

Carbon monoxide (CO)

readme: version 6.5.0

Each file contains data for one day of observation.

File names include the year, the month and the day of observation. Their structure is:

IASI_PLATFORM_L2_CO_YYYYMMDD_ULB-LATMOS_VERSION.nc

where:

PLATFORM = METOPA, METOPB or METOPC, YYYY = year, MM = month, DD = day, VERSION = VX.Y.Z where X.Y is the version number of the retrieval code and Z the version number of the NetCDF file production

The format of the files is NetCDF4.

The structure of the file header (eg for 1st May 2020) is as follows:

```
netcdf IASI_METOPA_L2_CO_20200501_ULB-LATMOS_V6.5.0 {
dimensions:
    time = UNLIMITED ; // (573650 currently)
    nlayers = 19 ;
    npressures = 20 ;
    nchartime = 16 ;
variables:
    double time(time) ;
        time:long_name = "UTC observation time in seconds since 2007-01-01 00:00:00 UTC" ;
        time:units = "second" ;
        time:standard_name = "time" ;
    char time_string(time, nchartime) ;
        time_string:long_name = "UTC observation time as YYYYMMDDThhmmssZ" ;
    double time_in_day(time) ;
        time_in_day:long_name = "UTC observation time in seconds in the day" ;
        time_in_day:units = "second" ;
    float latitude(time) ;
        latitude:least_significant_digit = 5LL ;
        latitude:standard_name = "latitude" ;
        latitude:long_name = "latitude of ground pixel center" ;
        latitude:units = "degrees_north" ;
        latitude:valid_range = -90.f, 90.f ;
    float longitude(time) ;
        longitude:least_significant_digit = 5LL ;
        longitude:standard_name = "longitude" ;
        longitude:long_name = "longitude of ground pixel center" ;
        longitude:units = "degrees_east" ;
        longitude:valid_range = -180.f, 180.f ;
    float solar_zenith_angle(time) ;
        solar_zenith_angle:least_significant_digit = 3LL ;
        solar_zenith_angle:long_name = "solar zenith angle at the Earth s surface for the pixel center" ;
        solar_zenith_angle:units = "degrees" ;
        solar_zenith_angle:standard_name = "solar_zenith_angle" ;
    float satellite_zenith_angle(time) ;
        satellite_zenith_angle:least_significant_digit = 3LL ;
        satellite_zenith_angle:long_name = "Metop zenith angle at the Earth s surface for the pixel center" ;
        satellite_zenith_angle:units = "degrees" ;
        satellite_zenith_angle:standard_name = "platform_zenith_angle" ;
    int64 orbit_number(time) ;
        orbit_number:long_name = "Metop orbit number" ;
    int scanline_number(time) ;
        scanline_number:long_name = "scanline number in the Metop orbit" ;
    int pixel_number(time) ;
        pixel_number:long_name = "pixel number in the current scanline" ;
        pixel_number:valid_range = 1, 120 ;
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int ifov_number(time) ;
    ifov_number:long_name = "field of view number in the 2 x 2 observation matrix" ;
    ifov_number:valid_range = 1, 4 ;
int retrieval_quality_flag(time) ;
    retrieval_quality_flag:long_name = "retrieval quality flag summarizing processing flags" ;
    retrieval_quality_flag:comment = "= 2 for the most reliable pixels; = 1 for the valuable pixels, to use with caution; = 0
for the remaining pixels that we recommend not to use" ;
float surface_altitude(time) ;
    surface_altitude:least_significant_digit = 1LL ;
    surface_altitude:units = "m" ;
    surface_altitude:long_name = "altitude of the surface" ;
    surface_altitude:standard_name = "surface_altitude" ;
float CO_apriori_partial_column_profile(time, nlayers) ;
    CO_apriori_partial_column_profile:units = "mol m-2" ;
    CO_apriori_partial_column_profile:long_name = "carbon monoxide a priori partial column vertical profile in
mole/m2 in the layers defined by the levels given in the variable atmosphere_pressure_grid" ;
    CO_apriori_partial_column_profile:standard_name = "mole_content_of_ozone_in_atmosphere_layer" ;
    CO_apriori_partial_column_profile:comment = "When the first levels are not available (because of the orography),
CO_apriori_partial_column_profile = -999. for these levels." ;
    CO_apriori_partial_column_profile:multiplication_factor_to_convert_to_molecules_percm2 = 6.02214086e+19 ;
    CO_apriori_partial_column_profile:missing_value = -999.f ;
float CO_partial_column_profile(time, nlayers) ;
    CO_partial_column_profile:units = "mol m-2" ;
    CO_partial_column_profile:long_name = "carbon monoxide partial column vertical profile in mole/m2 retrieved in
the layers defined by the levels given in the variable atmosphere_pressure_grid" ;
    CO_partial_column_profile:standard_name = "mole_content_of_carbon_monoxide_in_atmosphere_layer" ;
    CO_partial_column_profile:comment = "When the first levels are not available (because of the orography),
CO_partial_column_profile = -999. for these levels." ;
    CO_partial_column_profile:ancillary_variables = "CO_partial_column_error" ;
    CO_partial_column_profile:multiplication_factor_to_convert_to_molecules_percm2 = 6.02214086e+19 ;
    CO_partial_column_profile:missing_value = -999.f ;
float CO_partial_column_error(time, nlayers) ;
    CO_partial_column_error:long_name = "vertical profile of total retrieval error associated to carbon monoxide partial
column vertical profile in the layers defined by the levels given in the variable atmosphere_pressure_grid" ;
    CO_partial_column_error:comment = "This error is relative to the carbon monoxide total column; it is without
unit." ;
    CO_partial_column_error:standard_name = "atmosphere_mole_content_of_carbon_monoxide_standard_error" ;
    CO_partial_column_error:missing_value = -999.f ;
float CO_total_column(time) ;
    CO_total_column:units = "mol m-2" ;
    CO_total_column:long_name = "retrieved carbon monoxide total column in mole/m2" ;
    CO_total_column:standard_name = "atmosphere_mole_content_of_carbon_monoxide" ;
    CO_total_column:ancillary_variables = "CO_total_column_error" ;
    CO_total_column:multiplication_factor_to_convert_to_molecules_percm2 = 6.02214086e+19 ;
float CO_total_column_error(time) ;
    CO_total_column_error:long_name = "total retrieval error associated to carbon monoxide total column" ;
float CO_degrees_of_freedom(time) ;
    CO_degrees_of_freedom:long_name = "degrees of freedom of the signal in the retrieved carbon monoxide partial
column profile" ;
    CO_degrees_of_freedom:comment = "This is the estimation of the number of independant information pieces
concerning carbon monoxide vertical distribution in the signal." ;
float air_partial_column_profile(time, nlayers) ;
    air_partial_column_profile:units = "mol m-2" ;
    air_partial_column_profile:long_name = "air partial column vertical profile in mole/m2 in the layers defined by the
levels given in the variable atmosphere_pressure_grid" ;
    air_partial_column_profile:comment = "When the first levels are not available (because of the orography),
air_partial_column_profile = -999. for these levels." ;
    air_partial_column_profile:standard_name = "mole_content_of_air_in_atmosphere_layer" ;

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    air_partial_column_profile:multiplication_factor_to_convert_to_molecules_percm2 = 6.02214086e+19 ;
    air_partial_column_profile:missing_value = -999.f ;
    float atmosphere_pressure_grid(time, npressures) ;
    atmosphere_pressure_grid:units = "Pascal" ;
    atmosphere_pressure_grid:long_name = "pressures in Pa corresponding to levels used to define inversion layers: 18
layers of about 1 km height between Earth s surface and 18 km with an additional layer from 18 km to the top of the
atmosphere (60 km)" ;
    atmosphere_pressure_grid:comment = "When the first levels are not available (because of the orography),
atmosphere_pressure_grid = -999. for these levels. When the pressure profile could not be estimated,
atmosphere_pressure_grid = -999. for all levels." ;
    atmosphere_pressure_grid:standard_name = "air_pressure" ;
    atmosphere_pressure_grid:missing_value = -999.f ;
    float averaging_kernel_matrix(time, nlayers, nlayers) ;
    averaging_kernel_matrix:long_name = "carbon monoxide partial column averaging kernels matrix
((mol/m2)/(mol/m2)) in the layers defined by the levels given in the variable atmosphere_pressure_grid" ;
    averaging_kernel_matrix:comment = "When the first levels are not available (because of the orography),
averaging_kernel_matrix = -999. for these levels." ;
    averaging_kernel_matrix:missing_value = -999.f ;

// global attributes:
    :title = "IASI/METOPA ULB-LATMOS carbon monoxide (CO) L2 products (profiles of partial columns and total
columns)" ;
    :institution = "ULB-LATMOS for algorithm development ; EUMETSAT for data production ; LATMOS for data
reconstruction and formatting ; AERIS for data access" ;
    :product_version = "6.5.0" ;
    :history = "2020-06-25 09:02:11 (date of data extraction) - Product generated with FORLI v20151001 at EUMETSAT" ;
    :summary = "This dataset contains Level 2 carbon monoxide profile and total column products from IASI
observations. These products were generated at EUMETSAT under the auspices of AC SAF with the ULB-LATMOS FORLI
algorithm version 20151001 using the EUMETSAT v8.0 IASI Level 1C and v6.5 IASI Level 2 temperature, humidity and cloud
data. They are distributed in files in BUFR format via EumetCast. Data reconstruction and formatting in netcdf files are
processed by LATMOS. Quicklooks and data access are provided by AERIS" ;
    :source = "EUMETSAT IASI Level 2 carbon monoxide (CO) data version 6.5" ;
    :references = "Reference to the CO retrieval: FORLI radiative transfer and retrieval code for IASI, J. Quant. Spectrosc.
Ra., 113, 1391-1408, https://doi.org/10.1016/j.jqsrt.2012.02.036, 2012." ;
    :id = "IASI_METOPA_L2_CO_20200501_ULB-LATMOS_V6.5.0.nc" ;
    :tracking_id = "c7a27dfa-b6b1-11ea-b2c7-002590591942" ;
:geospatial_lat_min = "-90.0" ;
    :geospatial_lat_max = "+90.0" ;
    :geospatial_latitude_units = "degrees_north" ;
    :geospatial_lon_min = "-180.0" ;
    :geospatial_lon_max = "+180.0" ;
    :geospatial_longitude_units = "degrees_east" ;
    :geospatial_vertical_min = "0" ;
    :geospatial_vertical_max = "60" ;
    :geospatial_vertical_units = "km" ;
    :time_coverage_start = "20191201T000000Z" ;
    :time_coverage_end = "20191201T235959Z" ;
    :conventions = "CF-1.6" ;
    :standard_name_vocabulary = "NetCDF Climate and Forecast (CF) Metadata Convention version 30, 3 December
2015" ;
    :keywords = "satellite,observation,atmosphere,carbon monoxide,CO,level
2,column,altitude,profile,pollution,IASI,Metop-A" ;
    :keywords_vocabulary = "GCMD Science Keywords" ;
    :platform = "Metop-A" ;
    :sensor = "IASI" ;
    :spatial_resolution = "12km at nadir" ;
    :creator_type = "institution" ;
    :creator_name = "ULB-LATMOS" ;
    :contact_email = "contact form at http://iasi.aeris-data.fr/contact/" ;
    :data_policy = "see https://iasi.aeris-data.fr/data-use-policy/" ;
}

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