

# Adding DOI to observation data and enhancing WDCGG website functions

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The WMO World Data Centre for Greenhouse Gases (WDCGG) is one of the World Data Centres (WDCs) under the Global Atmosphere Watch (GAW) programme, which has been operated by the Japan Meteorological Agency (JMA) since 1990. It serves to collect, archive and distribute data on such gases (e.g., CO<sub>2</sub>, CH<sub>4</sub>, CFCs and N<sub>2</sub>O) and other related gases (such as CO) in the atmosphere, which are measured under GAW and other programmes.

WDCGG has begun assigning DOIs for the dataset on WDCGG in 2021 to promote dataset utilization in accordance with the GAW Implementation Plan 2016-2023. DOIs are given for each registered dataset, uniquely determined by the observation element, organization, and station, as well as for compiled datasets for each gas species.

Other recent improvements at WDCGG, such as enhanced search functions, quick look for aggregated data are also presented.



## GHG Observations

**Aircraft**  
**Satellite**

**Ground**  
**Ships**

Contributors: 74  
Stations: 221  
Countries/Territories: 56  
(as of 2 September 2022)

## WDCGG <https://gaw.kishou.go.jp/>

**Archive** → **Analysis**

- Greenhouse gases
- Other related gases
- Environmental information around the station
- Meteorological data
- Common data flags are added based on the original data flags

- Global monthly mean
- Long-term trend
- Average seasonal cycles
- etc...

## Products

WMO WDCGG Data Summary reports the results of global analyses of greenhouse and some related gas data submitted to the WDCGG by contributing organizations or projects. These data are used for global analysis for key greenhouse gases in the WMO Greenhouse Gas Bulletin.

Global monthly mean mole fraction of CO<sub>2</sub> and the deseasonalized long-term trend (top), and growth rate (bottom).

This Bulletin is distributed by UNFCCC/COP, IPCC and so on.

## Assignment of DOI to observation data by WDCGG

Digital Object Identifiers (DOIs) are permanent labels supporting research data accessibility, citation, reuse and verification. WDCGG offers two types of granularities for DOIs. One is for, a DOI for each dataset, and the other is a DOI for the merged dataset. A contributor can request WDCGG a DOI issuance for dataset that does not already have an original DOI. Requests are being accepted at any time.

Offers two types of granularity. Merged dataset Each dataset

### For each dataset

WDCGG issues DOIs for individual datasets if contributors request WDCGG DOI issuance upon data submission. DOIs are not issued for datasets that already have original identifiers issued by contributors, which are posted as-is on the WDCGG website. The DOIs for each dataset DOIs remain constant even when data are updated, users should cite the DOI with the relevant data version.

### For merged dataset

WDCGG also issues DOIs for merged dataset for each gas species, containing all data contributed by GAW stations and mobile stations regardless of DOI status. The new DOIs will be given every year, corresponding to all available datasets at that time (yearly fixed datasets) when the analysis were made for WMO GHG Bulletins and WDCGG Data Summaries. In case using the latest dataset including updated or added data after the issuance of the DOIs for the yearly fixed datasets, you need to refer to individual DOIs for the data from updated stations or mobile platforms in addition to the latest DOI for the yearly fixed dataset.

Gas Species	Offers two types of granularity.		
	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
Stations	CO <sub>2</sub> Yearly Fixed dataset 2021: doi:10.50849/WDCGG_CO2_ALL_2021	CH <sub>4</sub> Yearly Fixed dataset 2021: doi:10.50849/WDCGG_CH4_ALL_2021	N <sub>2</sub> O Yearly Fixed dataset 2021: doi:10.50849/WDCGG_N2O_ALL_2021
	CO <sub>2</sub> Yearly Fixed dataset 2020: doi:10.50849/WDCGG_CO2_ALL_2020	CH <sub>4</sub> Yearly Fixed dataset 2020: doi:10.50849/WDCGG_CH4_ALL_2020	N <sub>2</sub> O Yearly Fixed dataset 2020: doi:10.50849/WDCGG_N2O_ALL_2020
	CO <sub>2</sub> Yearly Fixed dataset 2019: doi:10.50849/WDCGG_CO2_ALL_2019	CH <sub>4</sub> Yearly Fixed dataset 2019: doi:10.50849/WDCGG_CH4_ALL_2019	N <sub>2</sub> O Yearly Fixed dataset 2019: doi:10.50849/WDCGG_N2O_ALL_2019
	: Update every year, assign new DOIs		
RYO	JMA RYO co2 surface insitu data1 10.50849/WDCGG_0001-2012-1001-01-01-9999	JMA RYO ch4 surface insitu data1 10.50849/WDCGG_0001-2012-1002-01-01-9999	JMA RYO n2o surface insitu data1 10.50849/WDCGG_0001-2012-1003-01-01-9999
YON	JMA YON co2 surface insitu data1 10.50849/WDCGG_0001-2028-1001-01-01-9999	JMA YON ch4 surface insitu data1 10.50849/WDCGG_0001-2028-1002-01-01-9999	
AOA	Same DOIs are used, even updated		JMA AOA n2o surface insitu data1 10.50849/WDCGG_0001-8002-1003-05-02-9999

## Enhancement of Web Site Functions

### Search function visualization (improved map search function)

Several ways are available to find the data at WDCGG, including choosing from the entire list, picking up on the map, or searching by keywords. And we have extended the search function on the map. By selecting the observation element and year / month, the user can find the observational points and their concentrations by colored symbols. You can use these search functions to filter the data and then download the data all at once you need. In addition, search by specifying the observation period is now available.

**Search map**

Changed the list from station name order to latitude order

Click on a station to display a time series graph

- Concentration display by color for each station
- Add any mobile stations
- Change of display date and area
- Batch download of selected data (choice of text format or NetCDF format)

### Improved quick look of observation data (add animation etc.)

WDCGG has made it possible to visually grasp the data for user convenience. For example, we added animations of the global average concentrations of greenhouse gases calculated using ground observation data, animations using satellite observation data (GOSAT and OCO-2), observational routes for mobile platforms, and so on. We hope that these visualizations will help you find the data you need, and that they can also be used for educational and public relations purposes.

2019 12

OCO-2 (Blue Corrected) - V580 (NO2) - 2021.04

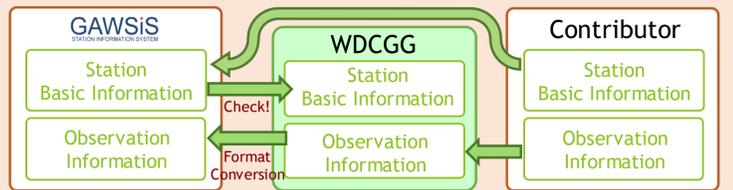
GOSAT (FTS L2) (Blue Corrected) - V02 (NO2) (NO) - 2021.04

CONTRAIL

## Future Plan

### Integration with GAW SIS metadata

As part of the WMO/GAW Expert Team on Atmospheric Composition Data Management (ET-ACDM), we aim to integrate observation station's metadata into GAW SIS (GAW Station information system). Basic information such as location that does not depend on observation items will be edited directly in GAW SIS by Contributors. On the other hand, information specific to GHG observations will be collected and registered with GAW SIS by the WDCGG. We plan to start registration of observation information in near future. Also, we are working on the issue of integrating the GAW ID into the WIGOS Station Identifier (WSI). GAW SIS no longer issue GAW IDs to stations in "GAW Other elements" and "GAW Contributing Networks" categories. Therefore, to avoid duplication of 3-letter code, we will change the station identifiers used on WDCGG.



### Addition of uncertainty information

We are going to introduce a frame to add data uncertainty information to each observational data following the GG2019 recommendations. Currently, the standard deviation of the reported mean value is registered for quality information. In addition to this, we are preparing to add short-term and long-term analytical stability information to the data column. We also plan to add one header item for scale transfer uncertainty. Also, we are working on adding a column for values converted on the current WMO scale and are receiving this information from contributors.

Site	gaw_id	year	month	day	hour	minute	second	value	value	scale
MNM	1993	01	01	00	00	00	-999	-9	-9	-9
MNM	1993	02	01	00	00	00	-999	-9	-9	-9
MNM	1993	03	01	00	00	00	-999	-9	-9	-9
MNM	1993	04	01	00	00	00	-999	-9	-9	-9
MNM	1993	05	01	00	00	00	-999	-9	-9	-9
MNM	1993	06	01	00	00	00	-999	-9	-9	-9
MNM	1993	07	01	00	00	00	-999	-9	-9	-9
MNM	1993	08	01	00	00	00	-999	-9	-9	-9
MNM	1993	09	01	00	00	00	-999	-9	-9	-9
MNM	1993	10	01	00	00	00	-999	-9	-9	-9
MNM	1993	11	01	00	00	00	-999	-9	-9	-9
MNM	1993	12	01	00	00	00	-999	-9	-9	-9
MNM	1994	01	01	00	00	00	-999	-9	-9	-9
MNM	1994	02	01	00	00	00	-999	-9	-9	-9

Original reported Value, Value converted on WMO scale, Short-term uncertainty, Long-term uncertainty