

| Name | Description | netcdf Type | Format | Required | Example | Attribute: Long name | Attribute: Comment | Attribute: Provider Comment | Attribute: Units | Attribute: Fill Value | Other attributes |
|----------------------|---|-------------|------------------------------|----------|----------------------|---|---|---|------------------------------------|---|---|
| time | Air sample collection time (UTC). POSIX time (number of seconds since January 1, 1970 in UTC). | int | | yes | 1477985400 | sample_time_in_seconds_since_january_1_1970 | POSIX time. Number of seconds since January 1, 1970 in UTC. Time-averaged values are reported at the middle of the averaging interval. For uneven averaging intervals times are rounded down to the nearest second. | Additional comments from the data provider may be placed here | seconds since 1970-01-01T00:00:00Z | N/A, This variable must contain a valid value | |
| start_time | Air sample collection time (UTC). POSIX time (number of seconds since January 1, 1970 in UTC). | int | | yes | 1477983600 | sample_start_time_in_seconds_since_january_1_1970 | POSIX start time. Number of seconds since January 1, 1970 in UTC. | Additional comments from the data provider may be placed here | seconds since 1970-01-01T00:00:00Z | N/A, This variable must contain a valid value | |
| midpoint_time | Air sample collection time (UTC). POSIX time (number of seconds since January 1, 1970 in UTC). | int | | no | 1477985400 | sample_midpoint_time_in_seconds_since_january_1_1970 | POSIX midpoint time. Number of seconds since January 1, 1970 in UTC. | Additional comments from the data provider may be placed here | seconds since 1970-01-01T00:00:00Z | N/A, This variable must contain a valid value if used | |
| datetime | Air sample date and time in UTC ISO 8601 format. | char | character array of 100 chars | no | 2016-11-01T07:30:00Z | air_sample_date_and_time_in_UTC | Air sample date and time in UTC ISO 8601 format. Time-averaged values are reported at the middle of the averaging interval. For uneven averaging intervals times are rounded down to the nearest second. | Additional comments from the data provider may be placed here | N/A | N/A, This variable must contain a valid value if used | |
| time_decimal | Air sample collection time (UTC) in decimal year notation (e.g., 2012.4523312). | double | year.fractional_year | yes | 2012.4523312 | sample_decimal_year_in_UTC | decimal year in UTC. Time-averaged values are reported at the middle of the averaging interval. For uneven averaging intervals times are rounded down to the nearest second. | Additional comments from the data provider may be placed here | N/A | N/A, This variable must contain a valid value | |
| time_components | Air sample collection time (UTC) represented as a 6-element array [year, month, day, hour, minute, second]. Calendar time components as integers. | int | [yyyy.mm.dd, hh, mm, ss] | yes | (2016,11,1,7,30,0) | integer_components_of_UTC_date/time | Calendar time components as integers. Times and dates are UTC. Time-averaged values are reported at the middle of the averaging interval. For uneven averaging intervals times are rounded down to the nearest second. | Additional comments from the data provider may be placed here | N/A | N/A, This variable must contain a valid value | order : year, month, day, hour, minute, second |
| solartime_components | Air sample collection time (solar time) represented as a 6-element array [year, month, day, hour, minute, second]. UTC time is converted to local solar time based on longitude and day-of-year. Solar time components as integers. | int | [yyyy.mm.dd, hh, mm, ss] | no | (2016,11,1,8,11,47) | integer_components_of_local_solar_date/time | Calendar local solar time components as integers. UTC time is converted to local solar time based on longitude and day-of-year. Time-averaged values are reported at the middle of the averaging interval. For uneven averaging intervals times are rounded down to the nearest second. | Additional comments from the data provider may be placed here | N/A | N/A, This variable must contain a valid value | order : year, month, day, hour, minute, second |
| time_interval | Total number of seconds of the averaging interval. | int | | no | 3600 | sample_time_interval_in_seconds | Total number of seconds of the averaging interval. | Additional comments from the data provider may be placed here | seconds | N/A, This variable must contain a valid value if used | |
| value | dataset gas species measured value | float | | yes | 0.0003552785 | measured_mole_fraction_of_trace_gas_in_dry_air | mole per mole of dry air | Additional comments from the data provider may be placed here | mol mol-1 | -1.00E+34 | scale_comment : value provided scale |
| value_original_scale | if value has been converted from native scale the values on their original scale will be provided here | float | | no | 0.00035514 | measured_mole_fraction_of_trace_gas_in_dry_air | Values supplied by data providers that are not on the common calibration scale are reported in this variable. | Additional comments from the data provider may be placed here | mol mol-1 | -1.00E+34 | scale_comment : The value_original_scale in this dataset have been supplied on the WMO CO2 X2007 calibration scale. |
| value_unc | This is the estimated uncertainty of the reported value. | float | | no | 1.26E-07 | estimated_uncertainty_in_reported_value | This is the estimated uncertainty of the reported value. See provider_comment if available. | Additional comments from the data provider may be placed here | mol mol-1 | -1.00E+34 | |
| value_std_dev | This is the standard deviation of the reported mean value when nvalue is greater than 1. | float | | no | 1.55E-07 | standard_deviation_in_reported_value | This is the standard deviation of the reported mean value when nvalue is greater than 1. See provider_comment if available. | Additional comments from the data provider may be placed here | mol mol-1 | -99.99 | |
| inst_repeatability | This is the standard deviation of the measurement instrument when measuring a constant air stream, e.g. from a standard or zero gas tank. | float | | no | 0.000000005 | instrument_precision | This is the standard deviation of the measurement instrument when measuring a constant air stream, e.g. from a standard or zero gas tank. See provider_comment if available. | Additional comments from the data provider may be placed here | mol mol-1 | -99.99 | |
| nvalue | Number of individual measurements used to compute reported value. | int | | no | 60 | number_of_measurements_contributing_to_reported_value | Number of individual measurements used to compute reported value. See provider_comment if available. | Additional comments from the data provider may be placed here | N/A | -9 | |

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|----------------------------|--|-------------|-----------------------------------|----------|---------------------------------------|---|--|---|------------------|-----------------------|---------------------------|
| latitude | Latitude at which air sample was collected (units: decimal degrees north). | float | -90 to 90 | yes | 45.9451 | sample_latitude_in_decimal_degrees | Latitude at which air sample was collected. | Additional comments from the data provider may be placed here | degrees_north | -1.00E+34 | standard_name : latitude |
| longitude | Longitude at which air sample was collected (units: decimal degrees east, range: -180° to +180°). | float | -180 to 180 | yes | -90.2732 | sample_longitude_in_decimal_degrees | Longitude at which air sample was collected using a range of -180 degrees to +180 degrees. | Additional comments from the data provider may be placed here | degrees_east | -1.00E+34 | standard_name : longitude |
| altitude | Altitude (surface elevation plus sample intake height) at which air sample was collected. Units are meters above sea level (masl). | float | | yes | 868 | sample_altitude_in_meters_above_sea_level | Altitude (in meters above sea level). See provider_comment if available. | Additional comments from the data provider may be placed here | m | -1.00E+34 | standard_name : altitude |
| pressure_altitude | Pressure Altitude in meters above sea level derived from ambient pressure at time of sampling. | float | | no | 5777.88 | pressure_altitude_in_meters_above_sea_level | Pressure Altitude (in meters above sea level) derived from ambient pressure at time of sampling. See provider_comment if available. | Additional comments from the data provider may be placed here | m | -1.00E+34 | |
| gps_altitude | GPS Altitude in meters above sea level taken at time of sampling. | float | | no | 5138.04 | sample_gps_altitude_in_meters_above_sea_level | GPS Altitude (in meters above sea level) taken at time of sampling. See provider_comment if available. | Additional comments from the data provider may be placed here | m | -1.00E+34 | |
| elevation | Surface or ground elevation at which air sample was collected. Units are meters above sea level (masl). | float | | no | 472 | surface_elevation_in_meters_above_sea_level | Surface elevation in meters above sea level. See provider_comment if available. | Additional comments from the data provider may be placed here | m | -1.00E+34 | standard_name : elevation |
| intake_height | Height above ground at which air sample was collected. Units are meters above ground level (magl). | float | | no | 396 | sample_intake_height_in_meters_above_ground_level | Sample intake height in meters above ground level (magl). See provider_comment if available. | Additional comments from the data provider may be placed here | m | -1.00E+34 | |
| qcflag | This is the quality control flag provided by the contributing PIs. | char | character array of 10 characters | no | "..." | quality_control_flag | This quality control flag is provided by the contributing PIs. See provider_comment if available. | Additional comments from the data provider may be placed here | N/A | N/A | |
| instrument | Instrument ID used to detect atmospheric parameter. | char | character array of 100 characters | no | "TL1" | instrument_ID_to_detect_atmospheric_parameter | Instrument ID used to detect atmospheric parameter. See provider_comment if available. | Additional comments from the data provider may be placed here | N/A | N/A | |
| analysis_datetime | air_sample_measurement_date_and_time_in_LT | char | character array of 100 characters | no | 2021-03-08 17:01:23 | air_sample_measurement_date_and_time_in_LT | Air sample measurement date and time in LT. See provider_comment if available. | Additional comments from the data provider may be placed here | N/A | N/A | |
| method | Air sample collection method. | char | character array of 100 characters | no | "S" | air_sample_collection_method | Air sample collection method. See provider_comment if available. | Additional comments from the data provider may be placed here | N/A | N/A | |
| event_number | Many laboratories identify each discrete air sample collected at some time and location using a unique sample event number. The event number (reported as a string) can be used to relate measurements of different trace gases and isotopes from the same sample. | char | character array of 200 characters | no | "126253" | Unique_Air_Sample_Event_Number | Many laboratories identify each discrete air sample collected at some time and location using a unique sample event number. The event number (reported as a string) can be used to relate measurements of different trace gases and isotopes from the same sample. | Additional comments from the data provider may be placed here | N/A | N/A | |
| source_id | The upstream data provider can optionally include a source_id string to identify or provide context for a particular observation in the source data. See provider_comment if available. | char | character array of 200 characters | no | "Mor.all.at1234.2019-06-07.tbl~1~134" | source_id | The upstream data provider can optionally include a source_id string to identify or provide context for a particular observation in the source data. See provider_comment if available. | Additional comments from the data provider may be placed here | N/A | N/A | |
| profile_id | The upstream data provider can optionally include a profile_id, generally for aircraft or shipboard programs, that can be used to identify unique profiles in the data. | char | character array of 200 characters | no | "1" | profile_id | The upstream data provider can optionally include a profile_id, generally for aircraft or shipboard programs, that can be used to identify unique profiles in the data. | Additional comments from the data provider may be placed here | N/A | N/A | |
| flight_id | If data item was sourced from an air campaign, the data provider can optionally provide a flight identification string. | char | character array of 200 characters | no | "1~1" | flight_id | If data item was sourced from an air campaign, the data provider can optionally provide a flight identification string. | Additional comments from the data provider may be placed here | N/A | N/A | |
| unique_sample_location_num | This variable uniquely identifies a sample location and datetime. The number assigned to each observation in this variable will be the same in all future ObsPack products including ones for other species measured in that sample. | int | | no | 12894573 | unique_sample_location_num | This variable uniquely identifies a sample location and datetime. The number assigned to each observation in this variable will be the same in all future ObsPack products including ones for other species measured in that sample. | Additional comments from the data provider may be placed here | N/A | N/A | |
| air_sample_container_id | ID of air sample container. | char | character array of 100 characters | no | "43-74" | Air_Sample_Container_ID | ID of air sample container. See provider_comment if available. | Additional comments from the data provider may be placed here | N/A | N/A | |

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|-----------------------|--|-------------|--|----------|-------------|--|---|---|------------------|---|--|
| pressure | Ambient pressure at time of sampling. Units are hectopascal (hPa) where 1 hPa = 100 Pa. This variable is not always available. | float | | no | 1008.96 | ambient_pressure_at_time_of_sampling | Ambient pressure at time of sampling (in hectopascal where 1 hPa = 100 Pa). See provider_comment if available. | Additional comments from the data provider may be placed here | hPa | -1.00E+34 | |
| h2o | Water Vapor mole fraction reported in units of micromol mol-1 (10-6 mol per mol of dry air); equivalent to ppm (parts per million). | float | | no | 0.00261 | measured_mole_fraction_of_h2o_in_dry_air | mole per mole of dry airR | Additional comments from the data provider may be placed here | mol mol-1 | -1.00E+34 | |
| u | Eastward (westerly) wind component in meters per second. | float | | no | -4.99 | Eastward wind component | Eastward (westerly) wind component in meters per second. See provider_comment if available. | Additional comments from the data provider may be placed here | m s-1 | -1.00E+34 | |
| v | Northward (southerly) wind component in meters per second. | float | | no | -4.382 | Northward wind component | Northward (southerly) wind component in meters per second. See provider_comment if available. | Additional comments from the data provider may be placed here | m s-1 | -1.00E+34 | |
| temperature | Temperature at time of sampling in Kelvin. | float | | no | 300.27 | temperature_at_time_of_sampling | Temperature at time of sampling in Kelvin. See provider_comment if available. | Additional comments from the data provider may be placed here | K | -1.00E+34 | |
| obs_flag | Representation flag indicates that reported value has large spatial scale representation (1) or is locally influenced (0). This attribute is derived from the data providers source data. The implementation of this flag is still being developed. Suggestions welcome. | int | 1 or 0, this flag is determined by first 3 columns of assimilation_concerns | yes | 1 | obs_flag | Determined by data provider (1: large spatial scale representation; 0: local/regional influence). The implementation of this flag is still being developed. | Additional comments from the data provider may be placed here | binary | N/A. This variable must contain a valid value | |
| assimilation_concerns | Values in this array indicate if the given observation has the assimilation concern defined by each column. A value of 0 means that there is no concern or it is not known to exist, and a non-zero value means that this concern does exist. | int | array of integers of length equal to the number of concerns. each integer is either a 1 or 0 | no | [1,0,0,0,1] | assimilation_concerns | Values in this array indicate if the given observation has the assimilation concern defined by each column. A value of 0 means that there is no concern or it is not known to exist, and a non-zero value means that this concern does exist. Data suitable for a global scale model in general will have a 0 in the time window, representivity, and variability columns of this variable. The implementation of this variable is still being developed. | Additional comments from the data provider may be placed here | N/A | N/A. This variable must contain a valid value | order : time window, representivity, variability, under review, wdcgg-background, scale_conversion |
| air_flag | Act america variable. This variable contains a 0, 1, or 2 which corresponds to fair_flight, cold, or warm respectively. | int | | no | 2 | Warm/Cold air flag | Act america variable. This variable contains a 0, 1, or 2 which corresponds to fair_flight, cold, or warm respectively. | Additional comments from the data provider may be placed here | N/A | | |
| bl_bt_flag | Act america variable. This variable contains a 0, 1, or 2 which corresponds to aircraft_on_ground, boundary_layer, or free_troposphere respectively. | int | | no | 1 | Boundary layer or free troposphere flag | Act america variable. This variable contains a 0, 1, or 2 which corresponds to aircraft_on_ground, boundary_layer, or free_troposphere respectively. | Additional comments from the data provider may be placed here | N/A | | |
| flight_flag | Act america variable. This variable contains a 1, 2, 3, 4, or 5 which corresponds to frontal, prefrontal_fair, postfrontal_fair, fair, or other respectively. | int | | no | 4 | Flight pattern flag | Act america variable. This variable contains a 1, 2, 3, 4, or 5 which corresponds to frontal, prefrontal_fair, postfrontal_fair, fair, or other respectively. | Additional comments from the data provider may be placed here | N/A | | |
| maneuver_flag | Act america variable. This variable contains a 0, 1, 2, 3, 4, 5, 6, or 7 which corresponds to on_ground, take_off, inline_ascent, inline_descent, spiral_up, spiral_down, constant_alt_legs, or landing respectively. | int | | no | 6 | Maneuver flag | Act america variable. This variable contains a 0, 1, 2, 3, 4, 5, 6, or 7 which corresponds to on_ground, take_off, inline_ascent, inline_descent, spiral_up, spiral_down, constant_alt_legs, or landing respectively. | Additional comments from the data provider may be placed here | N/A | | |
| maneuver_flagqc | Act america variable. This variable contains a 0 or 1 which corresponds to indicated_low_confidence_in_maneuverFlag or no_low_confidence_indicated respectively.* | int | | no | 0 | Maneuver flag QC | Act america variable. This variable contains a 0 or 1 which corresponds to indicated_low_confidence_in_maneuverFlag or no_low_confidence_indicated respectively.* | Additional comments from the data provider may be placed here | N/A | | |

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|-------------|--|-------------|--|----------|---|--------------------------------------|--|---|------------------|-----------------------|------------------|
| obspack_num | Unique observation index number across all data sets in the ObsPack distribution. Ranges from 1 to max_obspack_num. | int | | yes | 22333 | unique_ObsPack_observation_number | Unique observation index number across all data sets in the ObsPack data product. Range is from 1 to max_obspack_num | Additional comments from the data provider may be placed here | N/A | N/A | |
| obspack_id | Unique identification string that distinguishes the data item from all other data items in any ObsPack data product. It includes obspack_name, dataset_name, and obspack_num delimited by a tilde (~). | char | character array of 200 characters, obspack_product_name~dataset_name~obspack_num | yes | "obspack_co2_1_GLOBALVIEWplus_v7.0_2021-08-18~co2_act_aircraft-insitu_428_allvalid-b200~14866229" | unique_ObsPack_identification_string | ObsPack observation identification string. Unique across ALL ObsPack data products. Includes Obspack name, data set name, and ObsPack observation number delimited by a tilde (~). | Additional comments from the data provider may be placed here | N/A | N/A | |