListValue	eng
objectType	gmd:LanguageCode
../gmi:acquisitionInformation	
objectType	gmi:MI_AcquisitionInformation
../gmi:platform	
gmi:description	ENVISAT
objectType	gmi:MI_Platform
../gmi:identifier	
gmd:code	SCIA
gmd:codeSpace	http://www.esa.int/
objectType	gmd:RS_Identifier
../gmi:instrument	
objectType	gmi:MI_Instrument
../gmi:identifier	
gmd:code	EN
gmd:codeSpace	http://www.esa.int/
objectType	gmd:RS_Identifier
../gmi:type	
codeList	
codeListValue	UV-VIS spectrometer
objectType	gmi:MI_SensorTypeCode