

# International Contributions of JMA for Climate Issue

Japan Meteorological Agency

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# JMA's Observation



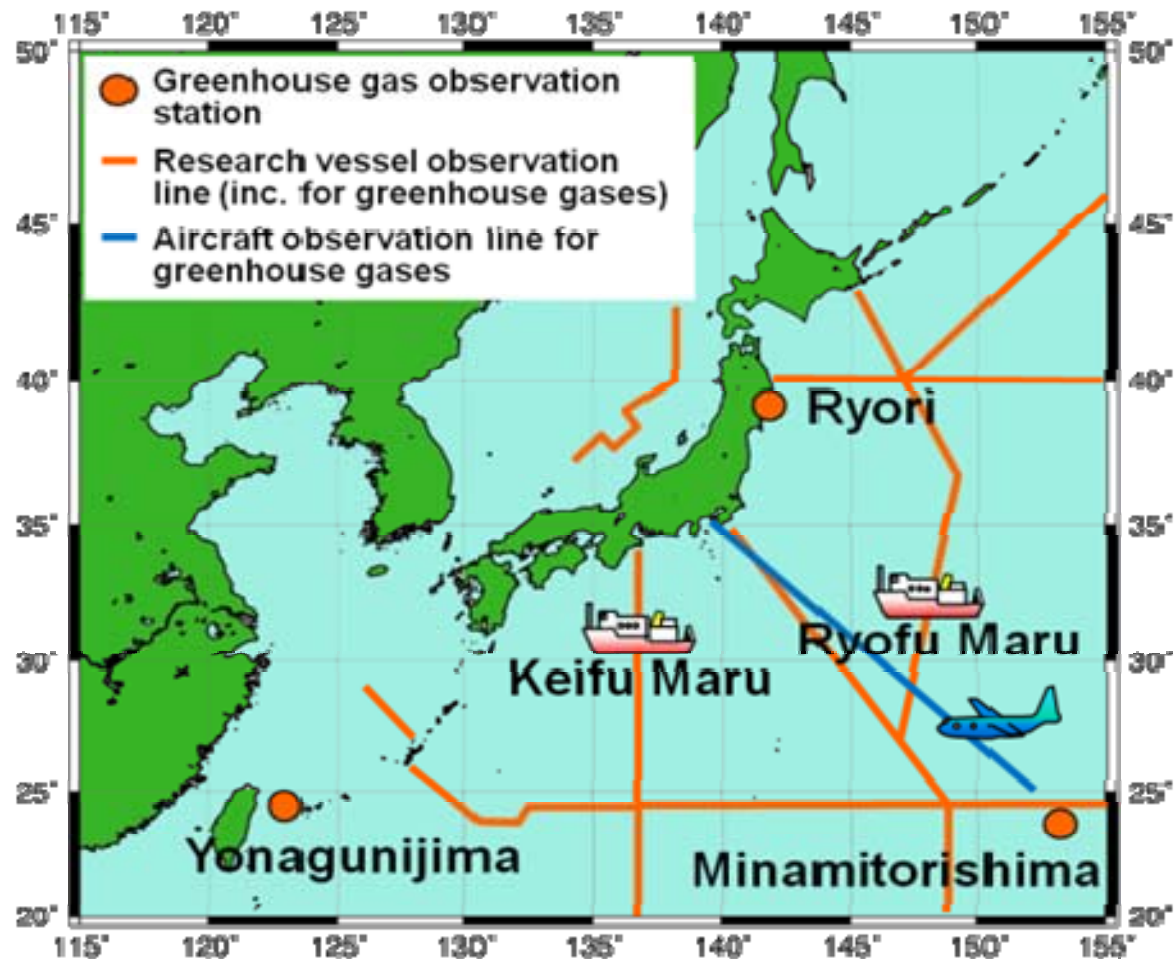
- JMA has continued observation of atmosphere and oceans.
- Long-term observation data have contributed to the detection and monitoring of climate change.
- These data is provided to the world through the framework of WMO and GCOS, and are used for monitoring of global scale climate change.



# JMA's Observation



- JMA monitors greenhouse gases at 3 surface stations, by 2 research vessels and cargo aircraft.



# JMA's Observation



## Greenhouse gases Observation Station

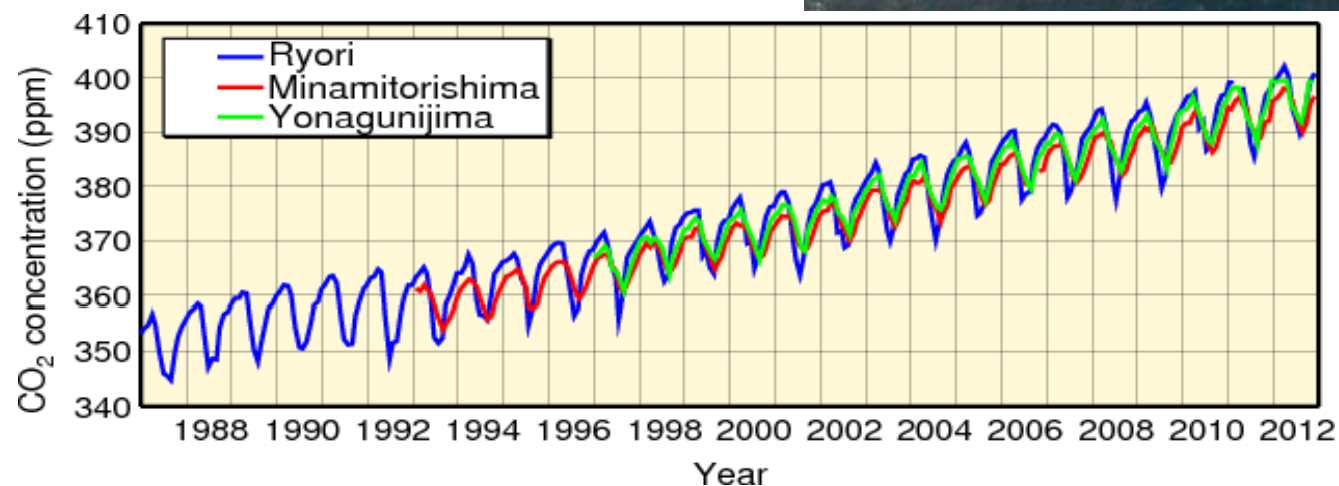
- JMA continues to observation of CO<sub>2</sub> and other GHGs over 25 years.
- These observation data indicate an increase GHGs concentrations by human activities.
- Ryori

The oldest observation Station  
for GHGs In Asia



## Minamitorishima

One of the 29 WMO/GAW Global stations



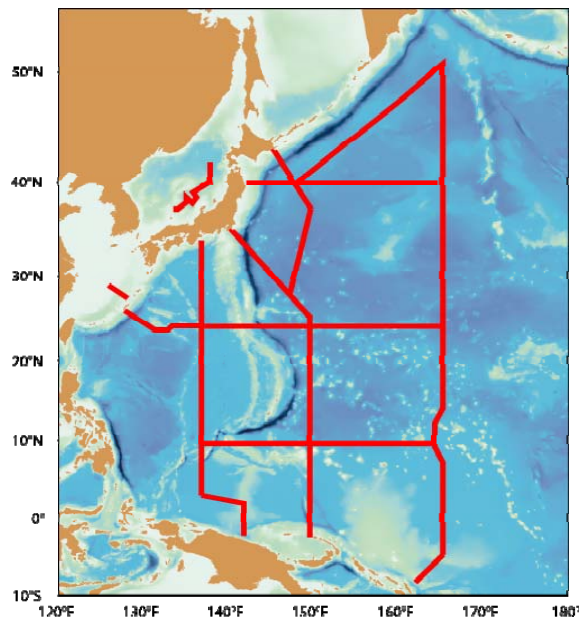
# JMA's Observation



Keifu Maru

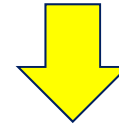


Ryofu Maru



## *Targets:*

- *CO<sub>2</sub> in the ocean and atmosphere*
- *Long-term change in ocean state*



Climate Change Monitoring & Projections

# Climate Projection (Issuing information)



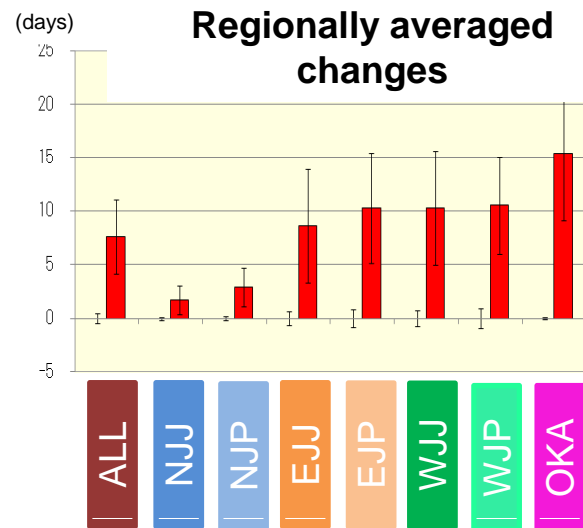
- JMA has published a series of reports entitled **Global Warming Projection (GWP)** in order to facilitate impact assessment of anthropogenic global warming, help promote implementation of measures to mitigate and adapt to global warming, and raise public awareness and understanding of scientific knowledge on the phenomenon.

## Global Warming Projection Vol.8 (in Japanese)



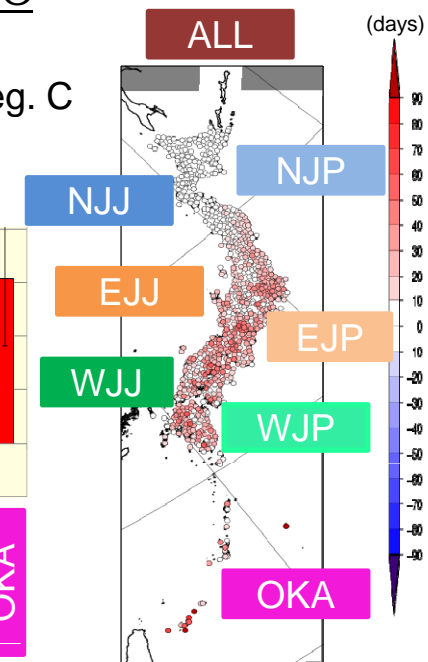
### Temperature extreme

Annual number of days with daily maximum temperature over 35 deg. C



### Precipitation extreme

etc...

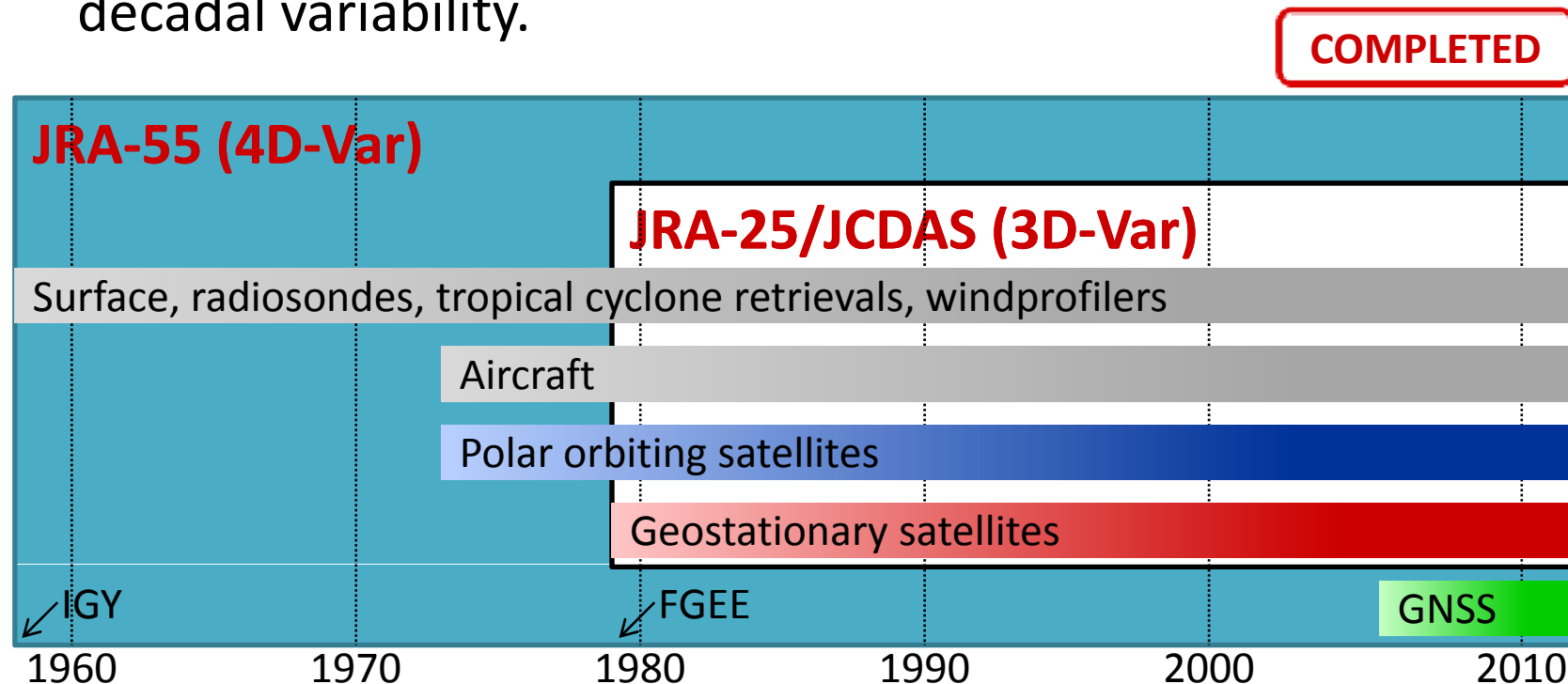


Use of the adaptation and mitigation of global warming

# JRA-55



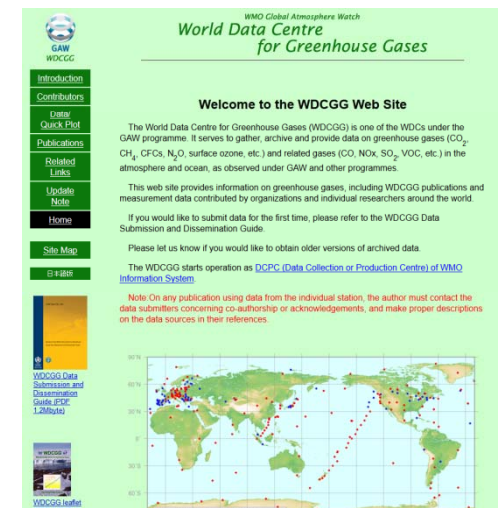
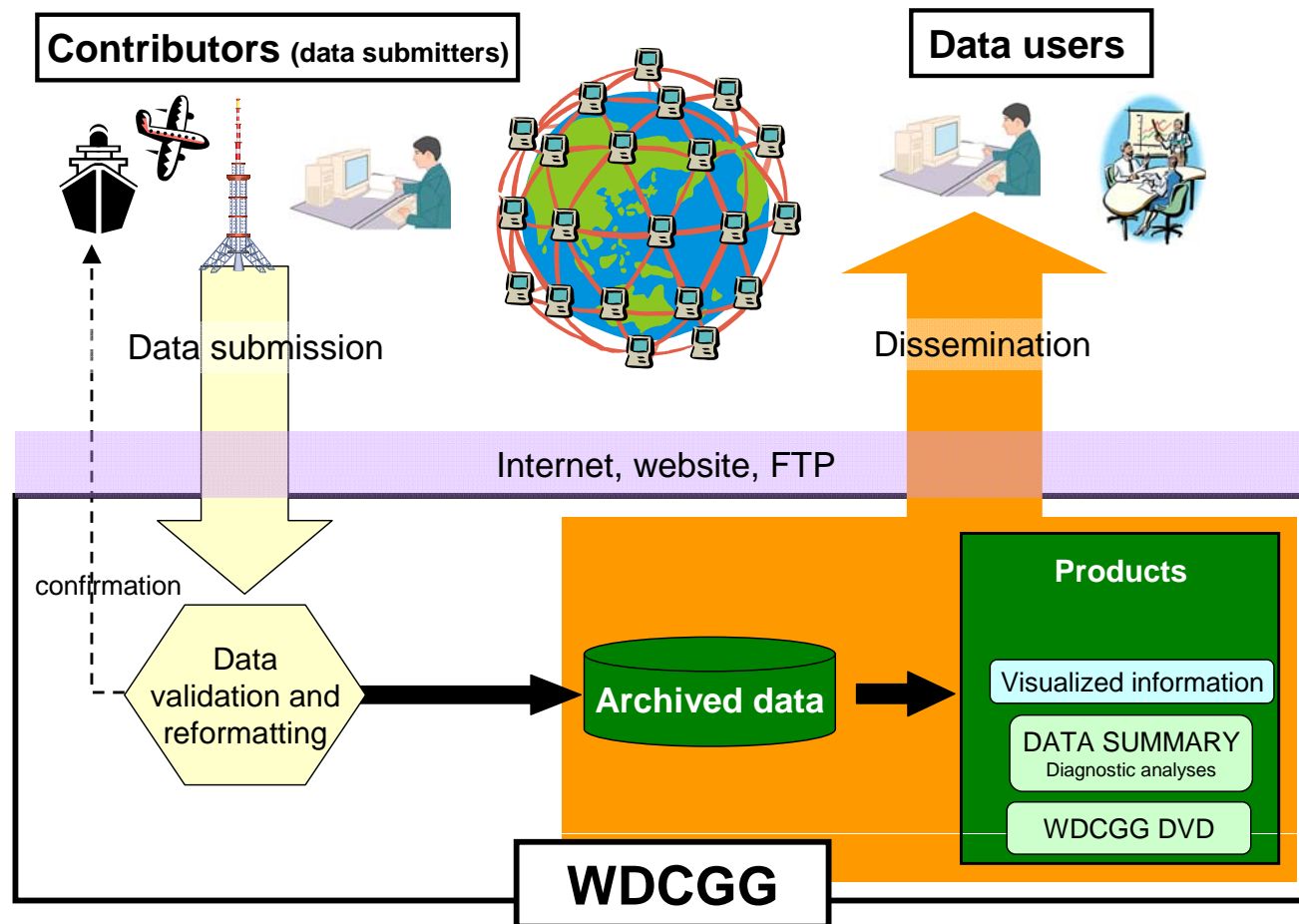
- The second Japanese global reanalysis conducted by JMA.
- The first comprehensive global atmospheric reanalysis that applies 4D-Var to the last half century.
- Aiming at providing a comprehensive atmospheric dataset that is suitable for studies of climate change and multi-decadal variability.



# WDCGG(World Data Center for Greenhouse Gases)



- Archive data reported from WMO/GAW stations and make them available to users
- Support data analysis for scientific advances and policy making
- Meet the needs of data submitters and data users



**Website:**

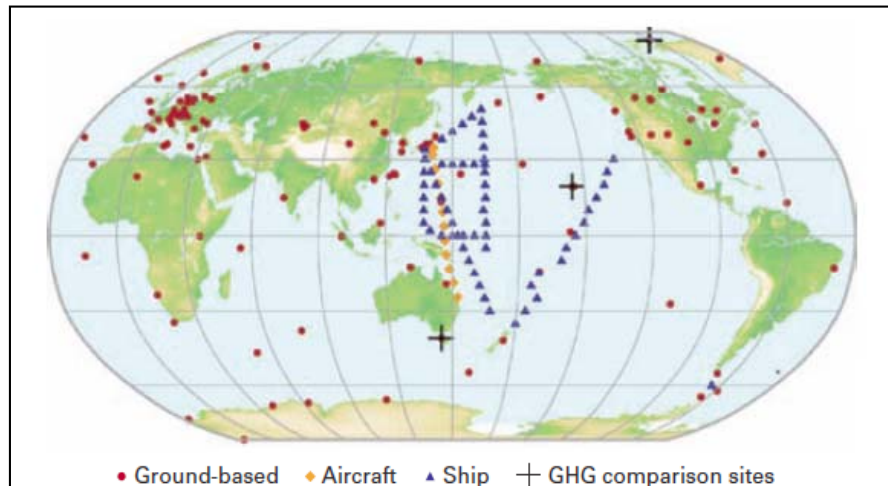
<http://ds.data.jma.go.jp/gmd/wdcgg/wdcgg.html>





# WDCGG(World Data Center for Greenhouse Gases)



- WMO/GAW issues the annual Greenhouse Gas Bulletin, which reports on the latest trends of greenhouse gases.
- This bulletin based observation data of greenhouse gases collected by WDCGG.
- WMO distribute latest bulletin in COP19.



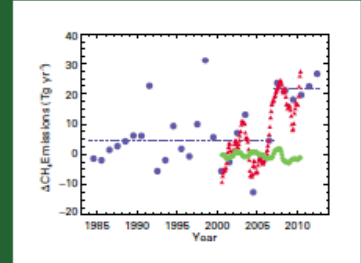
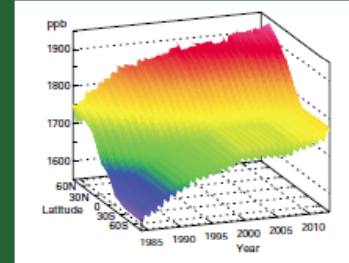


## WMO GREENHOUSE GAS BULLETIN

The State of Greenhouse Gases in the Atmosphere  
Based on Global Observations through 2012

No. 9 | 6 November 2013

ISSN 2079-0796



*The left hand figure shows the latitudinal distribution of atmospheric methane (CH<sub>4</sub>) interpolated from measurements made at the WMO Global Atmosphere Watch stations. After remaining nearly constant from 1989 to 2006, atmospheric CH<sub>4</sub> began increasing again in 2007. Total global emissions can be calculated from the observed atmospheric CH<sub>4</sub> burden and rate of increase, combined with an estimate of methane's atmospheric lifetime (about 9 years). Differences between these emissions (ΔCH<sub>4</sub>) and average emissions for 2003-2005 are plotted as blue circles in the right hand figure; the dashed blue lines show average differences for 1984-2006 and 2007-2012. From 1984 to 2006, emissions were highly variable but persistently lower than for 2007 to 2012, except for 1991 and 1998. Monthly emission differences (in Tg CH<sub>4</sub> yr<sup>-1</sup>) calculated globally (red) and for the Arctic (green) by a chemical transport model study are also shown (Bergamaschi, et al., 2013). Analysis of the data indicates that tropical and mid-latitude Northern Hemisphere emissions have contributed to increases in atmospheric CH<sub>4</sub> since 2007, and that there has not yet been a measurable increase in Arctic CH<sub>4</sub> emissions.*

### Executive summary

The latest analysis of observations from the WMO Global Atmosphere Watch (GAW) Programme shows that the globally averaged mole fractions of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) reached new highs in 2012, with CO<sub>2</sub> at 393.1±0.1 ppm<sup>(1)</sup>, CH<sub>4</sub> at 1819±1 ppb<sup>(2)</sup> and N<sub>2</sub>O at 325.1±0.1 ppb. These values constitute, respectively, 141%, 260% and 120% of pre-industrial (before 1750) levels. The atmospheric increase of CO<sub>2</sub> from 2011 to 2012 is higher than the average growth rate over the past 10 years. For N<sub>2</sub>O the increase from 2011 to 2012 is smaller than the one observed from 2010 to 2011 but larger than the average growth rate over the past 10 years. Atmospheric CH<sub>4</sub> continued to increase at a rate similar to the one observed over the past 4 years. The National Oceanic and Atmospheric Administration (NOAA) Annual Greenhouse Gas Index shows that from 1990 to 2012 radiative forcing by long-lived greenhouse gases increased by 32%, with CO<sub>2</sub> accounting for about 80% of this increase.

### Overview

This ninth WMO/GAW Annual GHG Bulletin reports atmospheric abundances and rates of change of the most important long-lived greenhouse gases (LLGHGs) – carbon dioxide, methane, nitrous oxide – and provides a summary of the contributions of the other gases. These three together