

# Meteorological Data Format

Data files are in UTF-8 text and NetCDF formats.

Meteorological data may remain as first provided even when greenhouse gas data are updated.

NetCDF format file details can be referenced in file headers.

Text format files are as described below.

The line feed code is LF.

Files contain header records and data records.

## 1. Header record

Header records are created automatically from metadata registered by data contributors. Lengths are variable and defined at the top of the record.

Composition items are as per the table on the following pages.

The information in the header record is as of the date indicated by `# dataset_creation_date` in its header records.

Item name	Example	Number of digits	Description of the item
# header_lines :	187	Variable	header length
# Data Set Name:	co2_ryo_surface-insitu_1_9999-9999_hourly_met	Variable	Character string that uniquely identifies the data set
# Data_Set_Version :	0001-2012-1001-01-01-9999_2018-03-09-1519	41	Version of the data set
# Data_Set_Fair_Use :	For Scientific purposes, access to these data is unlimited and provided without charge. By their use you accept that an offer of co-authorship will be made through personal contact with the contributors whenever substantial use is made of their data. In all cases, an acknowledgement must be made to the contributors and to the data centre when these data are used within a publication.		This is the WDCGG fair use statement agreed upon by data contributors.
# Data_Set_DOI :	10.50849/WDCGG_0001-2012-1001-01-01-9999	Variable	Dataset/data file DOI
# Data_Set_Citation_Format :	SAITO Kazuyuki (JMA), Atmospheric CO2 at Ryori by Japan Meteorological Agency , dataset published as CO2_RYO_surface-insitu_JMA_data1 at WDCGG, ver. 2020-12-14-1755, https://doi.org/10.50849/WDCGG_0001-2012-1001-01-01-9999 (Reference date*: YYYY/MM/DD) * As the reference date, please indicate the date you downloaded the files.	Variable	Citation format for a WDCGG-issued dataset DOI
#			
# GLOBAL ATTRIBUTES			
#			
# site_gaw_id :	MLO	3	3-letter site identification code as defined by GAW SIS for stationary platforms
# site_gaw_type :	GAW Global	Variable	GAW station category
# site_name :	Mauna Loa (HI)	Variable	Standard site name
# site_country/territory :	United States	Variable	Country/territory in which site is located
# site_wmo_region :	REGION V (South-West Pacific)	Variable	WMO Region
# site_address1 :	P.O. Box 275 Hilo, HI 96720 HAWAII	Variable	-
# site_address2 :		Variable	-
# site_address3 :		Variable	-
# site_latitude :	19.5362300873	Variable	Latitude (decimal degree) at representative site location
# site_longitude :	-155.5761566162	Variable	Longitude (decimal degree) at representative site location
# site_elevation :	3397	Variable	Ground or surface elevation at representative site location
# site_elevation_unit :	m	1	Units are meters above sea level (masl)
# site_1st2utc :	UTC-10:00	3 or 9	Hour conversion from UTC to LST
# site_climate_zone :	Cfb	Variable	Koepfen's classification of climate in which site is located
# site_climate_zone:comment :	Warm temperate climate, fully humid, warm summer	Variable	Climatic type
# dataset_creation_date :	2018-04-05	10	Date when the data set was prepared
# dataset_parameter :	met (co2)	Variable	Identifies trace gas species included in data set
# dataset_parameter_large_class :	Meteo (Greenhouse Gas)	Variable	Large classification of trace gas species included in data set
# dataset_parameter_small_class :		Variable	Small classification of trace gas species included in data set
# dataset_parameter_name_1 :	MET (CO2)	Variable	Identifies trace gas species included in data set
# dataset_parameter_name_2 :		Variable	Identifies trace gas species included in data set (alias name)
# dataset_parameter_name_3 :		Variable	Identifies trace gas species included in data set (alias name)
# dataset_parameter_name_4 :		Variable	Identifies trace gas species included in data set (alias name)
# dataset_parameter_name_5 :		Variable	Identifies trace gas species included in data set (alias name)
# dataset_project :	surface-flask	Variable	Typically identifies sampling platform and strategy
# dataset_platform :	fixed station	Variable	Fixed or Mobile
# dataset_selection :	All event data	Variable	Brief description of how data have been selected by data contributor
# dataset_selection_tag :	event	Variable	Short descriptor to help convey how data have been selected by data contributor
# dataset_time_zone :	UTC	Variable	This item expresses the differential to UTC.
# dataset_start_date :	1969-08-20T17:55:00Z	20 or 25	Date of first item in data set (ISO 8601 format). The letter '*' indicates that the time zone is unknown.
# dataset_end_date :	2016-12-27T20:44:00Z	20 or 25	Date of last item in data set (ISO 8601 format). The letter '*' indicates that the time zone is unknown.
# dataset_description :	Meteorological data may remain as first provided even when greenhouse gas data are updated. The height of anemometer is 10 m above ground level.	0-3500	Brief description of data set contents by data contributor
# dataset_buffer_code :	3001	4	Identification number necessary for additional observational condition
# dataset_buffer :	ccgg	Variable	Identification necessary for additional observational condition
# dataset_buffer:comment :	NOAA Carbon Cycle Greenhouse Gases	Variable	-
# dataset_footnote_code :	9999	4	Identification number of data set among same observational condition
# dataset_footnote :	default	Variable	Identification name of data set among same observational condition
# dataset_footnote:comment :		Variable	-
# contributor_organization_code :	2	Variable	Contributor identification number

# contributor_acronym :
# contributor_name :
# contributor_address1 :
# contributor_address2 :
# contributor_address3 :
# contributor_country/territory :
# contributor_url :
# contact_total_listed :
# contact_#_name :
# contact_#_address1 :
# contact_#_address2 :
# contact_#_address3 :
# contact_#_country/territory :
# contact_#_organization :
# contact_#_organization_acronym :
# contact_#_organization_url :
# contact_#_email :
# contact_#_tel :
# contact_#_fax:
# collaborator_total_listed :
# collaborator_#_organization_code :
# collaborator_#_acronym :
# collaborator_#_name :
# collaborator_#_address1 :
# collaborator_#_address2 :
# collaborator_#_address3 :
# collaborator_#_country/territory :
# collaborator_#_url :
# collaborator_#_person_total_listed :
# collaborator_#_person_#_name :
# collaborator_#_person_#_address1 :
# collaborator_#_person_#_address2 :
# collaborator_#_person_#_address3 :
# collaborator_#_person_#_country/territory :
# collaborator_#_person_#_email :
# collaborator_#_person_#_tel :
# collaborator_#_person_#_fax:
# wind_direction_flag
# wind_speed_flag
# relative_humidity_flag
# precipitation_amount_flag
# air_pressure_flag
# air_temperature_flag
# dew_point_temperature_flag
# sea_water_temperature_flag
# sea_surface_water_temperature_flag
# sea_water_salinity_flag
# sea_surface_water_salinity_flag
#
# VARIABLE ATTRIBUTES
#
# site_gaw_id:long_name :
# site_gaw_id:comment :
# time_components:FillValue :
# time_components:long_name :
# time_components:order :
# time_components:comment :

NOAA	1-16
Earth System Research Laboratory, NOAA	1-255
R/GMD1	0-255
NOAA/ESRL	0-255
325 Broadway Boulder, CO 80305-3337	0-255
United States	Variable
<a href="http://www.cmdl.noaa.gov/index.html">http://www.cmdl.noaa.gov/index.html</a>	0-255
1	Variable
Firstname LASTNAME	1-100
1-3-4 Otemachi	0-255
Chiyoda-ku	0-255
Tokyo 100-8122	0-255
Japan	Variable
Japan Meteorological Agency	1-255
JMA	1-16
<a href="http://www.jma.go.jp/jma/indexe.html">http://www.jma.go.jp/jma/indexe.html</a>	0-255
name@domain	1-100
+81-1-2345-6789	0-50
+81-1-2345-6789	0-50
1	Variable
2	Variable
NOAA	1-16
Earth System Research Laboratory, NOAA	1-255
R/GMD1	0-255
NOAA/ESRL	0-255
325 Broadway Boulder, CO 80305-3337	0-255
United States	Variable
<a href="http://www.cmdl.noaa.gov/index.html">http://www.cmdl.noaa.gov/index.html</a>	0-255
1	Variable
Firstname LASTNAME	1-100
1-3-4 Otemachi	0-255
Chiyoda-ku	0-255
Tokyo 100-8122	0-255
Japan	Variable
name@domain	1-100
+81-1-2345-6789	0-50
+81-1-2345-6789	0-50
1	1
1	1
1	1
1	1
1	1
1	1
1	1
0	1
0	1
0	1
0	1
unique_station/mobile_identifiers.	34
3-letter site identification code as defined by GAWSYS for stationary platforms	79
-999 or -9	10
integer_components_of_LST_date/time	35
year, month, day, hour, minute, second	38
Sample collection time (LST) represented as a 6-element array [year, month, day, hour, minute, second]. Calendar time components as integers.	141

Contributor abbreviation or acronym
Contributor name
-
-
-
Country/territory name
URL of contributor
Number of contact persons associated with the data set
Contact person name. The letter '#' represents a number from 1 to maximum (contact_total_listed).
-
-
-
Country/territory name
Organization name
Acronym of organization name
URL of organization
Email address of contact person
Telephone number of contact person
Fax number of contact person
Number of contributing collaborators associated with the data set
Collaborator identification number. The letter '#' represents a number from 1 to maximum (collaborator_total_listed).
Collaborator abbreviation or acronym
Collaborator name
-
-
-
Country/territory name
URL of collaborator
Number of person in collaborator organizaion associated with the data set
Collaborator person name. The letter '#' represents a number from 1 to maximum (collaborator_#_person_total_listed).
-
-
-
Country/territory name
Email address of collaborator person
Telephone number of collaborator person
Fax number of collaborator person
Flag indicating wind direction data availability (1: available; 0: unavailable)
Flag indicating wind speed data availability (1: available; 0: unavailable)
Flag indicating relative humidity data availability (1: available; 0: unavailable)
Flag indicating precipitation amount data availability (1: available; 0: unavailable)
Flag indicating air pressure data availability (1: available; 0: unavailable)
Flag indicating air temperature data availability (1: available; 0: unavailable)
Flag indicating dew point temperature data availability (1: available; 0: unavailable)
Flag indicating sea water temperature data availability (1: available; 0: unavailable)
Flag indicating sea surface water temperature data availability (1: available; 0: unavailable)
Flag indicating sea water salinity data availability (1: available; 0: unavailable)
Flag indicating sea surface water salinity data availability (1: available; 0: unavailable)
site_gaw_id : Site gaw id is an abbreviation for the sampling site name.
time_components : Sample collection time (LST or UTC) represented as a 6-element array [year, month, day, hour, minute, second]. Calendar time components as integers.

# wind_direction:FillValue :
# wind_direction:units :
# wind_direction:comment :
# wind_speed:FillValue :
# wind_speed:units :
# wind_speed:comment :
# relative_humidity:FillValue :
# relative_humidity:units :
# precipitation_amount:FillValue :
# precipitation_amount:units :
# air_pressure:FillValue :
# air_pressure:units :
# air_temperature:FillValue :
# air_temperature:units :
# dew_point_temperature:FillValue :
# dew_point_temperature:units :
# sea_water_temperature:FillValue :
# sea_water_temperature:units :
# sea_water_temperature:comment :
# sea_surface_water_temperature:FillValue :
# sea_surface_water_temperature:units :
# sea_water_salinity:FillValue :
# sea_water_salinity:units :
# sea_water_salinity:comment :
# sea_surface_water_salinity:FillValue :
# sea_surface_water_salinity:units :
# sea_surface_water_salinity:comment :
# latitude:FillValue :
# latitude:standard_name :
# latitude:long_name :
# latitude:units :
# latitude:comment :
# longitude:FillValue :
# longitude:standard_name :
# longitude:long_name :
# longitude:units :
# longitude:comment :
# altitude:FillValue :
# altitude:standard_name :
# altitude:long_name :
# altitude:units :
# altitude:comment :
# elevation:FillValue :
# elevation:standard_name :
# elevation:long_name :
# elevation:units :
# elevation:comment :
#
# VARIABLE ORDER
#

-99.9	5
degree	6
Angle (in degrees) between true north and wind direction, and clockwise increase	80
-99.9	5
m/s	3
Average wind speed for the previous 10 minutes	46
-99.9	5
%	1
-99.9	5
mm	2
-999.9	6
hPa	3
-99.9	5
degree Celsius	14
-99.9	5
degree Celsius	14
-99.9	5
degree Celsius	14
Temperature at the observation point	36
-99.9	5
degree Celsius	14
-9999.9	7
permil	6
Sea water salinity at the observation point as calculated using the Practical Salinity Scale 1978 (PSS-78; unit: permil)	120
-9999.9	7
permil	6
Sea surface water salinity as calculated using the Practical Salinity Scale 1978 (PSS-78; unit: permil)	103
-999.999999999	14
latitude	8
sample_latitude_in_decimal_degrees	34
degrees_north	13
Latitude of sampling location in decimal degrees (north: +; south: -)	69
-999.999999999	14
longitude	9
sample_longitude_in_decimal_degrees	35
degrees_east	12
Longitude of sampling location in decimal degrees (east: +; west: -)	68
-999.999	8
altitude	8
sample_altitude_in_meters_above_sea_level	41
m	1
Altitude (elevation + intake height) of air sample collection. Units are meters above sea level (masl). (height: +; depth: -)	125
-999.999	8
elevation	9
surface_elevation_in_meters_above_sea_level	43
m	1
Station height (m) above sea level	34

wind_direction : Angle (in degrees) between true north and wind direction, and clockwise increase (0 ≤ wind_direction < 360 degree).
wind_speed : Average wind speed for the previous 10 minutes. When it is not average wind speed for the previous 10 minutes, it is indicated at dataset_description.
sea_water_temperature : Temperature at the observation point
sea_water_salinity : Sea water salinity at the observation point as calculated using the Practical Salinity Scale 1978 (PSS-78; unit: permil)
sea_surface_water_salinity : Sea surface water salinity as calculated using the Practical Salinity Scale 1978 (PSS-78; unit: permil)
latitude : Latitude of sampling location in decimal degrees (north: +; south: -)
longitude : Longitude of sampling location in decimal degrees (east: +; west: -)
altitude : Altitude (elevation + intake height) of air sample collection. Units are meters above sea level (masl). This column is used mainly for mobile platform data with varying intake heights (depths) for individual observations (e.g., 3000 for 3 km, -1000 for 1000 m depth). Enter "-999.999" for data that are fixed for individual observations and varied for elements.
elevation : Station height (m) above sea level

# site\_gaw\_id year month day hour minute second wind\_direction wind\_speed relative\_humidity precipitation\_amount air\_pressure air\_temperature dew\_point\_temperature sea\_water\_temperature sea\_surface\_water\_temperature sea\_water\_salinity sea\_surface\_water\_salinity latitude longitude altitude elevation

## 2. Data record format

Meteorological data records in the new WDCGG file format are as follows (where “+” represents a space):

[Site\_gaw\_id]+[Year]+[Month]+[Day]+[Hour]+[Minute]+[Second]+[Wind\_direction]+[Wind\_speed]+[Relative\_humidity]+[Precipitation\_amount]+[Air\_pressure]+[Air\_temperature]+[Dew\_point\_temperature]+[Sea\_water\_temperature]+[Sea\_surface\_water\_Temperature]+[Sea\_water\_salinity]+[Sea\_surface\_water\_salinity]+[Latitude]+[Longitude]+[Altitude]+[Elevation].

Example:

```
# site_gaw_id year month day hour minute second wind_direction wind_speed relative_humidity
precipitation_amount air_pressure air_temperature dew_point_temperature sea_water_temperature
sea_surface_water_temperature sea_water_salinity sea_surface_water_salinity latitude longitude
altitude elevation
MNM 1993 01 01 00 00 00 337.5 5.2 70 0.0 1014.5 22.0 16.2 -99.9 -99.9 -9999.9 -9999.9 24.2883
153.9833 -999.999 7.1
```

Composition items are as per the table below.

Table. Data record elements

Item name	Number of digits	"No Data" expression	Content	Explanation of the item
Site_gaw_id	3	-	Site code	3-letter site identification code as defined by GAWSIS for stationary platforms
Year	4	-999	Year	Calendar year of observation
Month	2	-9	Month	Calendar month of observation
Day	2	-9	Day	Day of observation
Hour	2	-9	Hour	Hour of observation
Minute	2	-9	Minute	Minute of observation
Second	2	-9	Second	Second of observation
Wind_direction	Variable	-99.9	Wind direction (degree)	Angle (in degrees) between true north and wind direction, and clockwise increase.
Wind_speed	Variable	-99.9	Average wind speed (m/s)	Average wind speed for the previous 10 minutes. See note *1.
Relative_humidity	Variable	-99.9	Relative humidity (%)	
Precipitation_amount	Variable	-99.9	Precipitation amount (mm)	
Air_pressure	Variable	-999.9	Air pressure (hPa)	
Air_temperature	Variable	-99.9	Air temperature (degree Celsius)	
Dew_point_temperature	Variable	-99.9	Dew point temperature (degree Celsius)	
Sea_water_temperature	Variable	-99.9	Sea water temperature (degree Celsius)	Temperature at the observation point
Sea_surface_water_temperature	Variable	-99.9	Sea surface water temperature (degree Celsius)	
Sea_water_salinity	Variable	-9999.9	Sea water salinity (permil)	Sea water salinity at the observation point as calculated using the Practical Salinity Scale 1978 (PSS-78; unit: permil)
Sea_surface_water_salinity	Variable	-9999.9	Sea surface water salinity (permil)	Sea surface water salinity as calculated using the Practical Salinity Scale 1978 (PSS-78; unit: permil)
Latitude	Variable	-999.999999999	Latitude	Latitude of sampling location in decimal degrees (north: +; south: -)
Longitude	Variable	-999.999999999	Longitude	Longitude of sampling location in decimal degrees (east: +; west: -)

Altitude	Variable	-999.999	Elevation + intake height	Altitude (elevation + intake height) of sample collection. Units are meters above sea level (masl). *2
Elevation	Variable	-999.999	Station height	Station height (m) above sea level

\*1 Information on meteorological data (e.g., anemometer heights and wind speed sampling methods when it is not average wind speed for the previous 10 minutes) can be included in Step 5.2 during data submission.

\*2 This column is used mainly for mobile platform data with varying intake heights (depths) for individual observations (e.g., 3000 for 3 km, -1000 for 1000 m depth). Enter “-999.999” for data that are fixed for individual observations and varied for elements.

[Revision history]

2020-06-17 : Format Version. 1.0: Manual publication

2021-03-25 : Format Version. 2.0: Addition of DOI and data citation format in header information