Japan's Contributions to GAW

SUDA Kazuto

Atmospheric Environment Division

Japan Meteorological Agency

WMO Global Atmosphere Watch (GAW)

What is GAW?

- **Established in 1989 by merging long-term monitoring programmes dating back to the 1970s or earlier**
- **Focuses on global networks for ozone, greenhouse gases, reactive gases, atmospheric wet deposition, UV radiation, and aerosols**
- **Coordinates activities and data from hundreds of stations, including 24 Global Stations.**

WMO/GAW Strategic Plan: 2008–2015 covers GAW’s mission, long-term objectives and implementation principles, etc., consistent with the WMO Strategic Plan.

WMO Global Atmosphere Watch (GAW)

Mission of GAW

- **Reduce environmental risks to society and meet the requirements of environmental conventions.**
- **Strengthen capabilities to predict climate, weather and air quality.**
- **Contribute to scientific assessment in support of environmental policy**

To be achieved through

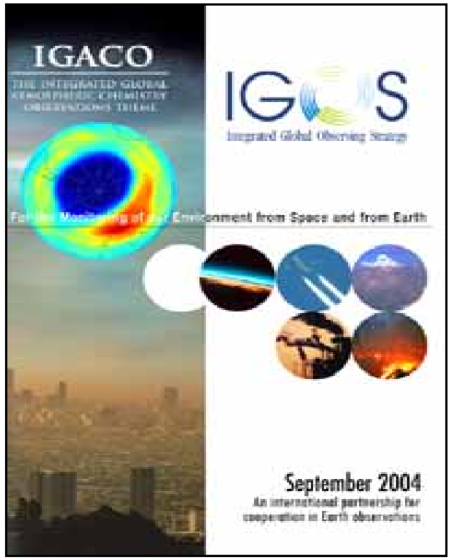
- **Maintaining and applying global, long-term observations of the chemical composition and selected physical characteristics of the atmosphere.**
- **Emphasizing quality assurance and quality control.**
- **Delivering integrated products and services of relevance to users.**

WMO/GAW & Global Climate Observing System (GCOS)

WMO/GAW Global Atmospheric CO_2 & CH_4 Monitoring Network has been designated as a Comprehensive Network of GCOS (GCOS–GAW Agreement in October 2006), providing vital and continuous support to the United Nations Framework Convention on Climate Change (UNFCCC).

WMO/GAW & Integrated Global Atmospheric Chemistry Observations (IGACO)

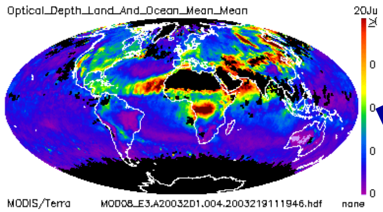
The GAW programme builds on the Integrated Global Atmospheric Chemistry Observations (IGACO) strategy.



IGACO System Components

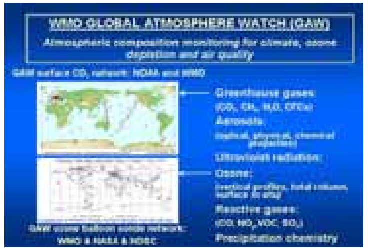
Observations

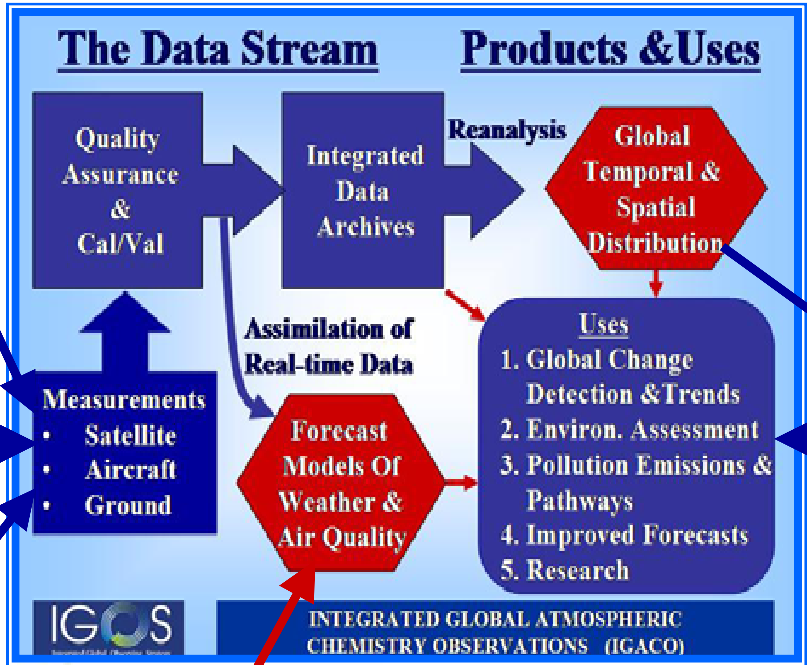
Satellite



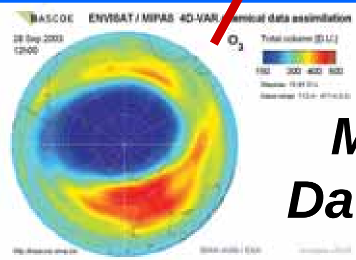
Aircraft

Ground-based





Global Products



Modelling and Data Assimilation

- **Ozone Depletion**
- **Air Quality**
- **Climate**

GAW Components

SCIENTIFIC ADVISORY GROUPS:
AEROSOL, OZONE, GHGs, PRECIPITATION CHEMISTRY UV and REACTIVE GASES

WMO/GAW Secretariat

CAS/WG
Environmental Pollution and Atmospheric Chemistry (EPAC)

QUALITY ASSURANCE-SCIENCE ACTIVITY CENTRES & CALIBRATION CENTRES

CENTRAL CALIBRATION LABORATORIES

Calibration, Training
Site Visits, Comparisons

Twinning
Workshops

Contributing Networks

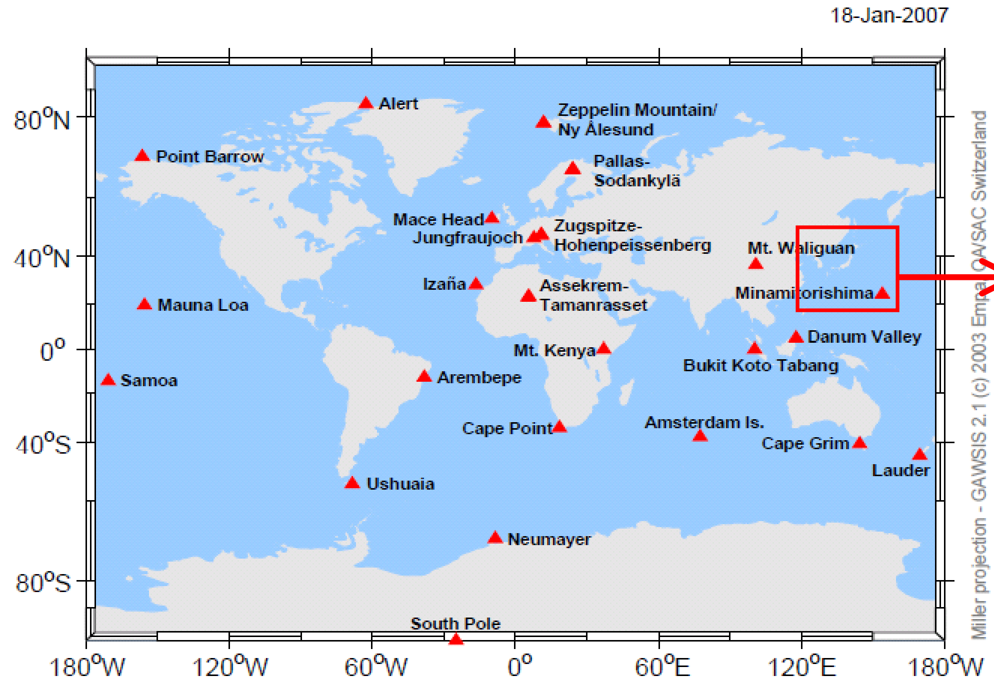
GAW STATIONS & GAWSIS
Global Regional

Satellite Observations

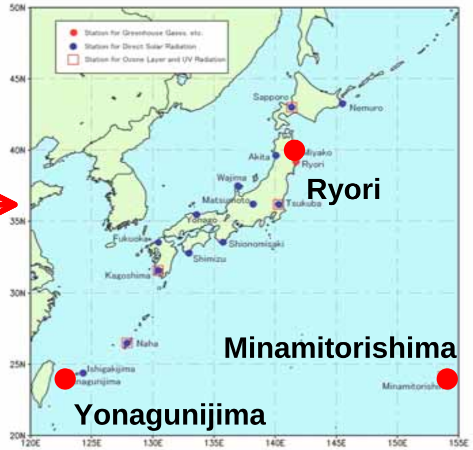
GAW WORLD DATA CENTRES:
OZONE/UV, GHGs (& Related Gases), AEROSOL, PRECIPITATION CHEMISTRY and RADIATION

Analysis
Synthesis
IGACO

GAW Monitoring Network



GAW Global surface-based *in situ* and remote sensing stations



Observation Sites of JMA

Near-surface concentrations of greenhouse gases are measured at three stations of JMA: Ryori, Minamitorishima and Yonagunijima.

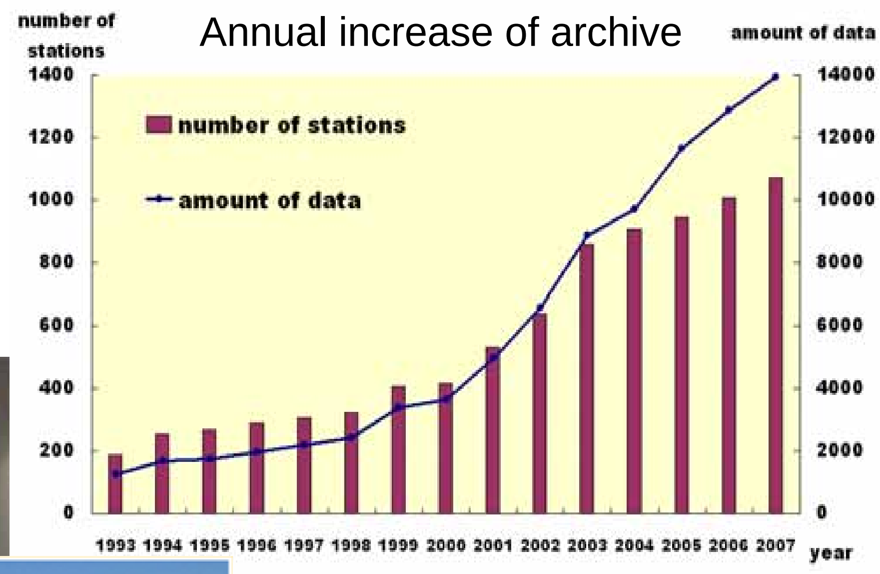
	Ryori	Minamitorishima	Yonagunijima
CO_2	1987	1993	1997
CH_4	1991	1994	1998
CO	1991	1994	1998
Surface O_3	1990	1994	1997
N_2O	1990	n/a	n/a
CFC-11,CFC-12,CFC-113	1990	n/a	n/a
CCl_4, CH_3CCl_3	1991	n/a	n/a

Monitoring parameters and start year for each station

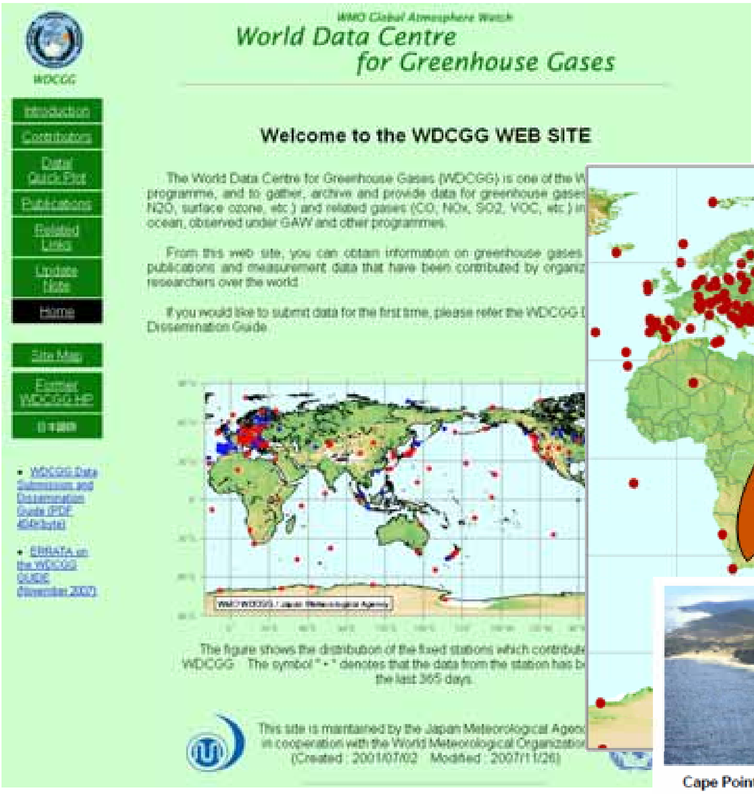
WMO World Data Centre for Greenhouse Gases (WDCGG)

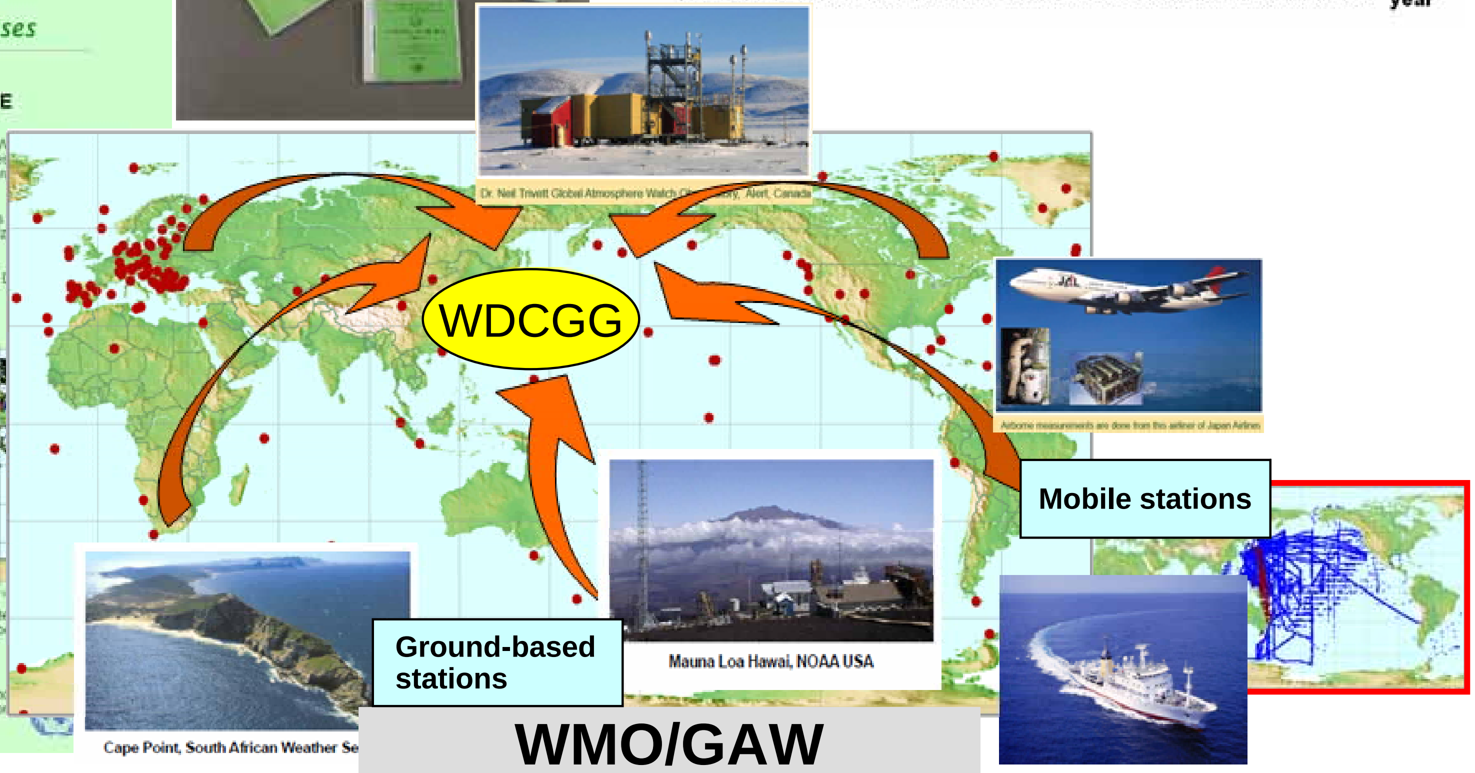
Function of WDCGG

- Collection of data through quality check
- Archive of observation data
- Creation of value added products
- Dissemination of data and products

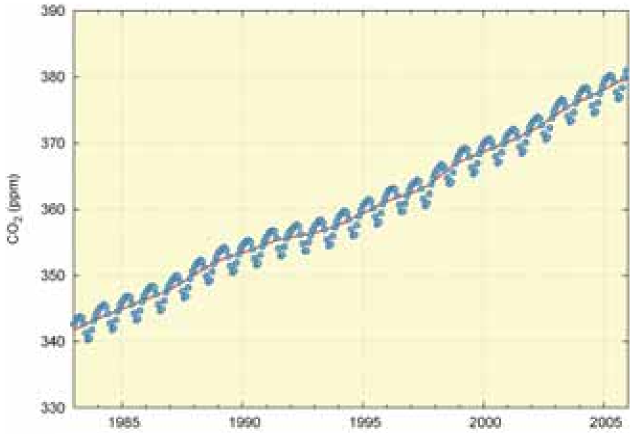


WDCGG website

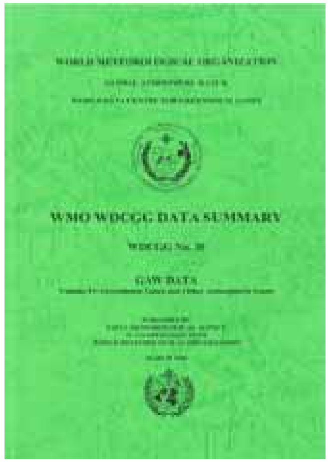


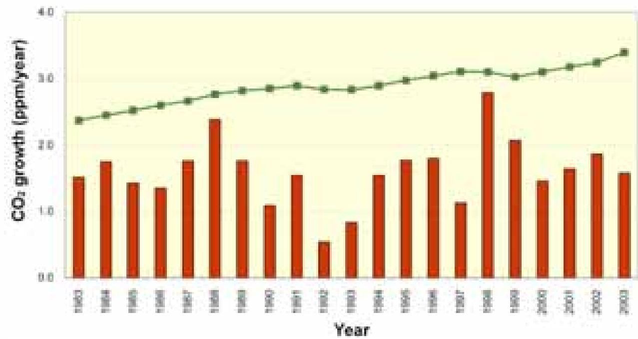


WDCGG Data Summary

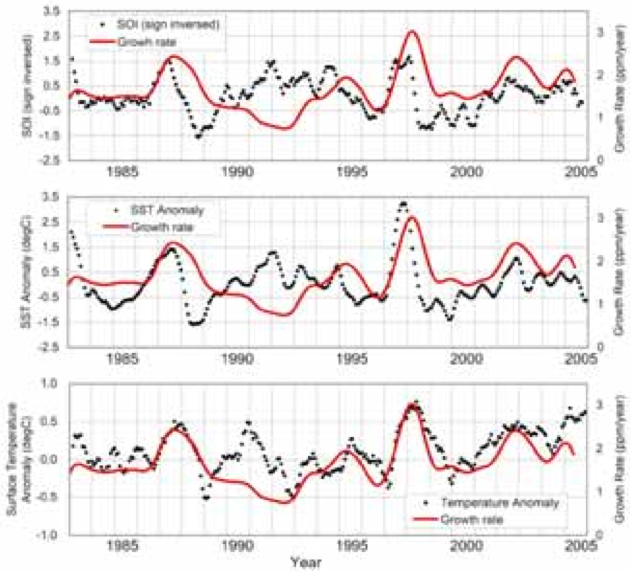


Global mean CO_2 concentrations

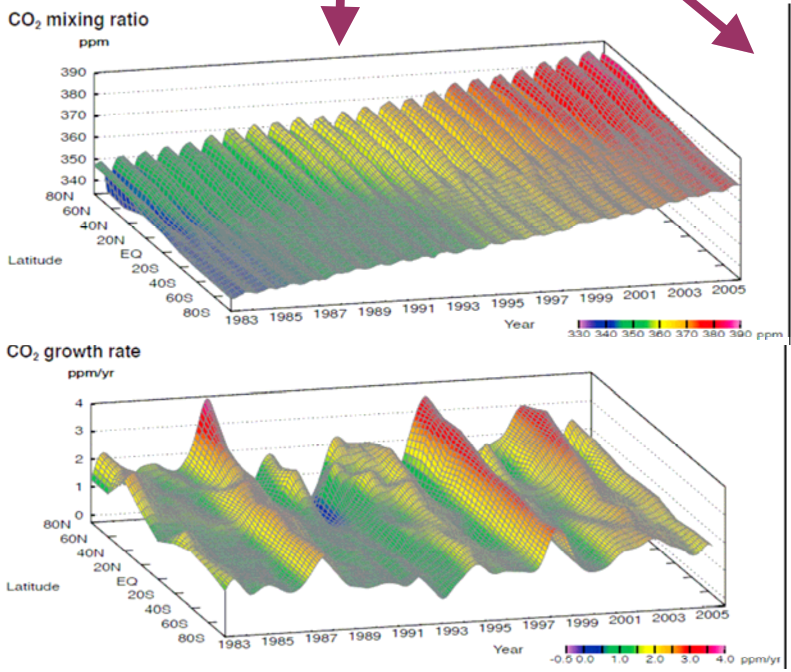




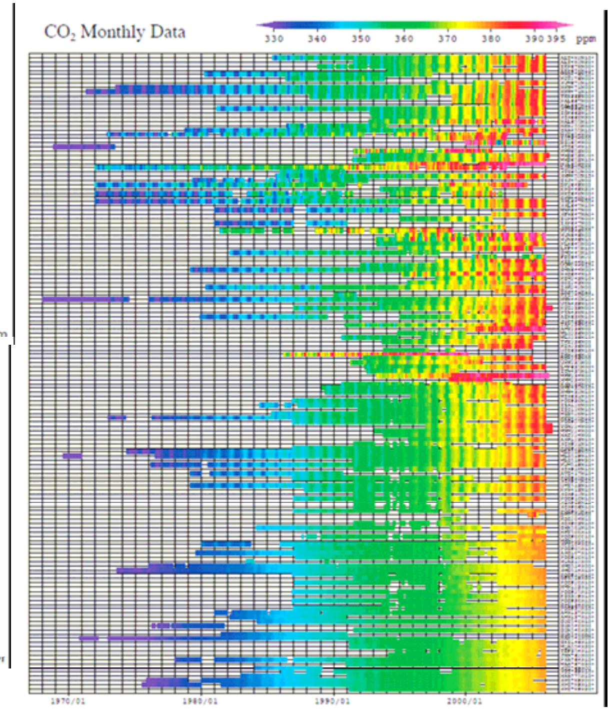
Annual mean atmospheric CO_2 growth rates as observed (red) and estimated from anthropogenic emissions (green).



CO_2 growth rates in the Tropics in comparison with related oceanographical and atmospheric indices.



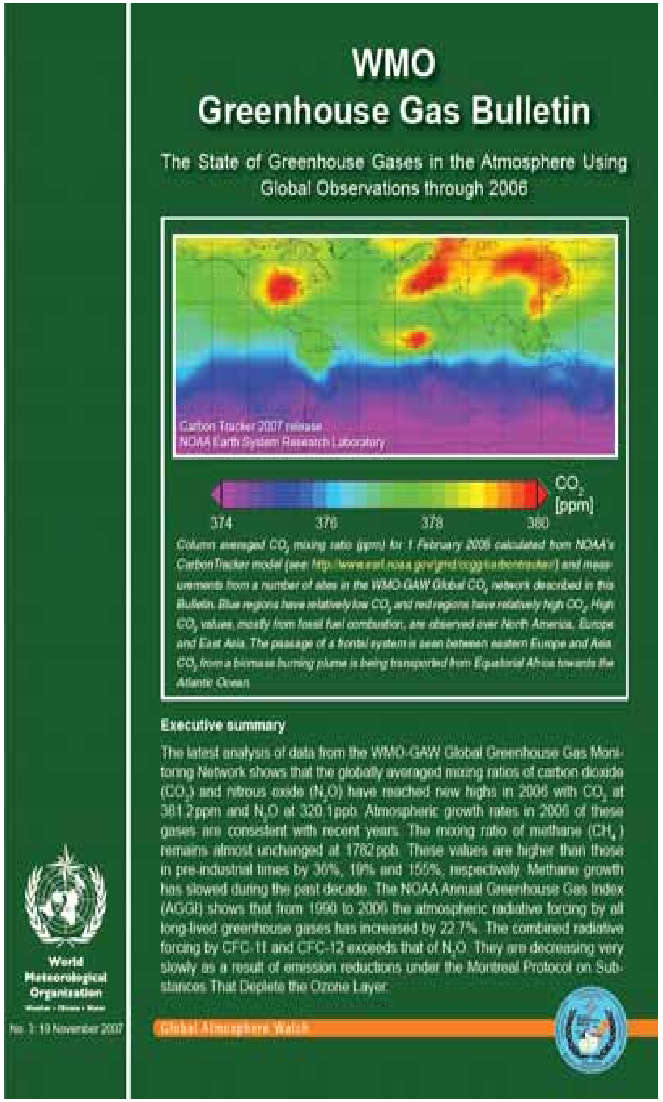
3D representation of latitudinal – temporal distributions of CO_2 concentrations and their growth rates



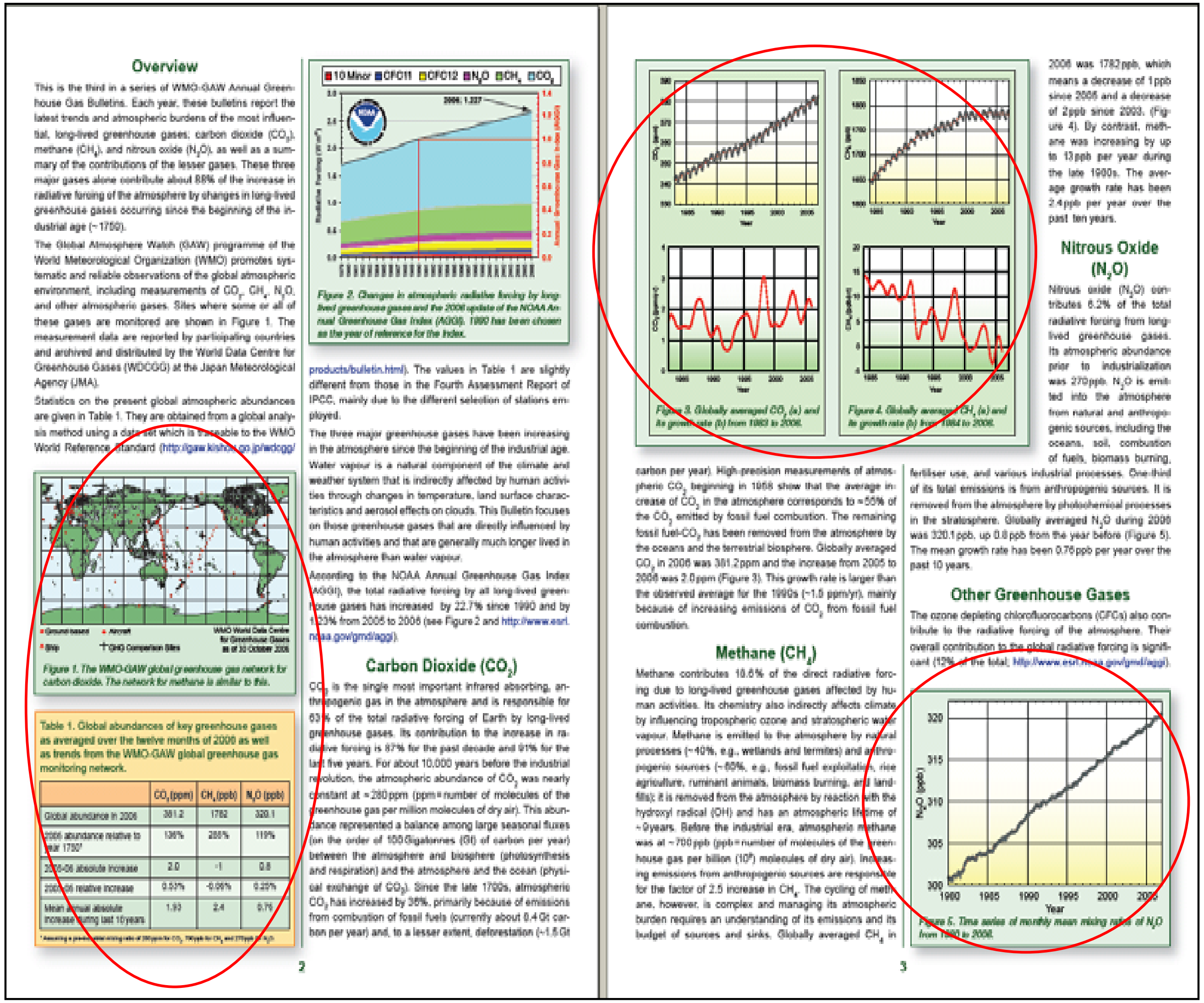
Data history for all stations with CO_2 concentrations in color

WMO Greenhouse Gas Bulletin

State of greenhouse gases in the atmosphere



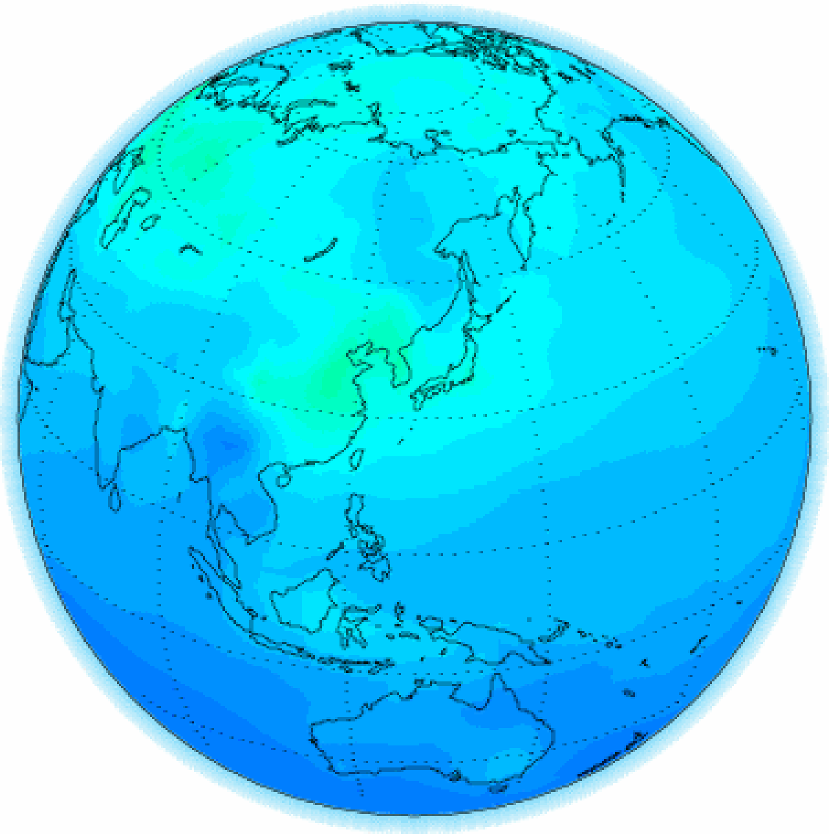
The latest analysis of data from the WMO-GAW Global Greenhouse Gas Monitoring Network shows that the globally averaged mixing ratios of carbon dioxide (CO_2) and nitrous oxide (N_2O) have reached new highs in 2006 with CO_2 at 381.2 ppm and N_2O at 320.1 ppb. Atmospheric growth rates in 2006 of these gases are consistent with recent years. The mixing ratio of methane (CH_4) remains almost unchanged at 1782 ppb. These values are higher than those in pre-industrial times by 36%, 19% and 155%, respectively. Methane growth has slowed during the past decade. The NOAA Annual Greenhouse Gas Index (AGGI) shows that from 1990 to 2006 the atmospheric radiative forcing by all long-lived greenhouse gases has increased by 22.7%. The combined radiative forcing by CFC-11 and CFC-12 exceeds that of N_2O. They are decreasing very slowly as a result of emission reductions under the Montreal Protocol on Substances That Deplete the Ozone Layer.

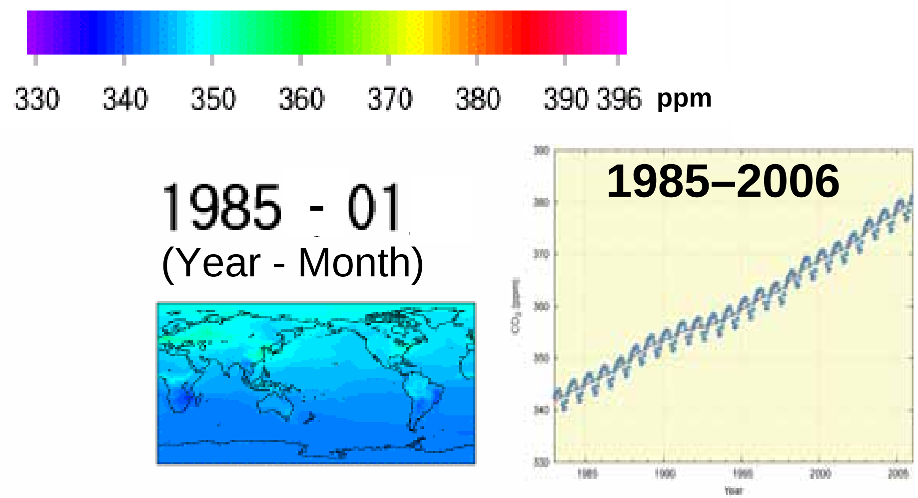


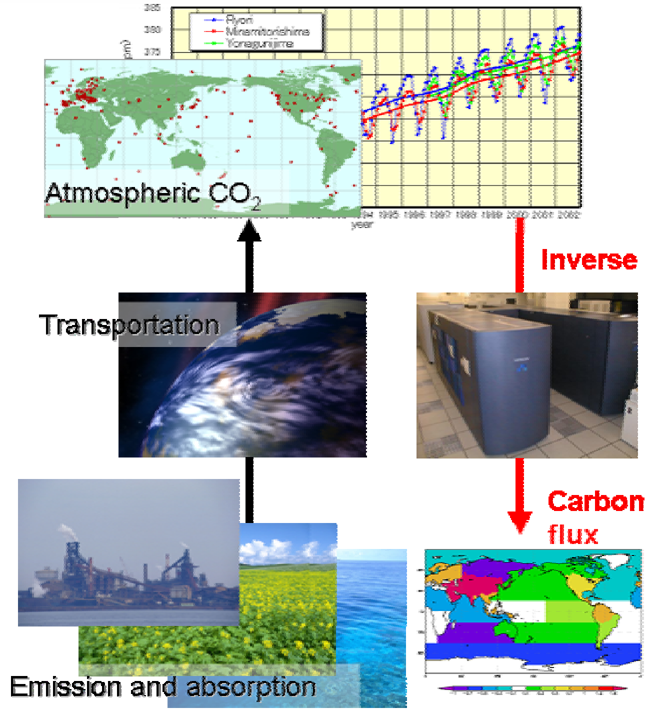
	CO_2 (ppm)	CH_4 (ppb)	N_2O (ppb)
Global abundance in 2006	381.2	1782	320.1
2006 abundance relative to year 1750*	136%	255%	119%
2005-06 absolute increase	2.0	-1	0.8
2005-06 relative increase	0.53%	-0.06%	0.25%
Mean annual absolute increase during last 10 years	1.93	2.4	0.76

The WDCGG makes substantial contributions to the annual Bulletin.

JMA's Analysis on Global CO_2 Distributions and Fluxes







Global distributions of CO_2, simulated from estimated fluxes and atmospheric transport