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DOCUMENT

Sentinel-5 Precursor - Pre-Operations Sample Data Set Description, processors version 2

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CHANGE RECORD

Issue 1	Revision 3		
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Final issue - 1.2: approved for news release	21/05/2021		
Final issue - 1.3: Removed sentence: “Fix error in the reflectance noise calculation” on NO2 bugfixes list	01/06/2021	Page 9	



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1 SAMPLE DATA SET DESCRIPTION

An update of the Copernicus Sentinel-5 Precursor (S5P) operation system is planned to take place by mid-2021, which will impact the L1b and L2 products:

- L1B_RA_BD_x, with x=1 to 8 (Radiances)
- L1B_IR_UVN, L1B_IR_SIR (Solar Irradiances)
- L2__NO2__
- L2__AER_AI
- L2__AER_LH
- L2__CH4__
- L2__CO__
- L2__SO2__
- L2__HCHO__
- L2__CLOUD__
- L2__O3__
- L2__O3_TCL
- L2__NP_BD_x, x=3, 6, 7. This is an auxiliary/support product containing cloud information relevant to each TROPOMI field-of-view derived from observations made by the VIIRS instrument on NPP.

Updates to algorithms and formats will be implemented with the updated processor versions.

1.1 L1b Radiance and Irradiance

1.1.1 L1b Processor V2.0 updates

The main changes of the processor V2.0 with respect to the operational V1.0 are:

- New algorithms to allow (using Calibration Key Data (CKD), see section 1.1.2 and 1.1.3) to correct for temporal effects in the radiance and irradiance data such as:
 - Electronic gain drift
 - Spectrometer degradation (spectral ageing)
 - Other radiance degradation
 - Diffuser degradation
 - Other irradiance degradation
- New transient signal detection and flagging algorithm
- CCD blooming detection and flagging (to flag pixels that are affected by detector blooming as a result of saturation in neighbouring pixels)
- Instrument thermal instability warning and flagging (see format change in section 1.6)
- Fixed scanline handling for partially missing scanlines
- Format changes (section 1.6)



Other changes/bug fixes

- Fixed `quality_level` in the irradiance products (off by a factor of 100)
- Include a 'doi' in the L1b radiance and irradiance metadata (see format change in section 1.6). There was no 'doi' information in radiance and irradiance of L1b V1.0
- Fixed bug where East and West coordinates in bounding box metadata are swapped
- Fixed bug in the metadata where for some bands the wrong Level 0 input products were reported
- Fixed erroneous timestamp in the L1b metadata for the case where the timestamp of the first packet in the granule is exactly at 00:00:00 UTC

1.1.2 Calibration Key Data (CKD) for V2.0 - April 2020

The following updates (most relevant) were performed through the CKD configuration file in June 2019, for data that was available to S5p Validation Team (S5PVT) in April 2020 (V02.00.00, collection number: '99', fileclass: 'RPRO'):

- Time dependent electronic drift (bands 1-6)
- Time dependent spectral ageing (spectrometer) correction (so far only for bands 1-2)
- Time dependent diffuser degradation (so far only for bands 1-6)
- Time dependent irradiance degradation (so far only for bands 1-6)
- Corrections to absolute radiometry irradiance (for bands 1-4, not needed for bands 5-8)
- Extended on-ground PRNU / RELRAD to cover more CCD pixels (all bands)
- Small bugfix in on-ground radiometry irradiance and radiance (all bands)
- New fix for spectral features in on-ground ABSRAD / BSDF calculation (all bands)
- Across-track radiometry irradiance (spot-map) (all bands)
- Solar angle dependence of irradiance radiometry (all bands)
- Slit irregularity correction (bands 1-2)
- Wavelength annotation (bands 3-8)

Note that:

- With this CKD update the radiance degradation remains uncorrected, only the spectral ageing features in bands 1-2 are corrected both in radiance and irradiance.
- For SWIR a diffuser and irradiance degradation correction are deemed unnecessary

1.1.3 Calibration Key Data (CKD) for V2.0 - June 2021

Further updates to the CKD configuration file were needed mainly for updating the time dependent correction factors (degradation and drift) up to February 2021, for the release of the L1b V2.0 in June 2021:

- Time dependent electronic drift (again bands 1-6)
- Time dependent spectral ageing (spectrometer) correction (again only for bands 1-2)
- Time dependent diffuser degradation (again only for bands 1-6)



- Time dependent irradiance degradation (again only for bands 1-6)

Note that:

- with this CKD update the radiance degradation still remains uncorrected, only the spectral ageing features in bands 1-2 are corrected both in radiance and irradiance
- For SWIR, a diffuser and irradiance degradation correction are still deemed unnecessary

In addition, the following CKD fields were updated:

- Wavelength annotation: added a shift of 14.4pm to the wavelength annotation (bands 1-2)
- South Atlantic Anomaly (SAA) definition: added an extra point to close the SAA polygon (all bands)
- Solar eclipse: extended time period of available solar eclipse data (all bands)

1.2 L2 Processor UPAS V2.2.0, changes with respect to UPAS V2.1.4 (operational version)

The main impact on the data products of the processor upgrade is:

- CLOUD:
 - New cloud-free maps based on 3 years of TROPOMI data
 - Improved handling of snow / ice conditions
 - Improved scan angle correction
 - Optimized for the new L1b V2.0 input
 - New fallback surface albedo climatology based on 3 years of TROPOMI data
 - Improved clear-sky filtering in background correction for CLOUD
- O3, NRTI only:
 - New fallback surface albedo climatology based on 3 years of TROPOMI data
 - Optimized for the new L1b V2.0 input, including updates to the destriping and degradation correction
 - Improved clear-sky filtering in background correction
- Added surface temperature to all products. Added DOAS polynomial coefficients to O3 NRTI, HCHO and SO2 (see section 1.6)

Bugfixes V2.2.0:

- HCHO and SO2 Background calculation: improved robustness of earthshine reference calculation to avoid failures due to the presence of fill values in the input L1b product.
- `surface_altitude_precision` is now correctly written (previous versions reported fill-value)



1.3 L2 Processor NLL2 V2.2.0, changes with respect to NLL2 V1.4.0 (operational version)

The main impact on the data products of the processor upgrade is:

- Update CH₄, CO and H₂O cross sections in the CO and CH₄ processors: the cross sections are now based on DLR SEOM IAS spectroscopy
- Added CO destriping algorithm
- The a-posteriori bias corrected CH₄ is now independent of any reference data
- NO₂:
 - New O₂-O₂ cloud algorithm integrated (this is the OMI cloud algorithm using the O₂-O₂ collision induced absorption around 477 nm). These cloud parameters are retrieved and stored in the output NO₂ product, but *not* used (in this V2.2) in the NO₂ calculations needed to convert slant columns to vertical columns (AMF calculations)
 - The regridded FRESCO cloud parameters are written to the NO₂ product as well
 - In FRESCO the surface albedo is now adjusted to avoid negative cloud fractions while maintaining radiance closure. Similarly, for fully clouded scenes with bright clouds, the cloud albedo is adjusted, rather than allowing over-unity cloud fraction. Similar changes were made in the NO₂ cloud fraction retrieval
 - Cloud parameters used for the AMF calculation (for converting NO₂ slant columns to NO₂ vertical columns): for every ground pixel, the actual parameters used are written to the 'old' cloud variables. In this version, V2.2, the cloud parameters are a copy of the FRESCO parameters. In the future, there will be rules to use O₂-O₂ or FRESCO cloud parameters depending on under which scene conditions they work best
 - Improved handling of saturation and transient effects in the spectral fitting
- AAI offset correction added, for both pairs separately. The biggest change for AAI comes from the impact of the updated V2.0 L1b, as that now includes a degradation correction in the irradiance
- ALH: The pixel selection scheme has been updated. The Enterprise Cloud Mask (ECM) cloud mask is now the primary cloud filter, with the aerosol index used to add pixels that have both a too high cloud fraction *and* a high AAI value. These are likely thick aerosol events where the cloud mask considers this a cloud. Full details on the new pixel selection scheme will be provided in the updated ATBD, at <https://sentinel.esa.int/web/sentinel/technical-guides/sentinel-5p/products-algorithms>
- Changes in format (see section 1.6)

Bugfixes V2.2.0:

- CH₄: The Suomi NPP (S-NPP) auxiliary file used for the methane (CH₄) data processing was updated (orbit 12432, 07-03-2020) with the new **ECM** substituting the VIIRS Cloud



Mask (**VCM**), for which production was discontinued. It was observed that the cloud filtering thresholds were too stringent causing a decrease of around 30% of the number of valid CH₄ measurements since the activation of the ECM data usage. With V2.2 this problem has been solved by updating the thresholds and the cloud fraction definition

- NO₂:
 - Correct the unit of the ghost column in the NRTI product
 - Offline only: metadata fix (in Chemistry Transport Model TM5 loop)

1.4 L2 Processor RAL V1.3.0 (support product), changes with respect to V1.1.0 (operational version)

The product L2__NP_BD_x (with x=3, 6, 7) is an auxiliary/support product containing cloud information relevant to each TROPOMI field-of-view derived from observations made by the VIIRS instrument on NPP.

The version 1.3.0 contains improved harmonisation of metadata elements between different S5p L2 products (see section 1.6.14).

1.5 Products availability

Sample products are available in this link: https://s5phub.copernicus.eu/s5p_dataset/

For any problems accessing the data, users are requested to contact:
eosupport@copernicus.esa.int



1.6 Data format changes

1.6.1 L1b Radiance (L1B_RA_BDx, with x=1 to 8)

New fields added

/METADATA/EOP_METADATA/eop:metaDataProperty/ attribute
:eop:doi = "10.5270/S5P-kb39wni" (There was no 'doi' information in Radiance L1b V1.0)

/BAND1_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND2_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND3_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND4_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND5_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND6_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND7_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND8_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

Removed fields

/METADATA/ISO_METADATA/gmd:identificationInfo/gmd:spatialResolution
/BAND1_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

/BAND2_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

/BAND3_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

/BAND4_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

/BAND5_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

/BAND6_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual



/BAND7_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

/BAND8_RADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

1.6.2 L1b Irradiance (L1B_IR_UVN, L1B_IR_SIR)

New fields added

/METADATA/EOP_METADATA/eop:metaDataProperty/ attribute
:eop:doi = "10.5270/S5P-mhtbru8" (There was no 'doi' information in Irradiance L1b V1.0)

/BAND1_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND2_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND3_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND4_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND5_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND6_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND7_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

/BAND8_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, added flag thermal_instability

Removed fields

/BAND1_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

/BAND2_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

/BAND3_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

/BAND4_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

/BAND5_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual



/BAND6_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

/BAND7_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

/BAND8_IRRADIANCE/STANDARD_MODE/OBSERVATIONS/measurement_quality attribute
flag_meanings, removed flag no_residual

1.6.3 NO2 (L2_NO2__)

New fields added

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/cloud_selection_flag (The configuration of version 2.2.0 fixes this to FRESCO)

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_cloud_fraction_crb
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_cloud_fraction_crb_not
_clipped

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_cloud_fraction_crb
_precision

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_cloud_pressure_crb
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_cloud_pressure_crb_not
_clipped

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_cloud_pressure_crb
_precision

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_cloud_height_crb
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_cloud_height_crb_precision
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_cloud_albedo_crb
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_scene_albedo
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_scene_albedo_precision
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_apparent_scene_pressure
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_apparent_scene_pressure
_precision

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_chi_square
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_continuum_at_reference
_wavelength

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_continuum_at_reference
_wavelength_precision

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_polynomial_coefficient
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_polynomial_coefficient
_precision

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_ring_coefficient
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_ring_coefficient_precision
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_nitrogendioxide_slant
_column_density



/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_nitrogendioxide_slant
_column_density_precision

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_oxygen_oxygen_dimer_slant
_column_density

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_oxygen_oxygen_dimer_slant
_column_density_precision

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_oxygen_oxygen_dimer_slant
_column_density_correction_factor

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_ozone_slant_column_density
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_ozone_slant_column_density
_precision

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_surface_albedo
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_wavelength_calibration
_irradiance_offset

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_wavelength_calibration
_offset

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_wavelength_calibration
_offset_precision

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_wavelength_calibration
_stretch

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/O22CLD/o22cld_wavelength_calibration
_stretch_precision

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/FRESCO
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/FRESCO/fresco_cloud_fraction_crb
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/FRESCO/fresco_cloud_pressure_crb
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/FRESCO/fresco_scene_albedo
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/FRESCO/fresco_apparent_scene_pressure
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/FRESCO/fresco_cloud_albedo_crb
/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/FRESCO/fresco_surface_albedo
/PRODUCT/SUPPORT_DATA/INPUT_DATA/surface_albedo **attribute** ancillary_variables
/PRODUCT/SUPPORT_DATA/INPUT_DATA/cloud_pressure_crb **attribute** ancillary_variables
/PRODUCT/SUPPORT_DATA/INPUT_DATA/cloud_fraction_crb **attribute** ancillary_variables
/PRODUCT/SUPPORT_DATA/INPUT_DATA/cloud_albedo_crb **attribute** ancillary_variables
/PRODUCT/SUPPORT_DATA/INPUT_DATA/scene_albedo **attribute** ancillary_variables
/PRODUCT/SUPPORT_DATA/INPUT_DATA/apparent_scene_pressure **attribute**
ancillary_variables

/METADATA/QA_STATISTICS **attribute** number_of_missing_scanlines
/METADATA/QA_STATISTICS **attribute**
number_of_max_num_outlier_exceeded_error_occurrences

/METADATA/GRANULE_DESCRIPTION **attribute** CollectionIdentifier



Removed fields

/METADATA/ISO_METADATA/gmd:identificationInfo/gmd:spatialResolution
 /PRODUCT/SUPPORT_DATA/INPUT_DATA/surface_albedo_nitrogendioxide_window attribute
 radiation_wavelength (removed by mistake, will be added at the first opportunity)

/PRODUCT/SUPPORT_DATA/INPUT_DATA/surface_albedo attribute radiation_wavelength
 /PRODUCT/SUPPORT_DATA/INPUT_DATA/cloud_pressure_crb attribute source
 /PRODUCT/SUPPORT_DATA/INPUT_DATA/cloud_fraction_crb attribute source
 /PRODUCT/SUPPORT_DATA/INPUT_DATA/cloud_albedo_crb attribute source
 /PRODUCT/SUPPORT_DATA/INPUT_DATA/scene_albedo attribute source
 /PRODUCT/SUPPORT_DATA/INPUT_DATA/scene_albedo attribute radiation_wavelength
 /PRODUCT/SUPPORT_DATA/INPUT_DATA/apparent_scene_pressure attribute source

Renamed fields

/PRODUCT/qa_value attribute valid_min_
 → /PRODUCT/qa_value attribute valid_min

/PRODUCT/qa_value attribute valid_max_
 → /PRODUCT/qa_value attribute valid_max

/METADATA/QA_STATISTICS attribute number_of_aai_warning_occurrences
 → /METADATA/QA_STATISTICS attribute number_of_AAI_warning_occurrences

1.6.4 AAI (L2_AER_AI)

New fields added

/METADATA/QA_STATISTICS attribute number_of_missing_scanlines
 /METADATA/QA_STATISTICS attribute
 number_of_max_num_outlier_exceeded_error_occurrences

/METADATA/GRANULE_DESCRIPTION attribute CollectionIdentifier

Removed fields

/METADATA/ISO_METADATA/gmd:identificationInfo/gmd:spatialResolution

Renamed fields

/PRODUCT/qa_value attribute valid_min_
 → /PRODUCT/qa_value attribute valid_min

/PRODUCT/qa_value attribute valid_max_
 → /PRODUCT/qa_value attribute valid_max

/METADATA/QA_STATISTICS attribute number_of_aai_warning_occurrences
 → /METADATA/QA_STATISTICS attribute number_of_AAI_warning_occurrences



1.6.5 ALH (L2__AER_LH)

New fields added

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/aerosol_mid_pressure_not_clipped
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/aerosol_optical_thickness attribute comment
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/aerosol_optical_thickness attribute
 radiation_wavelength

/METADATA/QA_STATISTICS attribute number_of_missing_scanlines
 /METADATA/QA_STATISTICS attribute
 number_of_max_num_outlier_exceeded_error_occurrences

/METADATA/GRANULE_DESCRIPTION attribute CollectionIdentifier

Removed fields

/METADATA/ISO_METADATA/gmd:identificationInfo/gmd:spatialResolution

Renamed fields

/PRODUCT/qa_value attribute valid_min_
 → /PRODUCT/qa_value attribute valid_min

/PRODUCT/qa_value attribute valid_max_
 → /PRODUCT/qa_value attribute valid_max

/METADATA/QA_STATISTICS attribute number_of_aai_warning_occurrences
 → /METADATA/QA_STATISTICS attribute number_of_AAI_warning_occurrences

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/aerosol_optical_thickness attribute
 proposed_standard_name
 → standard_name

1.6.6 CH4 (L2__CH4__)

New fields added

/METADATA/QA_STATISTICS attribute number_of_missing_scanlines
 /METADATA/QA_STATISTICS attribute
 number_of_max_num_outlier_exceeded_error_occurrences

/METADATA/GRANULE_DESCRIPTION attribute CollectionIdentifier

Removed fields

/METADATA/ISO_METADATA/gmd:identificationInfo/gmd:spatialResolution

Renamed fields

/PRODUCT/qa_value attribute valid_min_
 → /PRODUCT/qa_value attribute valid_min

/PRODUCT/qa_value attribute valid_max_
 → /PRODUCT/qa_value attribute valid_max



/METADATA/QA_STATISTICS attribute number_of_aai_warning_occurrences
 → /METADATA/QA_STATISTICS attribute number_of_AAI_warning_occurrences

1.6.7 CO (L2_CO___)

New fields added

/METADATA/QA_STATISTICS attribute number_of_missing_scanlines
 /METADATA/QA_STATISTICS attribute number_of_max_num_outlier_exceeded_error_occurrences

/METADATA/GRANULE_DESCRIPTION attribute CollectionIdentifier
 /PRODUCT/carbonmonoxide_total_column_corrected: This variable contains the carbon monoxide total column with a destriping correction applied. The destriping algorithm requires a full orbit, and is therefore not possible in NRTI processing. In a NRTI granule this variable only contains fill values.

/PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/carbonmonoxide_total_column_stripe_offset: This variable is the stripe correction (offset) that is calculated in OFFLINE processing.

Removed fields

/METADATA/ISO_METADATA/gmd:identificationInfo/gmd:spatialResolution

Renamed fields

/PRODUCT/qa_value attribute valid_min_
 → /PRODUCT/qa_value attribute valid_min

/PRODUCT/qa_value attribute valid_max_
 → /PRODUCT/qa_value attribute valid_max

/METADATA/QA_STATISTICS attribute number_of_aai_warning_occurrences
 → /METADATA/QA_STATISTICS attribute number_of_AAI_warning_occurrences

1.6.8 SO2 (L2_SO2___)

New fields added

/PRODUCT/SUPPORT_DATA/INPUT_DATA/surface_temperature
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/number_of_doas_polynomial_coefficients_win1
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/number_of_doas_polynomial_coefficients_win2
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/number_of_doas_polynomial_coefficients_win3
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/doas_polynomial_coefficients_win1
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/doas_polynomial_coefficients_win2
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/doas_polynomial_coefficients_win3

1.6.9 HCHO (L2_HCHO__)

/PRODUCT/SUPPORT_DATA/INPUT_DATA/surface_temperature
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/number_of_doas_polynomial_coefficients
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/doas_polynomial_coefficients



1.6.10 CLOUD (L2_CLOUD_)

New fields added

/PRODUCT/SUPPORT_DATA/INPUT_DATA/surface_temperature
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/ attribute cloud_phase:flag_meanings
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/ attribute cloud_phase:flag_values

1.6.11 O3 (L2_O3___) NRTI

New fields added

/PRODUCT/SUPPORT_DATA/INPUT_DATA/surface_temperature
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/number_of_doas_polynomial_coefficients
 /PRODUCT/SUPPORT_DATA/DETAILED_RESULTS/doas_polynomial_coefficients

1.6.12 O3 (L2_O3___) OFFL

New fields added

/PRODUCT/SUPPORT_DATA/INPUT_DATA/surface_temperature

1.6.13 O3 Tropospheric Column (L2_O3_TCL)

No changes

1.6.14 S5p NPP CLOUD (L2_NP_BDx, with x=3, 6, 7)

Metadata harmonization

/METADATA/EOP_METADATA/eop:metaDataProperty/eop:processing/eop:processingDate → updated from *date-time* field to *only date* field

/METADATA/ISO_METADATA/gmd:dataQualityInfo/gmd:lineage/gmd:processStep/gmi:processingInformation/gmi:softwareReference/gmd:date attribute gmd:date → updated from *date* field to *date-time* field

/METADATA/ESA_METADATA/earth_explorer_header/variable_header/gmd:lineage/gmd:processStep/gmi:processingInformation/gmi:softwareReference/gmd:date attribute gmd:date → updated from *date* field to *date-time* field

/METADATA/ISO_METADATA/gmd:dataQualityInfo/gmd:lineage/gmd:processStep/gmi:processingInformation/gmi:softwareReference/gmd:title → text changed

/METADATA/ESA_METADATA/earth_explorer_header/variable_header/gmd:lineage/gmd:processStep/gmi:processingInformation/gmi:softwareReference/gmd:title → text changed



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