



S5P COBRA Sulphur Dioxide Product Format Specification



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Version History

Revision	Date	Author(s)	Description
1.0	14/09/2022	Jonas Vlietinck, Nicolas Theys	First release.
2.0	14/12/2023	Jonas Vlietinck, Nicolas Theys	Adapting to version 02.00.00 of the processor.
2.1	18/04/2024	Jonas Vlietinck, Nicolas Theys	Removed some empty variable attributes.
2.2	18/04/2024	Jonas Vlietinck, Nicolas Theys	Variable o3_grid included now.

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1 Introduction.

This document serves as a guide to understand the layout and format specifications of the Level-2 (L2) SO2CBR product. For an interpretation and explanation of the data in the SO2CBR product, see [2]. An explanation of the filename structure of the product is given in section 2. From [2] it follows that the retrieval results are subdivided into three fitting windows, which is reflected in the variables, as we will see later. The retrieval results obtained with the COBRA algorithm in the SO2CBR product are currently limited to fitting window 1. For completeness the DOAS retrieval results for fitting window 2 and 3 were added from the TROPOMI SO2 operational algorithm. For all details about the results in those windows, we refer to the documentation on [1].

- **fitting window 1 (310.5-326 nm)** : results from COBRA algorithm.
- **fitting window 2 (325-335 nm)** : results from DOAS algorithm.
- **fitting window 3 (360-390 nm)** : results from DOAS algorithm.

An overview of the variables that contain the main retrieval results and errors is given in section 4.1. The product is stored in a NetCDF4 binary format, following the CF-convention. Furthermore, the file format should be compliant with the guidelines provided in [3]. A description of the global attributes is provided in section 3. A full list of all variables that can be found in the L2 SO2CBR together with all the metadata is provided in section 4.

2 filename construction

S5P_<fileclass>_L2__SO2CBR_<start>_<end>_<orbit>_<coll>_<proc>_<mod>.nc

- **fileclass** [4 characters :] File class of the product. (example: PAL_)
- **start** [YYYYMMDDThhmmss :] start time of the orbit
- **end** [YYYYMMDDThhmmss :] end time of the orbit
- **orbit** [5 digits :] orbit number
- **coll** [2 digits :] collection id
- **proc** [6 digits :] processor version
- **mod** [YYYYMMDDThhmmss :] modification or creation time

3 global attributes

In this section the global attributes in a product file are listed. The name of the attribute is provided together with the datatype. The static or dynamic nature of the attributes is also given. Static means that the attribute has the same values across all product files, dynamic means that the attributes values depends on the orbit of the product file.

Conventions [int32] (*static*)

CF-1.7 (Version of CF convtions that is followed.)

comments [string] (*dynamic*)

(Version of the python packages from which the processor is composed off).

- cobra-so2 : x.y.z
- cobra-amf : x.y.z

file_class [string] (*dynamic*)

File class of the product.

footprint [string] (*dynamic*)

GeoJSON format. Footprint of the product as a single GeoJSON string value.

history [string] (*dynamic*)

YYY-MM-DDThh:mm:ssZ cobra_so2 <name of the orbit file>, with the time string the time of creation of the file.

id [string] (*dynamic*)

Product name (filename without extension)

input_files [string] (*dynamic*)

List that contains the filenames of all inputs to the processor.

institution [string] (*static*)

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orbit [int32] (<i>dynamic</i>)
orbit number. (matches the orbit number in the filename)
processing_center [string] (<i>static</i>)
S5P-PAL
processor_version [string] (<i>dynamic</i>)
xx.yy.zz (version number of the processor)
source [string] (<i>static</i>)
Sentinel 5 precursor, TROPOMI, space-borne remote sensing, L2
summary [string] (<i>static</i>)
TROPOMI/S5P SO2CBR L2 data Swath 5.5x3.5km2
time_coverage_end [string] (<i>dynamic</i>)
YYYY-MM-DDThh:mm:ss.fffZ (Start time of last measurement in the product)
time_coverage_resolution [string] (<i>dynamic</i>)
PT<duration>S (duration in seconds of the scanline)
time_coverage_start [string] (<i>dynamic</i>)
YYYY-MM-DDThh:mm:ss.fffZ (Start time of first measurement in the product)
time_reference [string] (<i>static</i>)
YYYY-MM-DDThh:mm:ss.fffZ (Start of the day of the sensing time)
tracking_id [string] (<i>dynamic</i>)
UUID

4 variables

PRODUCT	section 4.2
└─ SUPPORT_DATA	
└─ DETAILED_RESULTS	section 4.6
└─ GEOLOCATIONS	section 4.3
└─ INPUT_DATA	section 4.4
└─ WAVELENGTH_CALIBRATIONS	section 4.8
└─ BACKGROUND_CORRECTION	section 4.5

4.1 SO2 main retrieval results

The following variables contain cobra results from fitting window 1 and DOAS results for fitting window 2 and 3.

VCD and SCD	Errors
<ul style="list-style-type: none"> • sulfur dioxide_total_vertical_column • sulfur dioxide_slant_column_corrected • sulfur dioxide_total_vertical_column_1km • sulfur dioxide_total_vertical_column_7km • sulfur dioxide_total_vertical_column_15km 	<ul style="list-style-type: none"> • sulfur dioxide_total_vertical_column_precision • sulfur dioxide_total_vertical_column_trueness • sulfur dioxide_slant_column_corrected_trueness • sulfur dioxide_total_vertical_column_1km_precision • sulfur dioxide_total_vertical_column_1km_trueness • sulfur dioxide_total_vertical_column_7km_precision • sulfur dioxide_total_vertical_column_7km_trueness • sulfur dioxide_total_vertical_column_15km_precision • sulfur dioxide_total_vertical_column_15km_trueness

The above variables can be found in sections 4.2 and 4.6

Note that a flag *selected_fitting_window_flag* (see section 4) describes the selected fitting window for SO2 retrieval results. For each pixel the flag value indicates whether the used fitting window is 1,2 or 3.

The following variables contain only results for fit window 2 and 3 (and are not relevant for cobra so2 in fit window 1):

- fitted_radiance_shift
- fitted_radiance_squeeze
- number_of_spectral_points_in_retrieval
- number_of_iterations_in_retrieval
- fitted_root_mean_square

The variable *sulfur dioxide_slant_column_corrected_doas* is providing the doas results for fit window 1,2 and 3. This variable is meant for comparison purposes with the cobra so2 results.

4.2 /PRODUCT

corner [int32] (*corner*)

- **units** : 1
- **long_name** : pixel corner index
- **comment** : This coordinate variable defines the indices for the pixel corners; index starts a 0 (counter-clockwise, starting from south-western corner of the pixel in ascending part of the orbit).

delta_time [int32] (*time, scanline*)

- **long_name** : offset from reference start time of measurement
- **units** : milliseconds since yyyy-mm-dd 00:00:00Z (with yyyy the year, mm the month and dd the day)

ground_pixel [int32] (*ground_pixel*)

- **units** : 1
- **axis** : X
- **long_name** : across-track dimension index
- **comment** : This coordinate variable defines the indices across track, from west to east; index starts at 0

latitude [float32] (*time, scanline, ground_pixel*)

- **long_name** : pixel center latitude
- **units** : degrees_north
- **standard_name** : latitude
- **valid_min** : -90.0
- **valid_max** : 90.0
- **bounds** : /PRODUCT/SUPPORT_DATA/GEOLOCATIONS/latitude_bounds

layer [int32] (*layer*)

- **units** : 1
- **long_name** : layer dimension index

longitude [float32] (*time, scanline, ground_pixel*)

- **long_name** : pixel center longitude
- **units** : degrees_east
- **standard_name** : longitude
- **valid_min** : -180.0
- **valid_max** : 180.0
- **bounds** : /PRODUCT/SUPPORT_DATA/GEOLOCATIONS/longitude_bounds

qa_value [uint8] (*time, scanline, ground_pixel*)

- **units** : 1
- **scale_factor** : 0.01
- **add_offset** : 0.0
- **valid_min** : 0
- **valid_max** : 100
- **long_name** : data quality value
- **comment** : A continuous quality descriptor, varying between 0 (no data) and 1 (full quality data). Recommend to ignore data with qa_value < 0.5
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

scanline [int32] (*scanline*)

- **units** : 1
- **axis** : Y
- **long_name** : along-track dimension index
- **comment** : This coordinate variable defines the indices along track; index starts at 0

sulfurdioxide_total_vertical_column [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **standard_name** : atmosphere_mole_content_of_sulfur_dioxide
- **long_name** : total vertical column of sulfur dioxide for the polluted scenario derived from the total slant column
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_total_vertical_column_precision [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **standard_name** : atmosphere_mole_content_of_sulfur_dioxide_standard_error
- **long_name** : precision of the total vertical column of sulfur dioxide for the polluted scenario derived from the total slant column
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

time [int32] (*time*)

- **units** : seconds since 2010-01-01 00:00:00
- **standard_name** : time
- **axis** : T
- **long_name** : reference time for the measurements
- **comment** : The time in this variable corresponds to the time in the time_reference global attribute

4.3 /PRODUCT/SUPPORT_DATA/GEOLOCATIONS

geolocation_flags [uint8] (*time, scanline, ground_pixel*)

- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **flag_masks** : [0 1 2 4 8 16 128]
- **flag_meanings** : no_error solar_eclipse sun_glint_possible descending night geo_boundary_crossing geolocation_error
- **flag_values** : [0 1 2 4 8 16 128]
- **long_name** : ground pixel quality flag
- **max_val** : 254
- **min_val** : 0
- **units** : 1

latitude_bounds [float32] (*time, scanline, ground_pixel, corner*)

- **units** : degrees_north

longitude_bounds [float32] (*time, scanline, ground_pixel, corner*)

- **units** : degrees_east

satellite_altitude [float32] (*time, scanline*)

- **long_name** : satellite altitude
- **units** : m
- **comment** : The altitude of the satellite with respect to the geodetic sub satellite point on the WGS84 reference ellipsoid
- **valid_min** : 700000.0
- **valid_max** : 900000.0

satellite_latitude [float32] (*time, scanline*)

- **long_name** : sub satellite latitude
- **units** : degrees_north
- **comment** : Latitude of the geodetic sub satellite point on the WGS84 reference ellipsoid
- **valid_min** : -90.0
- **valid_max** : 90.0

satellite_longitude [float32] (*time, scanline*)

- **long_name** : satellite_longitude
- **units** : degrees_east
- **comment** : Longitude of the geodetic sub satellite point on the WGS84 reference ellipsoid
- **valid_min** : -180.0
- **valid_max** : 180.0

satellite_orbit_phase [float32] (time, scanline)

- **long_name** : fractional satellite orbit phase
- **units** : 1
- **comment** : Relative offset [0.0, ..., 1.0] of the measurement in the orbit
- **valid_min** : -0.02
- **valid_max** : 1.02

solar_azimuth_angle [float32] (time, scanline, ground_pixel)

- **long_name** : solar azimuth angle
- **standard_name** : solar_azimuth_angle
- **units** : degree
- **valid_min** : -180.0
- **valid_max** : 180.0
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **comment** : Solar azimuth angle at the ground pixel location on the reference ellipsoid. Angle is measured clockwise from the North (East = 90, South = 180, West = 270)

solar_zenith_angle [float32] (time, scanline, ground_pixel)

- **long_name** : solar zenith angle
- **standard_name** : solar_zenith_angle
- **units** : degree
- **valid_min** : 0.0
- **valid_max** : 180.0
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **comment** : Solar zenith angle at the ground pixel location on the reference ellipsoid. Angle is measured away from the vertical

viewing_azimuth_angle [float32] (time, scanline, ground_pixel)

- **long_name** : viewing azimuth angle
- **standard_name** : viewing_azimuth_angle
- **units** : degree
- **valid_min** : -180.0
- **valid_max** : 180.0
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **comment** : Satellite azimuth angle at the ground pixel location on the reference ellipsoid. Angle is measured clockwise from the North (East = 90, South = 180, West = 270)

viewing_zenith_angle [float32] (time, scanline, ground_pixel)

- **long_name** : viewing zenith angle
- **standard_name** : viewing_zenith_angle
- **units** : degree
- **valid_min** : 0.0
- **valid_max** : 180.0
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **comment** : Zenith angle of the satellite at the ground pixel location on the reference ellipsoid. Angle is measured away from the vertical

4.4 /PRODUCT/SUPPORT_DATA/INPUT_DATA

aerosol_index_340_380 [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **standard_name** : ultraviolet_aerosol_index
- **comment** : Aerosol index from 380 and 340 nm
- **long_name** : aerosol index from 380 and 340 nm
- **radiation_wavelength** : [340. 380.]
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

cloud_albedo_crb [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **standard_name** : cloud_albedo
- **long_name** : cloud albedo from the CRB model
- **source** : crb
- **comment** : Coregistered cloud albedo based on the OCRA/ROCINN CRB model.
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

cloud_albedo_crb_precision [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **standard_name** : cloud_albedo_standard_error
- **long_name** : cloud albedo precision from the CRB model
- **source** : crb
- **comment** : Error of the coregistered cloud albedo based on the OCRA/ROCINN CRB model.
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

cloud_fraction_crb [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **standard_name** : TBD
- **long_name** : effective radiometric cloud fraction from the CRB model
- **source** : crb
- **comment** : Coregistered effective radiometric cloud fraction using the OCRA/ROCINN CRB model.
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

cloud_fraction_crb_precision [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **standard_name** : TBD
- **long_name** : effective radiometric cloud fraction precision from the CRB model
- **source** : crb
- **comment** : Error of the coregistered effective radiometric cloud fraction using the OCRA/ROCINN CRB model.
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

cloud_height_crb [float32] (*time, scanline, ground_pixel*)

- **units** : m
- **standard_name** : TBD
- **long_name** : cloud radiometric optical centroid height from the CRB model
- **source** : crb
- **comment** : Coregistered height at the level of cloud w.r.t. the geoid/MSL using the OCRA/ROCINN CRB model.
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

cloud_height_crb_precision [float32] (time, scanline, ground_pixel)

- **units** : m
- **standard_name** : TBD
- **long_name** : cloud radiometric optical centroid height precision from the CRB model
- **source** : crb
- **comment** : Error of the coregistered height at the level of cloud w.r.t. the geoid/MSL using the OCRA/ROCINN CRB model.
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

cloud_pressure_crb [float32] (time, scanline, ground_pixel)

- **units** : Pa
- **standard_name** : TBD
- **long_name** : cloud radiometric optical centroid pressure from the CRB model
- **source** : crb
- **comment** : Coregistered and converted atmospheric pressure at the level of cloud using the OCRA/ROCINN CRB model.
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

cloud_pressure_crb_precision [float32] (time, scanline, ground_pixel)

- **units** : Pa
- **standard_name** : TBD
- **long_name** : cloud radiometric optical centroid pressure precision from the CRB model
- **source** : crb
- **comment** : Error of the coregistered and converted atmospheric pressure at the level of cloud using the OCRA/ROCINN CRB model.
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

eastward_wind [float32] (time, scanline, ground_pixel)

- **units** : m s-1
- **standard_name** : eastward_wind
- **long_name** : Eastward wind from ECMWF at 10 meter height level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

instrument_configuration_identifier [int32] (time, scanline)

- **long_name** : IcID
- **comment** : The Instrument Configuration ID defines the type of measurement and its purpose. The number of instrument configuration IDs will increase over the mission as new types of measurements are created and used

instrument_configuration_version [int16] (time, scanline)

- **long_name** : IcVersion
- **comment** : Version of the instrument_configuration_identifier

northward_wind [float32] (time, scanline, ground_pixel)

- **units** : m s-1
- **standard_name** : northward_wind
- **long_name** : Northward wind from ECMWF at 10 meter height level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

ozone_total_vertical_column [float32] (*time, scanline, ground_pixel*)

- **units** : mol m-2
- **standard_name** : atmosphere_mole_content_of_ozone
- **long_name** : total ozone column
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

ozone_total_vertical_column_precision [float32] (*time, scanline, ground_pixel*)

- **units** : mol m-2
- **standard_name** : atmosphere_mole_content_of_ozone error
- **long_name** : total ozone column random error
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

scaled_small_pixel_variance [float32] (*time, scanline, ground_pixel*)

- **long_name** : scaled small pixel variance
- **units** : 1
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **comment** : The scaled variance of the reflectances of the small pixels

snow_ice_flag [uint8] (*time, scanline, ground_pixel*)

- **units** : 1
- **threshold** : 0.3
- **long_name** : snow-ice mask
- **comment** : flag indicating snow/ice at center of ground pixel
- **flag_meanings** : snow_free snow_ice
- **flag_values** : [0 1]
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

surface_albedo_328nm [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **standard_name** : surface_albedo
- **long_name** : surface albedo at 328nm
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

surface_albedo_376nm [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **standard_name** : surface_albedo
- **long_name** : surface albedo at 376nm
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

tm5_constant_b [float32] (*time, layer*)

- **units** : 1

tm5_tropopause_layer_index [int32] (*time, scanline, ground_pixel*)

- **units** : 1

4.5 /PRODUCT/SUPPORT_DATA/INPUT_DATA/BACKGROUND_CORRECTION

o3_grid [float32] (*o3_grid*)

- **units** : DU

detector_rows [int32] (*detector_rows*)

- **units** : 1
- **long_name** : detector_rows dimension index

earthshine_reference_radiance [float32] (*detector_rows, wavelengths*)

- **units** : mol.m-2.nm-1.sr-1.s-1

earthshine_reference_wavelength [float32] (*wavelengths*)

- **units** : nm

lat_grid [float32] (*lat_grid*)

- **units** : degrees_north

wavelengths [int32] (*wavelengths*)

- **units** : 1
- **long_name** : wavelengths dimension index

window1_north [float32] (*o3_grid, detector_rows*)

- **units** : mol m-2

window1_south [float32] (*o3_grid, detector_rows*)

- **units** : mol m-2

window2 [float32] (*lat_grid, detector_rows*)

- **units** : mol m-2

window3 [float32] (*lat_grid, detector_rows*)

- **units** : mol m-2

4.6 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS

averaging_kernel [float32] (*time, scanline, ground_pixel, layer*)

- **units** : 1
- **long_name** : averaging kernel

cloud_fraction_intensity_weighted [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : cloud fraction intensity weighted
- **valid_min** : 0.0
- **valid_max** : 1.0
- **comment** : VCD clear sky vs. cloudy weighting factor.
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

cloud_fraction_intensity_weighted_precision [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : random error of the cloud fraction intensity weighted
- **valid_min** : 0.0
- **valid_max** : 1.0
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

doas_polynomial_coefficients_win2 [float32] (*time, scanline, ground_pixel, number_of_doas_polynomial_coefficients_win2*)

- **units** : 1
- **long_name** : DOAS polynomial coefficients
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **comment** : Values of the DOAS polynomial coefficients

doas_polynomial_coefficients_win3 [float32] (*time, scanline, ground_pixel, number_of_doas_polynomial_coefficients_win3*)

- **units** : 1
- **long_name** : DOAS polynomial coefficients
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **comment** : Values of the DOAS polynomial coefficients

fitted_radiance_shift [float32] (*time, scanline, ground_pixel*)

- **units** : nm
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **long_name** : radiance wavelength shift from the doas fit

fitted_radiance_shift_win2 [float32] (*time, scanline, ground_pixel*)

- **units** : nm
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **long_name** : radiance wavelength shift from the doas fit in fitting window 2

fitted_radiance_shift_win3 [float32] (*time, scanline, ground_pixel*)

- **units** : nm
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **long_name** : radiance wavelength shift from the doas fit in fitting window 3

fitted_radiance_squeeze [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **long_name** : radiance wavelength squeeze from the doas fit

fitted_radiance_squeeze_win2 [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **long_name** : radiance wavelength shift from the doas fit in fitting window 2

fitted_radiance_squeeze_win3 [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **long_name** : radiance wavelength shift from the doas fit in fitting window 3

fitted_root_mean_square [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : root mean square of the sulfur dioxide slant column
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

fitted_root_mean_square_win1 [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **long_name** : root mean square residual in fitting window 1

fitted_root_mean_square_win2 [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **long_name** : root mean square residual of the fit in fitting window 2

fitted_root_mean_square_win3 [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **long_name** : root mean square residual of the fit in fitting window 3

fitted_slant_columns_win1 [float64] (*time, scanline, ground_pixel, number_of_slant_columns_win1*)

- **units** : mol m⁻²
- **long_name** : slant columns of all absorbers in fitting window 1
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **index_meaning** : SO2_203K_Bogumil_deconv_resampled_301_364_NOMOPS_BF2bd2-6_band_3.xs

fitted_slant_columns_win1_precision [float32] (*time, scanline, ground_pixel, number_of_slant_columns_win1*)

- **units** : mol m-2
- **long_name** : slant column random errors of all absorbers in fitting window 1
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **index_meaning** : SO2_203K_Bogumil_deconv_resampled_301_364_NOMOPS_BF2bd2-6_band_3.xs

fitted_slant_columns_win2 [float64] (*time, scanline, ground_pixel, number_of_slant_columns_win2*)

- **units** : mol m-2
- **long_name** : slant columns of all absorbers in fitting window 2
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **index_meaning** : SO2_203K_Bogumil_deconv_resampled_301_364_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x1080.bis
O3_228K_Brion_vac_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x2010.bis O3_243K_Brion_vac_NOMOPS_BF2bd2-6_
band_3.xs#1#float64#2#451x2010.bis o3lambda_Io_S5P_OPT_SFP.xs#1#float64#2#451x2002.bis o3squared_Io_S5P_OPT_
SFP.xs#1#float64#2#451x2002.bis Ringev1_HR_200_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x1100.bis Ringev2_HR_
870_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x1100.bis

fitted_slant_columns_win2_precision [float32] (*time, scanline, ground_pixel, number_of_slant_columns_win2*)

- **units** : mol m-2
- **long_name** : slant column random all absorbers in fitting window 2
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **index_meaning** : SO2_203K_Bogumil_deconv_resampled_301_364_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x1080.bis
O3_228K_Brion_vac_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x2010.bis O3_243K_Brion_vac_NOMOPS_BF2bd2-6_
band_3.xs#1#float64#2#451x2010.bis o3lambda_Io_S5P_OPT_SFP.xs#1#float64#2#451x2002.bis o3squared_Io_S5P_OPT_
SFP.xs#1#float64#2#451x2002.bis Ringev1_HR_200_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x1100.bis Ringev2_HR_
870_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x1100.bis

fitted_slant_columns_win3 [float64] (*time, scanline, ground_pixel, number_of_slant_columns_win3*)

- **units** : mol m-2
- **long_name** : slant columns of all absorbers in fitting window 3
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **index_meaning** : SO2_203K_vandaele_extrapol_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x2010.bis no2_cb_vac_NOMOPS_
BF2bd2-6_band_3.xs#1#float64#2#451x2010.bis ring_sao2010_combined_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x2010.bis
o4_hand_vac_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x2001.bis

fitted_slant_columns_win3_precision [float32] (*time, scanline, ground_pixel, number_of_slant_columns_win3*)

- **units** : mol m-2
- **long_name** : slant column random errors of all absorbers in fitting window 3
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **index_meaning** : SO2_203K_vandaele_extrapol_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x2010.bis no2_cb_vac_NOMOPS_
BF2bd2-6_band_3.xs#1#float64#2#451x2010.bis ring_sao2010_combined_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x2010.bis
o4_hand_vac_NOMOPS_BF2bd2-6_band_3.xs#1#float64#2#451x2001.bis

number_of_doas_polynomial_coefficients_win2 [int32] (*number_of_doas_polynomial_coefficients_win2*)

- **units** : 1
- **long_name** : number_of_doas_polynomial_coefficients_win2 dimension index

number_of_doas_polynomial_coefficients_win3 [int32] (*number_of_doas_polynomial_coefficients_win3*)

- **units** : 1
- **long_name** : number_of_doas_polynomial_coefficients_win3 dimension index

number_of_iterations_in_retrieval [uint16] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : number of iterations used in the retrieval
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

number_of_iterations_in_retrieval_win2 [uint16] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : number of iterations used in the retrieval for window 2
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

number_of_iterations_in_retrieval_win3 [uint16] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : number of iterations used in the retrieval for window 3
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

number_of_slant_columns_win1 [int32] (*number_of_slant_columns_win1*)

- **units** : 1
- **long_name** : number_of_slant_columns_win1 dimension index

number_of_slant_columns_win2 [int32] (*number_of_slant_columns_win2*)

- **units** : 1
- **long_name** : number_of_slant_columns_win2 dimension index

number_of_slant_columns_win3 [int32] (*number_of_slant_columns_win3*)

- **units** : 1
- **long_name** : number_of_slant_columns_win3 dimension index

number_of_spectral_points_in_retrieval [uint16] (*time, scanline, ground_pixel*)

- **long_name** : Number of spectral points used in the DOAS retrieval
- **units** : 1
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

number_of_spectral_points_in_retrieval_win2 [uint16] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : Number of spectral points used in the DOAS retrieval for window 2
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

number_of_spectral_points_in_retrieval_win3 [uint16] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : Number of spectral points used in the DOAS retrieval for window 3
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_averaging_kernel_scaling_box_7km [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : scaling box of the total air mass factor for a sulfur dioxide plume at 7km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_clear_air_mass_factor_15km [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : clear sky air mass factor for a sulfur dioxide plume at 15km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_clear_air_mass_factor_1km [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : clear sky air mass factor for a sulfur dioxide plume at 1km altitude w.r.t. the topography
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_clear_air_mass_factor_7km [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : clear sky air mass factor for a sulfur dioxide plume at 7km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_clear_air_mass_factor_polluted [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : clear sky air mass factor for the boundary layer polluted scenario
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_cloudy_air_mass_factor_15km [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : cloudy sky air mass factor for a sulfur dioxide plume at 15km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_cloudy_air_mass_factor_1km [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : cloudy sky air mass factor for a sulfur dioxide plume at 1km altitude w.r.t. the topography
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_cloudy_air_mass_factor_7km [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : cloudy sky air mass factor for a sulfur dioxide plume at 7km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_cloudy_air_mass_factor_polluted [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : cloudy sky air mass factor for the boundary layer polluted scenario
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_cobra_flag [uint8] (*time, scanline, ground_pixel*)

- **flag_meanings** : 0: not applied, 1: not all iterations done, 2: all iterations done
- **long_name** : sulfur dioxide slant column density cobra retrieval flag
- **units** : 1
- **flag_values** : [0 1 2]
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_detection_flag [int32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : sulfur dioxide volcano activity flag
- **flag_meanings** : no detection,detection,clear detection close to known volcano,clear detection close to known anthropogenic source,detection at high SZA
- **flag_values** : [0 1 2 3 4]
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_profile_apriori [float32] (*time, scanline, ground_pixel, layer*)

- **units** : 1
- **long_name** : volume mixing ratio profile of sulfur dioxide
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_slant_column_corrected [float32] (*time, scanline, ground_pixel*)

- **units** : mol m-2
- **long_name** : background corrected sulfur dioxide slant column density for final selected fitting window
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_slant_column_corrected_doas [float32] (*time, scanline, ground_pixel*)

- **units** : mol m-2
- **long_name** : background corrected sulfur dioxide slant column density obtained by a DOAS retrieval for final selected fitting window
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_slant_column_corrected_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : mol m-2
- **long_name** : systematic error of the corrected sulfur dioxide slant column
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_slant_column_corrected_win1 [float32] (*time, scanline, ground_pixel*)

- **units** : mol m-2
- **long_name** : background corrected sulfur dioxide slant column density for fitting window 1
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_slant_column_corrected_win2 [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **long_name** : background corrected sulfur dioxide slant column density for fitting window 2
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_slant_column_corrected_win3 [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **long_name** : background corrected sulfur dioxide slant column density for fitting window 3
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_total_air_mass_factor_15km [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : total air mass factor for a sulfur dioxide plume at 15km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_15km_kernel_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : systematic error of the total air mass factor using kernels for a sulfur dioxide plume at 15km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_15km_precision [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : random error of the total air mass factor for a sulfur dioxide plume at 15km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_15km_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : systematic error of the total air mass factor for a sulfur dioxide plume at 15km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_1km [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : total air mass factor for a sulfur dioxide plume at 1km altitude w.r.t. the topography
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_1km_kernel_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : systematic error of the total air mass factor using kernels for a sulfur dioxide plume at 1km altitude w.r.t. the topography
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_1km_precision [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : random error of the total air mass factor for a sulfur dioxide plume at 1km altitude w.r.t. the topography
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_1km_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : systematic error of the total air mass factor for a sulfur dioxide plume at 1km altitude w.r.t. the topography
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_7km [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : total air mass factor for a sulfur dioxide plume at 7km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_7km_kernel_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : systematic error of the total air mass factor using kernels for a sulfur dioxide plume at 7km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_7km_precision [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : random error of the total air mass factor for a sulfur dioxide plume at 7km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_7km_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : systematic error of the total air mass factor for a sulfur dioxide plume at 7km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_polluted [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : total air mass factor for boundary layer polluted scenario
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_polluted_kernel_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : systematic error of the total air mass factor for the kernel polluted scenario
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_polluted_precision [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : random error of the total air mass factor for the boundary layer polluted scenario
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_air_mass_factor_polluted_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : 1
- **long_name** : systematic error of the total air mass factor for the boundary layer polluted scenario
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude

sulfurdioxide_total_vertical_column_15km [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **standard_name** : atmosphere_mole_content_of_sulfur_dioxide
- **long_name** : total vertical column density of sulfur dioxide for a sulfur dioxide plume at 15km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_total_vertical_column_15km_precision [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **standard_name** : atmosphere_mole_content_of_sulfur_dioxide_standard_error
- **long_name** : random error of the total vertical column density of sulfur dioxide for a sulfur dioxide plume at 15km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_total_vertical_column_15km_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **long_name** : systematic error of the total vertical column density of sulfur dioxide for a sulfur dioxide plume at 15km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_total_vertical_column_1km [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **standard_name** : atmosphere_mole_content_of_sulfur_dioxide
- **long_name** : total vertical column density of sulfur dioxide for a sulfur dioxide plume at 1km altitude w.r.t. the topography
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_total_vertical_column_1km_precision [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **standard_name** : atmosphere_mole_content_of_sulfur_dioxide_standard_error
- **long_name** : random error of the total vertical column density of sulfur dioxide for a sulfur dioxide plume at 1km altitude w.r.t. the topography
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_total_vertical_column_1km_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **long_name** : systematic error of the total vertical column density of sulfur dioxide for a sulfur dioxide plume at 1km altitude w.r.t. the topography
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_total_vertical_column_7km [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **standard_name** : atmosphere_mole_content_of_sulfur_dioxide
- **long_name** : total vertical column density of sulfur dioxide for a sulfur dioxide plume at 7km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_total_vertical_column_7km_precision [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **standard_name** : atmosphere_mole_content_of_sulfur_dioxide_standard_error
- **long_name** : random error of the total vertical column of sulfur dioxide for a sulfur dioxide plume at 7km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_total_vertical_column_7km_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **long_name** : systematic error of the total vertical column of sulfur dioxide for a sulfur dioxide plume at 7km altitude w.r.t. the sea level
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

sulfurdioxide_total_vertical_column_trueness [float32] (*time, scanline, ground_pixel*)

- **units** : mol m⁻²
- **long_name** : systematic error of the total vertical column density of sulfur dioxide for the polluted scenario
- **coordinates** : /PRODUCT/longitude /PRODUCT/latitude
- **multiplication_factor_to_convert_to_DU** : 2241.15
- **multiplication_factor_to_convert_to_molecules_per_cm2** : 6.02214e+19

4.7 /PRODUCT/SUPPORT_DATA

4.8 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/WAVELENGTH_CALIBRATION

calibration_polynomial_coefficients_win1 [float32] (*number_of_calibrations, degrees_of_polynomial_shift - win1*)

- **units** : 1
- **long_name** : computed coefficients of the polynomial function in fitting window 1

calibration_polynomial_coefficients_win2 [float32] (*number_of_calibrations, degrees_of_polynomial_shift_win2*)

- **units** : 1
- **long_name** : computed coefficients of the polynomial function in fitting window 2

calibration_polynomial_coefficients_win3 [float32] (*number_of_calibrations, degrees_of_polynomial_shift_win3*)

- **units** : 1
- **long_name** : computed coefficients of the polynomial function in fitting window 3

calibration_subwindows_root_mean_square_win1 [float32] (*number_of_calibrations, number_of_subwindows_win1*)

- **units** : 1
- **long_name** : calibration rms per subwindow in fitting window 1

calibration_subwindows_root_mean_square_win2 [float32] (*number_of_calibrations, number_of_subwindows_win2*)

- **units** : 1
- **long_name** : calibration rms per subwindow in fitting window 2

calibration_subwindows_root_mean_square_win3 [float32] (*number_of_calibrations, number_of_subwindows_win3*)

- **units** : 1
- **long_name** : calibration rms per subwindow in fitting window 3

calibration_subwindows_shift_win1 [float32] (*number_of_calibrations, number_of_subwindows_win1*)

- **units** : nm
- **long_name** : irradiance wavelengths shift values per subwindow in fitting window 1

calibration_subwindows_shift_win2 [float32] (*number_of_calibrations, number_of_subwindows_win2*)

- **units** : nm
- **long_name** : irradiance wavelengths shift fitted values per subwindow in fitting window 2

calibration_subwindows_shift_win3 [float32] (*number_of_calibrations, number_of_subwindows_win3*)

- **units** : nm
- **long_name** : irradiance wavelengths shift values per subwindow in fitting window 3

calibration_subwindows_squeeze_win1 [float32] (*number_of_calibrations, number_of_subwindows_win1*)

- **units** : 1
- **long_name** : irradiance wavelengths squeeze fitted values per subwindow in fitting window 1

calibration_subwindows_squeeze_win2 [float32] (*number_of_calibrations, number_of_subwindows_win2*)

- **units** : 1
- **long_name** : irradiance wavelengths squeeze fitted values per subwindow in fitting window 1

calibration_subwindows_squeeze_win3 [float32] (*number_of_calibrations, number_of_subwindows_win3*)

- **units** : 1
- **long_name** : irradiance wavelengths squeeze fitted values per subwindow in fitting window 3

calibration_subwindows_wavelength_win1 [float32] (*number_of_subwindows_win1*)

- **units** : nm
- **long_name** : calibration wavelength center in each subwindow in fitting window 1

calibration_subwindows_wavelength_win2 [float32] (*number_of_subwindows_win2*)

- **units** : nm
- **long_name** : calibration wavelength center in each subwindow in fitting window 2

calibration_subwindows_wavelength_win3 [float32] (*number_of_subwindows_win3*)

- **units** : nm
- **long_name** : calibration wavelength center in each subwindow of the wavelength calibration in window 3

degrees_of_polynomial_shift_win1 [int32] (*degrees_of_polynomial_shift_win1*)

- **units** : 1
- **long_name** : degrees_of_polynomial_shift_win1 dimension index

degrees_of_polynomial_shift_win2 [int32] (*degrees_of_polynomial_shift_win2*)

- **units** : 1
- **long_name** : degrees_of_polynomial_shift_win2 dimension index

degrees_of_polynomial_shift_win3 [int32] (*degrees_of_polynomial_shift_win3*)

- **units** : 1
- **long_name** : degrees_of_polynomial_shift_win3 dimension index

number_of_calibrations [int32] (*number_of_calibrations*)

- **units** : 1
- **long_name** : number_of_calibrations dimension index

number_of_subwindows_win1 [int32] (*number_of_subwindows_win1*)

- **units** : 1
- **long_name** : number_of_subwindows_win1 dimension index

number_of_subwindows_win2 [int32] (*number_of_subwindows_win2*)

- **units** : 1
- **long_name** : number_of_subwindows_win2 dimension index

number_of_subwindows_win3 [int32] (*number_of_subwindows_win3*)

- **units** : 1
- **long_name** : number_of_subwindows_win3 dimension index

References

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- [3] *S5P-PAL: Sentinel 5P Product Algorithm Laboratory L2 Processor File Format Guidelines*. **source:** S&T; **ref:** ST-ESA-S5P_PAL-L2FFG-001; **issue:** 1.4; **date:** 2023-03-27.