



WMO World Data Centre for Greenhouse Gases (WDCGG)

Hiroshi Koide

with WDCGG staff members

Japan Meteorological Agency



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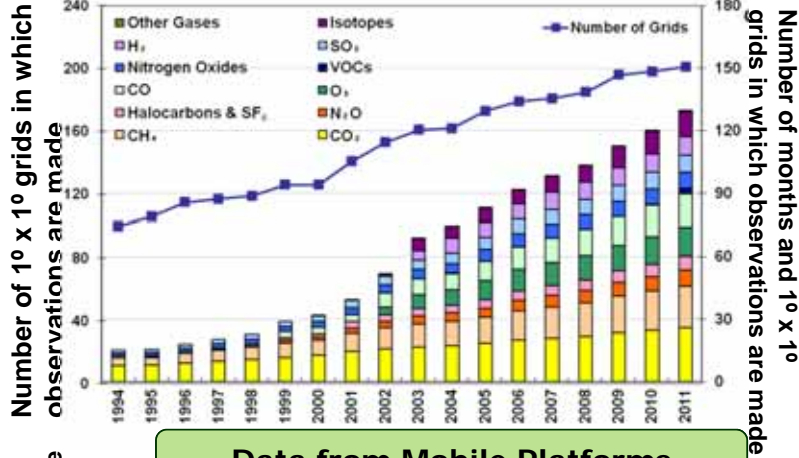
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- 3. NOAA contributors information**
- 4. Argument and Vision**



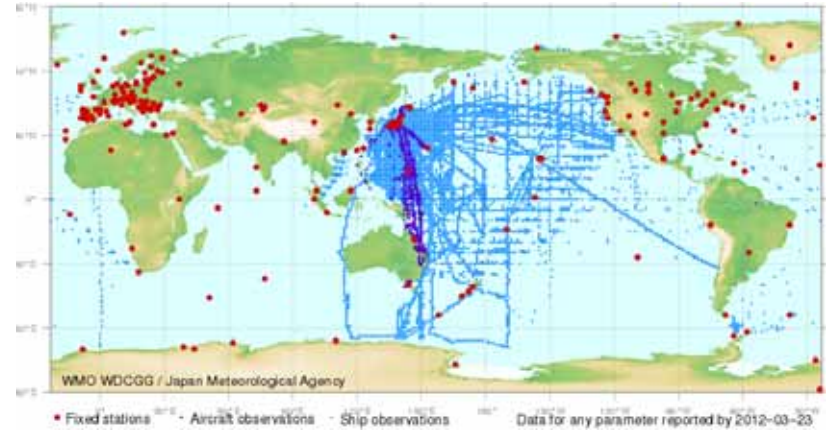
Development of total amount of WDCGG data archive



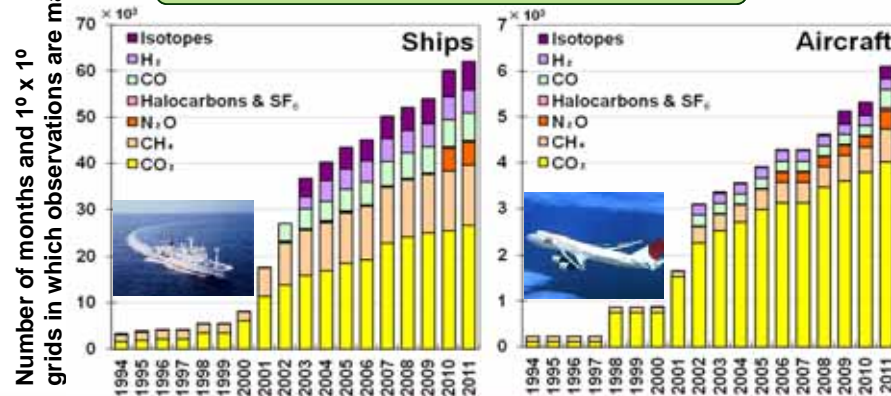
Increase of Archived Data Covering Grid Number of Archived Data



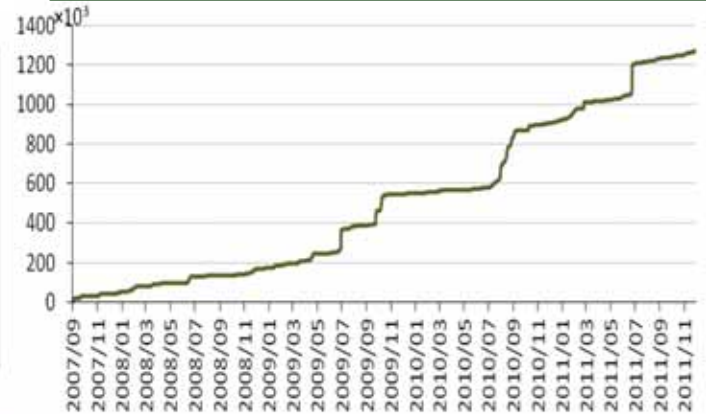
Distribution of the Fixed Stations and Mobile Platforms



Data from Mobile Platforms

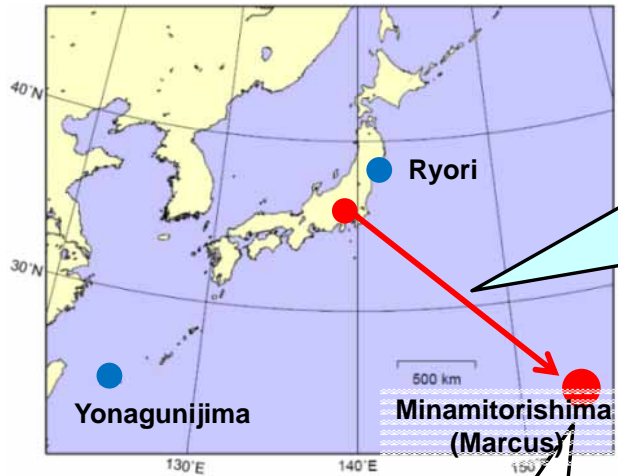


Accumulated FTP Download Counts





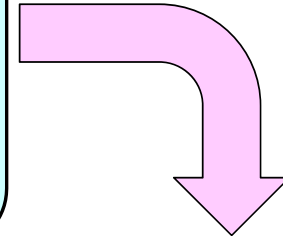
JMA started aircraft observation



Aircraft



Flask Sampling
(1.7 L)



JMA headquarters (Tokyo)



Measurement of CO₂, CH₄, CO, N₂O concentrations



WDCGG "citation" in Google Scholar



- Hit count in Google Scholar is gradually increasing and just reaching 700 (698 now).

The screenshot shows a Google Scholar search for "WDCGG". The search results page displays "About 698 results (0.07 sec)". The search bar contains "WDCGG" and the Google logo is visible. The results list includes several articles and legal documents, such as "Other Atmospheric Gases: March 2008//JMA & WMO/WMO WDCGG Data Summary", "The Global Analysis Method by the WDCGG using the Archived Data Y Tsutsumi - WMO World Data Centre for Greenhouse Gases", and "World Data Centre for Greenhouse Gases WMO WDCGG - Japan Meteorological Agency". The browser's address bar shows "WDCGG - Google Scholar" and the page is viewed in Japanese.



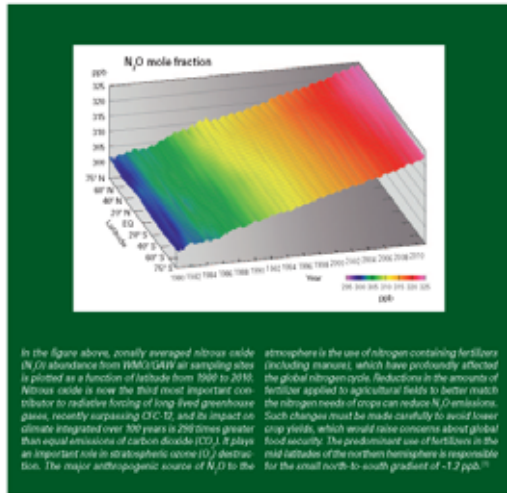
WMO Greenhouse Gas Bulletin



The WDCGG has contributed to the WMO Greenhouse Gas Bulletin by providing global analyses for major greenhouse gases

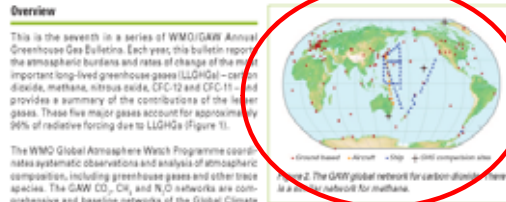


No. 7 | 21 November 2012



Executive summary

The latest analysis of observations from the WMO Global Atmosphere Watch (GAW) Programme shows that the globally averaged mixing ratio of carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) reached new highs in 2010, with CO₂ at 389.6 ppm, CH₄ at 1868 ppb and N₂O at 323.2 ppb. These values are greater than those in pre-industrial times (before 1750) by 36%, 154% and 20%, respectively. Atmospheric increases of CO₂ and N₂O from 2006 to 2010 are consistent with recent years, but they are higher than both those observed from 2008 to 2009 and those averaged over the past 10 years. Atmospheric CH₄ continues to increase, consistent with the past three years. The NOAA Annual Greenhouse Gas Index shows that from 1990 to 2010 radiative forcing by long-lived greenhouse gases increased by 29%, with CO₂ accounting for nearly 80% of this increase. Radiative forcing of N₂O exceeded that of CFC-12, making N₂O the third most important long-lived greenhouse gas.

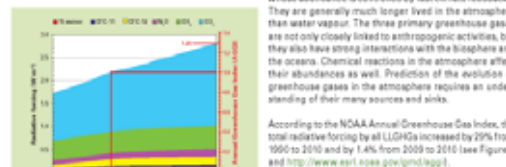


Overview

This is the seventh in a series of WMO/GAW Annual Greenhouse Gas Bulletin. Each year, this bulletin reports the atmospheric burdens and rates of change of the most important long-lived greenhouse gases (LLGHGs)—carbon dioxide, methane, nitrous oxide, CFC-12 and CFC-11—and provides a summary of the contributions of the lesser gases. These five major gases account for approximately 99% of radiative forcing due to LLGHGs (Figure 1).

The WMO Global Atmosphere Watch Programme coordinates systematic observations and analysis of atmospheric composition, including greenhouse gases and other trace species. The GAW CO₂, CH₄ and N₂O networks are comprehensive and baseline networks of the Global Climate Observing System (GCOS). Sites where greenhouse gases are monitored are shown in Figure 2. Measurement data are reported by participating countries and archived and distributed by the World Data Centre for Greenhouse Gases (WDCGG) at the Japan Meteorological Agency.

Statistics on global atmospheric abundances in 2010 and changes in abundance since 2009 and 1750 for the three major greenhouse gases are given in the table. These results are obtained from a global analysis (GAW Report No. 184, available at <http://www.wmo.int/gaw/gaw-report-no-184>).



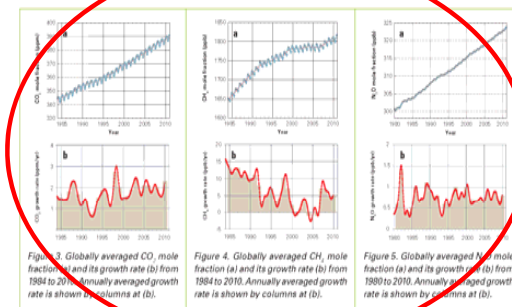
The three greenhouse gases summarized in the table have been increasing in the atmosphere since the beginning of the industrial era. Their atmospheric abundances are directly connected with human activity, unlike water vapour, which is the most important greenhouse gas but whose abundance is controlled by fast climate feedbacks. They are generally much longer lived in the atmosphere than water vapour. The three primary greenhouse gases are not only closely linked to anthropogenic activities, but they also have strong interactions with the biosphere and the oceans. Chemical reactions in the atmosphere affect their abundances as well. Prediction of the evolutions of greenhouse gases in the atmosphere requires an understanding of their major sources and sinks.

According to the NOAA Annual Greenhouse Gas Index, the total radiative forcing by all LLGHGs increased by 29% from 1990 to 2010 and by 1.4% from 2009 to 2010 (see Figure 1 and <http://www.esrl.noaa.gov/gmd/aggi>).

Carbon dioxide (CO₂)

Carbon dioxide is the single most important anthropogenic greenhouse gas in the atmosphere, contributing 64% to radiative forcing by LLGHGs. It is responsible for 85% of the increase in radiative forcing over the past decade and 81% over the last five years. For about 10 000 years before the industrial revolution, the atmospheric abundance of CO₂ was nearly constant at ~280 ppm. This level represented a balance among the atmosphere, the oceans and the biosphere. Since 1750, atmospheric CO₂ has increased by 29%, primarily because of emissions from combustion of fossil fuels (total of 8.4 ± 0.5 PgC_{org} in 2008; <http://www.globalcarbonproject.org>), deforestation and land-use change. High-precision measurements of atmospheric CO₂ beginning in 1958 show that the average increase in CO₂ is the atmosphere corresponds to ~55% of the CO₂ emitted by fossil fuel combustion. The remaining ~45% has been removed from the atmosphere by the oceans and the terrestrial biosphere. The airborne fraction, the portion of CO₂ emitted by fossil fuel combustion that remains in the atmosphere, varies interannually without a confirmed global trend. Globally averaged CO₂ in 2010 was 389.6 ppm and the increase from the previous year

	CO ₂ (ppm)	CH ₄ (ppb)	N ₂ O (ppb)
Global abundance in 2010	389.6	1868	323.2
2010 abundance relative to year 1750	36%	154%	20%
2009-2010 absolute increase	2.3	16	0.8
2009-2010 relative increase	0.57%	0.27%	0.25%
Mean annual absolute increase during last 10 years	1.9	24	0.6



was 2.3 ppm (Figure 3). This growth rate is higher than the average for the 1990s (~1.5 ppm/yr) and the average for the past decade (~2.0 ppm/yr).

Methane (CH₄)

Methane contributes ~18% to radiative forcing by LLGHGs. Approximately 40% of methane emitted into the atmosphere comes from natural sources such as wetlands and termites, while anthropogenic sources, such as ruminants, rice agriculture, fossil fuel exploitation, landfills and biomass burning, account for about 60%. Methane is removed from the atmosphere primarily by reaction with the hydroxyl radical (OH). Before the industrial era, atmospheric methane was at ~700 ppb. Increasing emissions from anthropogenic sources are responsible for the 158% increase in CH₄. Globally averaged CH₄ in 2010 was 1868 ppb, an increase of 5 ppb from the previous year. It exceeds the highest annual mean abundance so far, which was recorded in 2009 (Figure 4). The growth rate of CH₄ decreased from ~13 ppb/yr during the early 1980s to near zero from 1999 to 2006. Since 2007, atmospheric CH₄ has been increasing again. The 19 ppb rise from 2006 to 2009 was followed by a 5 ppb rise in 2010. The reasons for the renewed increase in CH₄ are not fully understood and several factors, mostly biogenic, were reported to contribute to this increase. To improve our understanding of the processes that affect CH₄ emissions, more in situ measurements are needed close to the source regions.

Nitrous oxide (N₂O)

Nitrous oxide contributes ~6% to radiative forcing by LLGHGs. It is now the third most important contributor to this total. Its atmospheric abundance prior to industrialization was 270 ppb. It is emitted into the atmosphere from natural and anthropogenic sources, including oceans, soil, biomass and various industrial processes. Anthropogenic sources may account for approximately 40% of the total N₂O emissions. It is removed from the atmosphere by photochemical processes in the stratosphere. Globally averaged N₂O during 2010 was 323.2 ppb, up 0.8 ppb from the previous year (Figure 5) and 20% above the pre-industrial level. The mean growth rate has been 0.75 ppb/yr over the past 10 years.



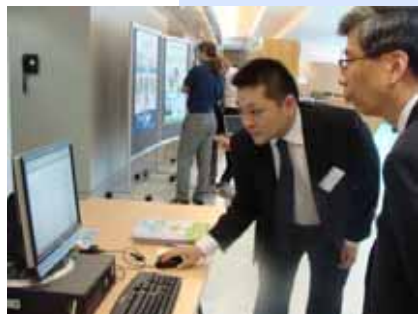
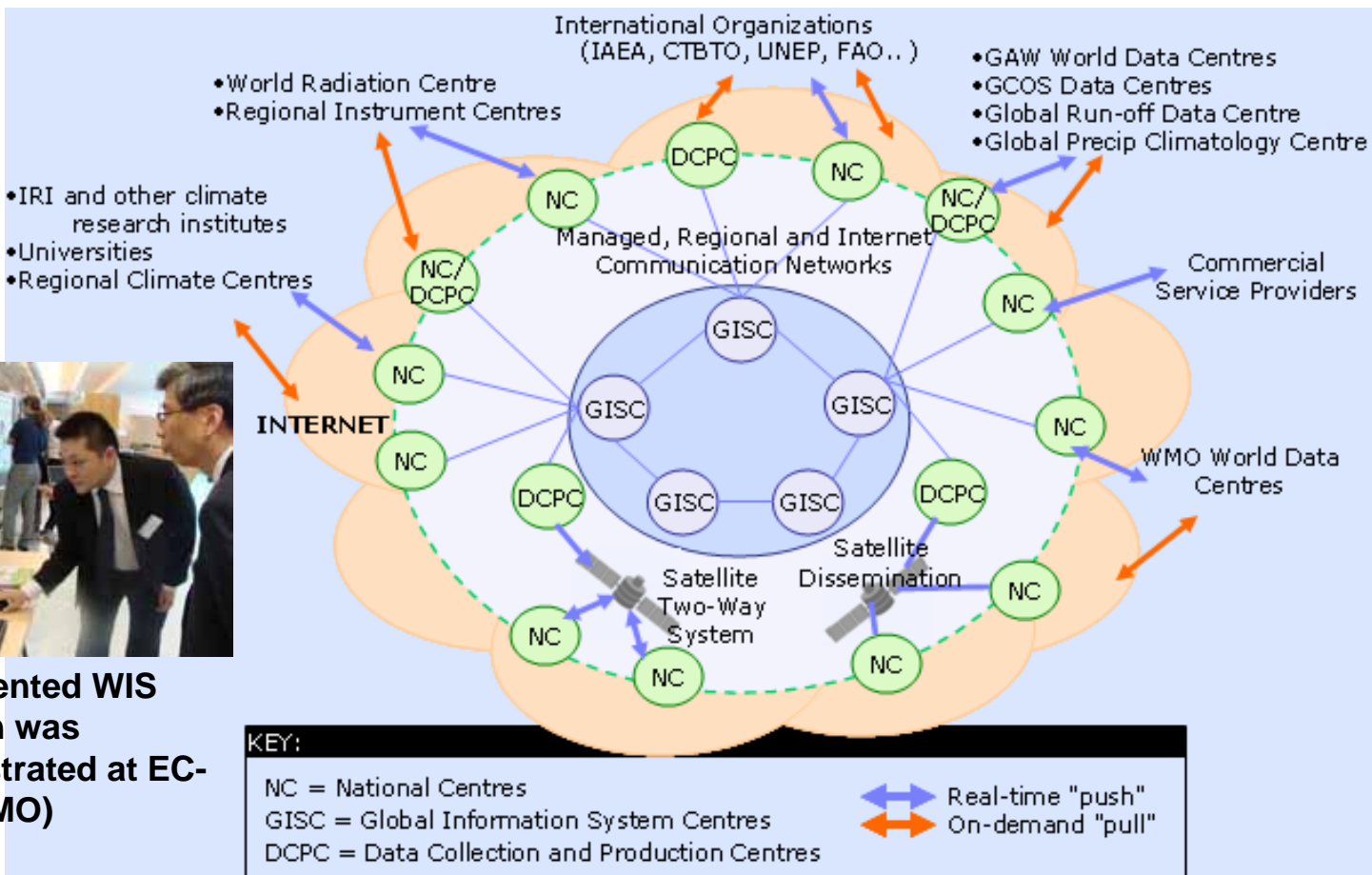
Figure 6. Monthly mean mole fraction of sulphur hexafluoride (SF₆) from 1977 to 2010 averaged over the network (between 7 and 19 stations)



WMO Information System (WIS)



To enhance the present GTS network,
to facilitate information and data exchanges for all WMO programmes.



Implemented WIS function was demonstrated at EC-LXII (WMO)



GISC Tokyo Web site

http://www.wis-jma.go.jp/cms/



ISO compliant
Meta Data format
and contents



GISC Offenbach Web site

http://gisc.dwd.de/GISC_DWD/toStart.do



Data / Products

Search
 Search for experts
 SRU Search
 Product packages

Registration
Miscellaneous

Search

Search in all fields

Accuracy: precise (radio buttons) fuzzy (radio button)

Search in specific fields

Title: WDCGG

Abstract

Keywords: Select keywords

Provider: all

Type of licence: all

Beginning

End

Top level product

Region

Metadata (overview)

Product ID	Title	Product	Metadata	File	Example
urn:wwm:md:jg.go:jma.wis.dcp:wdcgg:p.BAL655N00.13CO2	WDCGG - 13CO2 observation at Baltic Sea by NOAA/ESRL				
urn:wwm:md:jg.go:jma.wis.dcp:wdcgg:p.BAL655N00.C18O2	WDCGG - C18O2 observation at Baltic Sea by NOAA/ESRL				
urn:wwm:md:jg.go:jma.wis.dcp:wdcgg:p.BAL655N00.CH4	WDCGG - CH4 observation at Baltic Sea by NOAA/ESRL				
urn:wwm:md:jg.go:jma.wis.dcp:wdcgg:p.BAL655N00.CO2	WDCGG - CO2 observation at Baltic Sea by NOAA/ESRL				
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urn:wwm:md:jg.go:jma.wis.dcp:wdcgg:p.BAL655N00.VOCS	WDCGG - VOCS observation at Baltic Sea by NOAA/ESRL				
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urn:wwm:md:jg.go:jma.wis.dcp:wdcgg:p.BRT149N00.OS	WDCGG - OS observation at Bratskhiyej by USA				
urn:wwm:md:jg.go:jma.wis.dcp:wdcgg:p.CM6464N00.CH4	WDCGG - CH4 observation at Monte Cimone by SAC				

World Data Centre for Greenhouse Gases

Baltic Sea - NOAA/ESRL

Parameter	Shortcode	Category	Period	Type of Data	Update	Parameters Included	Number of Data Points
CO2	CO2	Air sampling observation	1982-08-24 to 2010-12-31	event monthly	2010-04-28		
CO2	CO2	Air sampling observation	1982-08-24 to 2010-12-31	event monthly	2010-04-28		
CO2	CO2	Air sampling observation	1982-08-24 to 2010-12-31	event monthly	2010-04-28		
CO2	CO2	Air sampling observation	1982-08-24 to 2010-12-31	event monthly	2010-04-28		

Metadata (overview)

Product ID: urn:wwm:md:jg.go:jma.wis.dcp:wdcgg:p.BAL655N00.13CO2

Title: WDCGG - 13CO2 observation at Baltic Sea by NOAA/ESRL

Originator: NOAA/ESRL

Abstract: WMO GAW formatted text

Code: WDCGG - 13CO2 observation at Baltic Sea by NOAA/ESRL

Production type: products directly published by the DCPC

Data transmission: download

Web URL: http://ds.star.jma.go.jp/jrmd/wdgg/cp-bn/wdgg/access/select/inventory/index.html?index=BAL655N00-NOAA

Status: Metadata created at: 2012-03-28; last modification: 2012-03-28

Publication date: 2012-03-28; Expires: 2012-03-28; Modified: 2012-03-28

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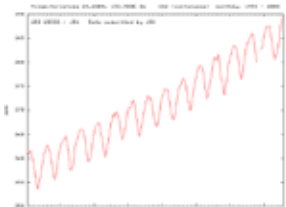
WDCGG Web Site



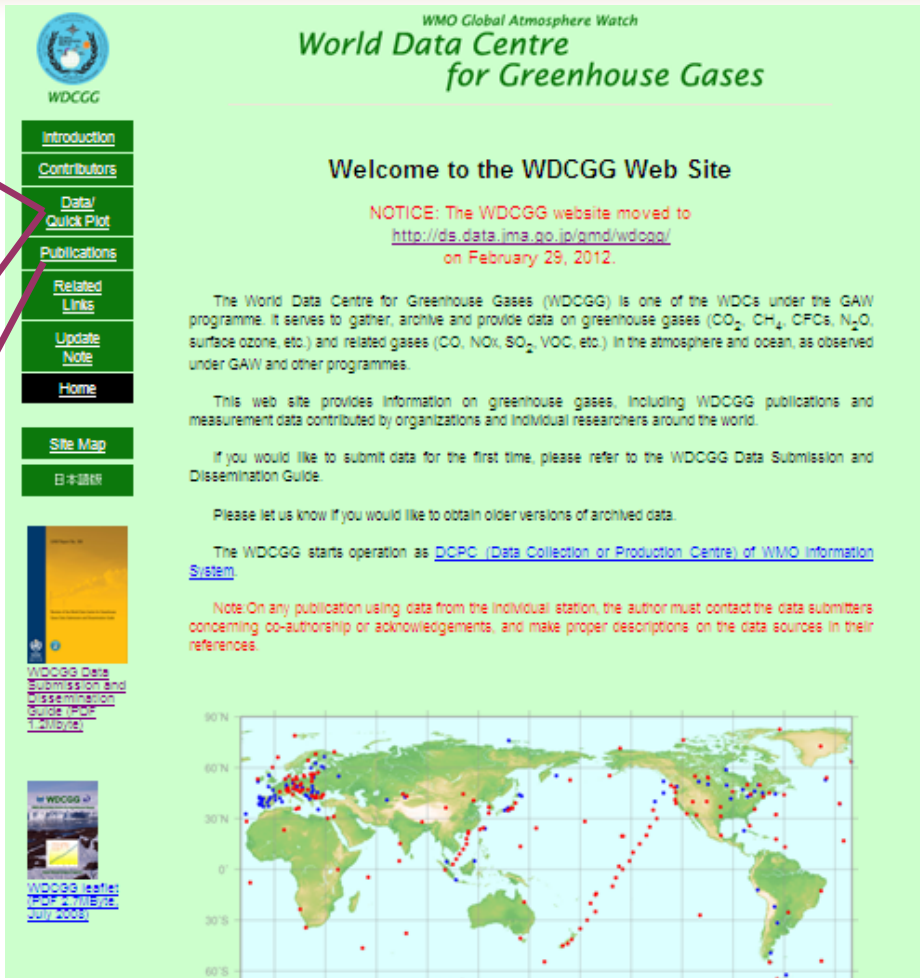
Searchable Station Directory & Metadata



Online Data Search & Plot



Downloadable Data & Publications

WMO Global Atmosphere Watch
World Data Centre
for Greenhouse Gases

Welcome to the WDCGG Web Site

NOTICE: The WDCGG website moved to <http://ds.data.jma.go.jp/gmd/wdogg/> on February 29, 2012.

The World Data Centre for Greenhouse Gases (WDCGG) is one of the WDCs under the GAW programme. It serves to gather, archive and provide data on greenhouse gases (CO₂, CH₄, CFCs, N₂O, surface ozone, etc.) and related gases (CO, NOx, SO₂, VOC, etc.) in the atmosphere and ocean, as observed under GAW and other programmes.

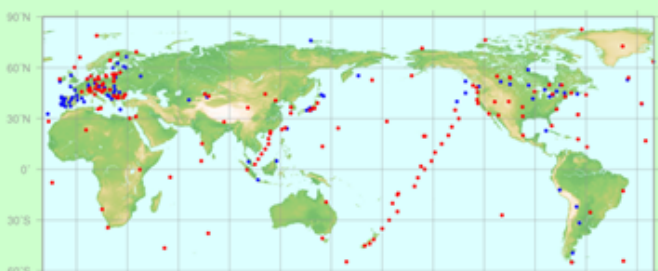
This web site provides information on greenhouse gases, including WDCGG publications and measurement data contributed by organizations and individual researchers around the world.

If you would like to submit data for the first time, please refer to the WDCGG Data Submission and Dissemination Guide.

Please let us know if you would like to obtain older versions of archived data.

The WDCGG starts operation as DCPC (Data Collection or Production Centre) of WMO Information System.

Note: On any publication using data from the individual station, the author must contact the data submitters concerning co-authorship or acknowledgements, and make proper descriptions on the data sources in their references.



[Introduction](#)
[Contributors](#)
[Data/Quick Plot](#)
[Publications](#)
[Related Links](#)
[Update Note](#)
[Home](#)

[Site Map](#)
日本語版

[WDCGG Data Submission and Dissemination Guide \(PDF, 740KB\)](#)

[WDCGG poster \(PDF, 1.1MB\)](#)

<http://ds.data.jma.go.jp/gmd/wdogg/>



Minor Extension of WDCGG Web from Tronto

Function1. Posting the number of data downloaded for each parameter at each station during the 12 months until the last month

WMO Global Atmosphere Watch
World Data Centre
for Greenhouse Gases

Minamitorishima - JMA

[Parameter Inventory](#) |
 [Parameter Metadata](#) |
 [Station](#) |
 [Contributor](#)

Parameter (Data/Quick Plot)	Category	Period	Types of Data	Update	Parameters included	Number of Data Downloaded 2010-09-01 - 2011-08-31
CH₄^{***} continuous	Air sampling observation	1994-01-01 - 2011-07-31	hourly, daily, monthly	2011-08-30		378
CO₂[*] continuous	Air sampling observation	1994-01-01 - 2011-07-31	hourly, daily, monthly	2011-08-30		390
CO₂^{***} continuous	Air sampling observation	1993-01-01 - 2011-07-31	hourly, daily, monthly	2011-08-30		659
O₃[*] continuous	Air sampling observation	1994-01-01 - 2011-07-31	hourly, daily, monthly	2011-08-30		344

updated on the first day of every month



Minor Extension of WDCGG Web from Tronto

Function2. Downloadable list of metadata in csv format

WMO Global Atmosphere Watch
World Data Centre
for Greenhouse Gases

Category: Stationary, Parameter: CO2, Country/Territory: Japan, Contributor: JMA

Updated in the last 365 days

1. Select item from each pull-down menu and click "Start Search" button

2. Click on "Download metadata csv file"

Total = 3 [Download archives of the CO₂ data listed below](#) [Download metadata csv file](#) Sorted by Station Name

Station Name	Country/Territory	Contributor	Parameter
Minamitorishima *	Japan	JMA	CH ₄ ** , CO, CO ₂ ** , O ₃ , MET
Ryori *			
Yonagunijima			

	A	B	C	D	E	F	G	H	I	J
1	Station name	WDCGG ID	GAW Category	Country	Category	Platform	Latitude	Longitude	Altitude	Paramet
2	Minamitorishima	MNM224N00-JMA	Global	Japan	Stationary	Ground base	24.28	153.98	8	CO2
3	Ryori	RYO239N00-JMA	Regional	Japan	Stationary	Ground base	39.03	141.82	260	CO2
4	Yonagunijima	YON224N00-JMA	Regional	Japan	Stationary	Ground base	24.47	123.02	30	CO2

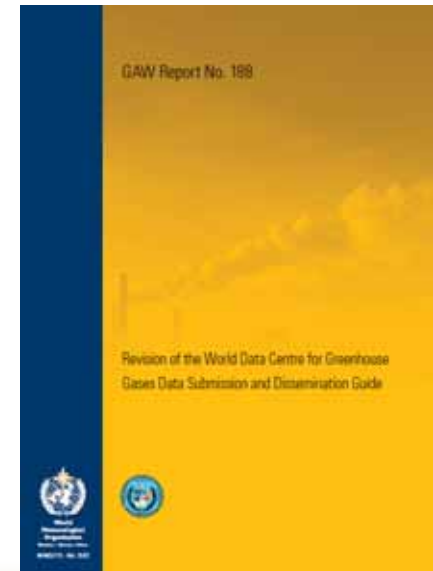
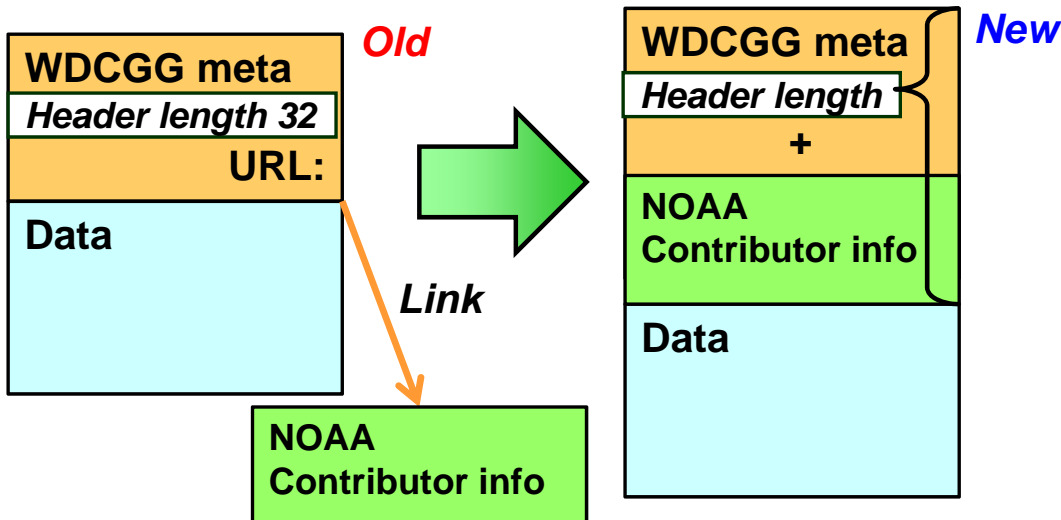
3. Downloadable metadata csv



Update for NOAA Contributors Information



- Request from NOAA/ESRL and its Contributors, not to separate original CONTRIBUTORS information.
- WDCGG changed the header part of NOAA/ESRL data on 26 April 2012.
- Numbers of the header lines are not consistently fixed 32 as assigned in "WDCGG Data Submission and Dissemination Guide" (GAW Report No. 188). Length of the header lines is at the line number 5 (C05) as usual.





Argument

- Observers requested more strict standard for download:
 1. User registration (Name, Affiliation and Country, E-mail?)
 2. Download >> automatic (e-mail) notification of data policy with ccing to the PI.
 - Spin off: precise user statistics in WDCs would be available
- Oksana tried to gather the pros and cons for introducing registration in WDCGG using Google docs.

Question

- The registration could be discouraging potential users?



Future prospects



New data product from GOSAT



- Column total CO₂ Bias 10ppm > 2-3ppm
- Seeking resources (satellite data expert).

Request from Transcom-CH₄ group

- Handling model output time series in WDCGG ?
- Practical Concerns

WDCGG Restructuring



WDCGG Restructuring



Background

- Increasing Requests and Interests
- Registration?
- Flexibility for Future Functions

Work plan

- Design for Database until Mar. 2013
- New Metadata (WIS+WIGOS compliant)

Headache

- Parallel Burden



Thank you for your attention!

