



# **InterComparison Experiments for Greenhouse Gases Observation (iceGGO) in Japan**

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- 1. JMA activities as WCC for methane**
- 2. Intercomparison experiments for Greenhouse Gases Observation (iceGGO) in Japan**



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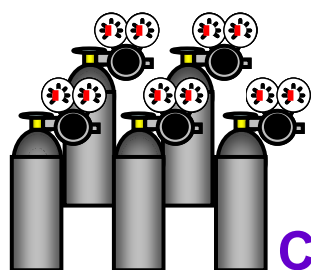


# CH<sub>4</sub> Calibration System and Standard Gases in JMA



## CH<sub>4</sub> Calibration in JMA

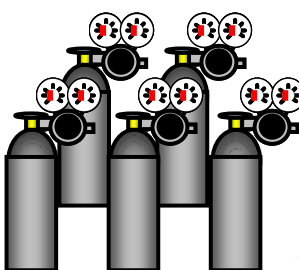
Primary Standards	5 Cylinders (1622 - 2109 ppb)
Standard Gas Scale	NOAA04 scale Every 6 years
Calibration system	GC-FID SHIMADZU-GC14BPF
Overall Precision	~ 2ppb



5 Primary



Calibration



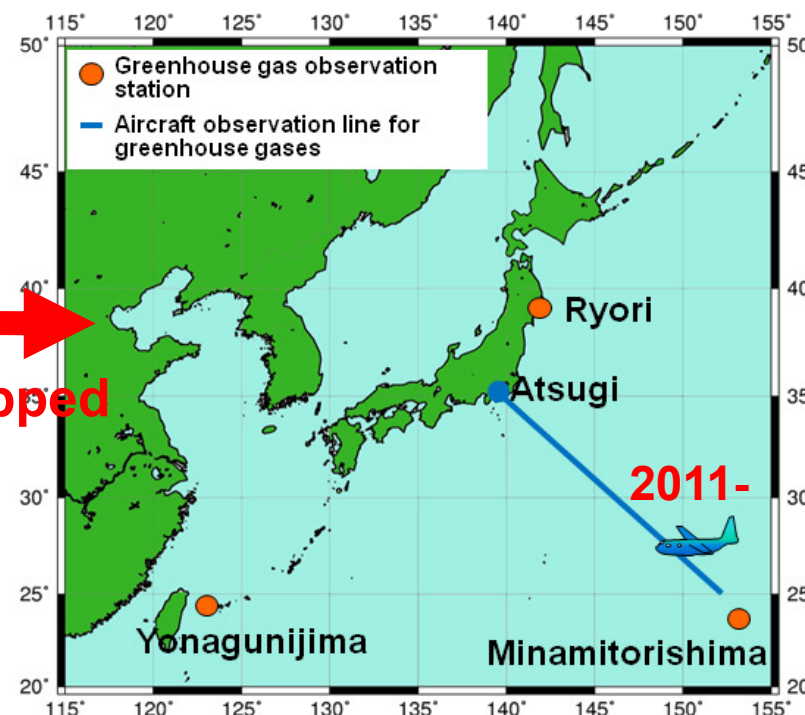
4 - 5 Working  
(4: Station  
5: Aircraft)

Shipped



NOAA/ESRL

Calibration Central Calibration Laboratory(CCL)





# Methane Reference Gas Intercomparison for WCC/GAW in JMA



- CH<sub>4</sub> Reference Gas Intercomparison as activities for WCC (A/O)
- Asia (China, Korea), South-West Pacific (Australia, New Zealand) and Japan

Intercomparison Round	Period	Participant	2 Cylinders [ppb]
1st	2001.04 - 2005.03	CMA, KMA, CSIRO, NIWA, TU, NIES	1800, 1950
2nd	2005.07 - 2010.01	CMA, KMA, KRISS, CSIRO, NIWA, NIES, TU	1700, 1875
3rd	2008.05 - 2013.02	KRISS, KMA, CMA, CSIRO, NIWA, NIPR, AIST, MRI, NIES, TU	1665, 1850
4th	2011.06 - 2012.05	CMA, KMA	1740, 1880
	2013 - (Ongoing)	CSIRO, NIWA	

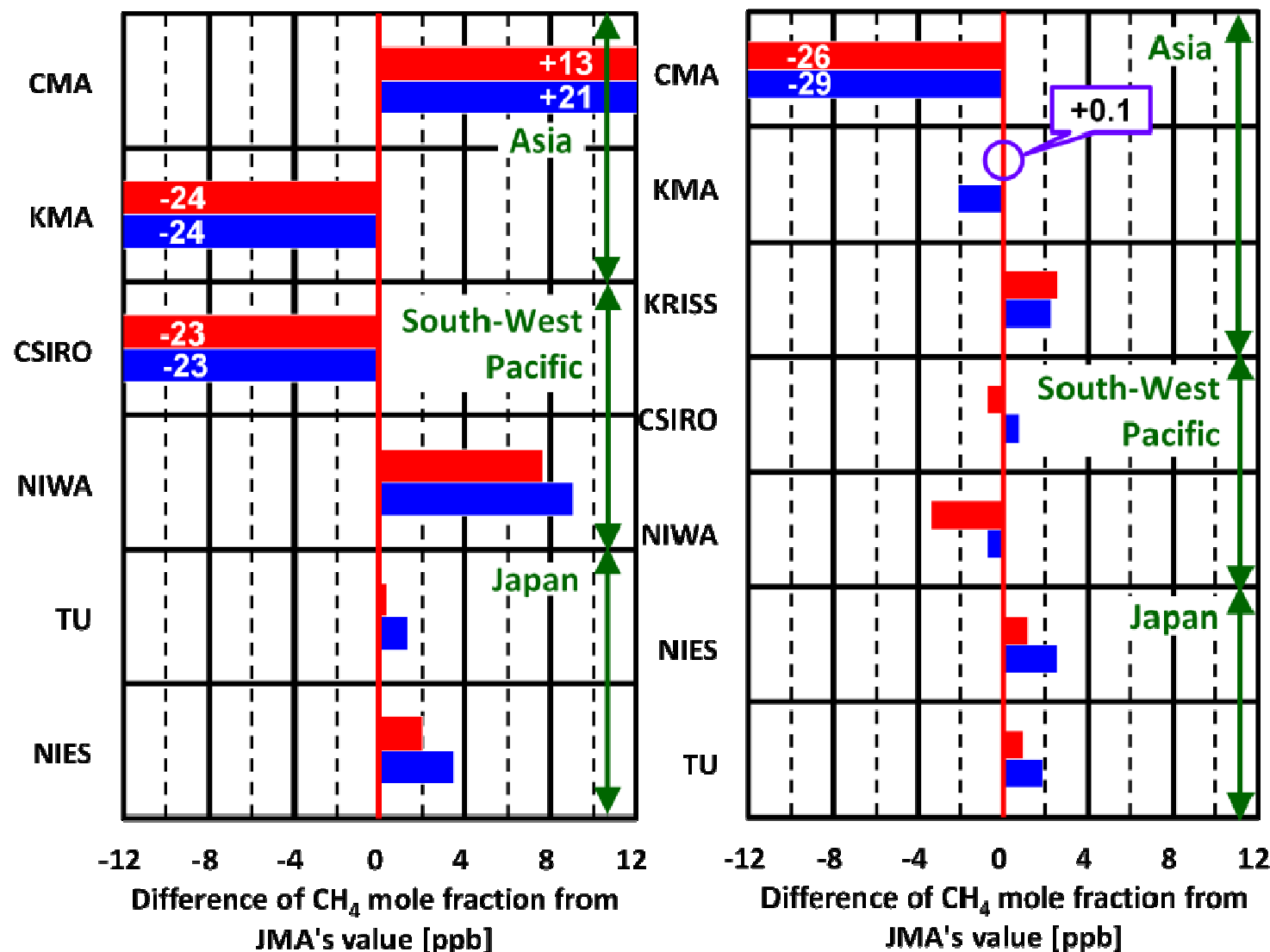
A/O: Asia and the South-West Pacific



# Results of the 1st and 2nd CH<sub>4</sub> Reference Gas Intercomparison

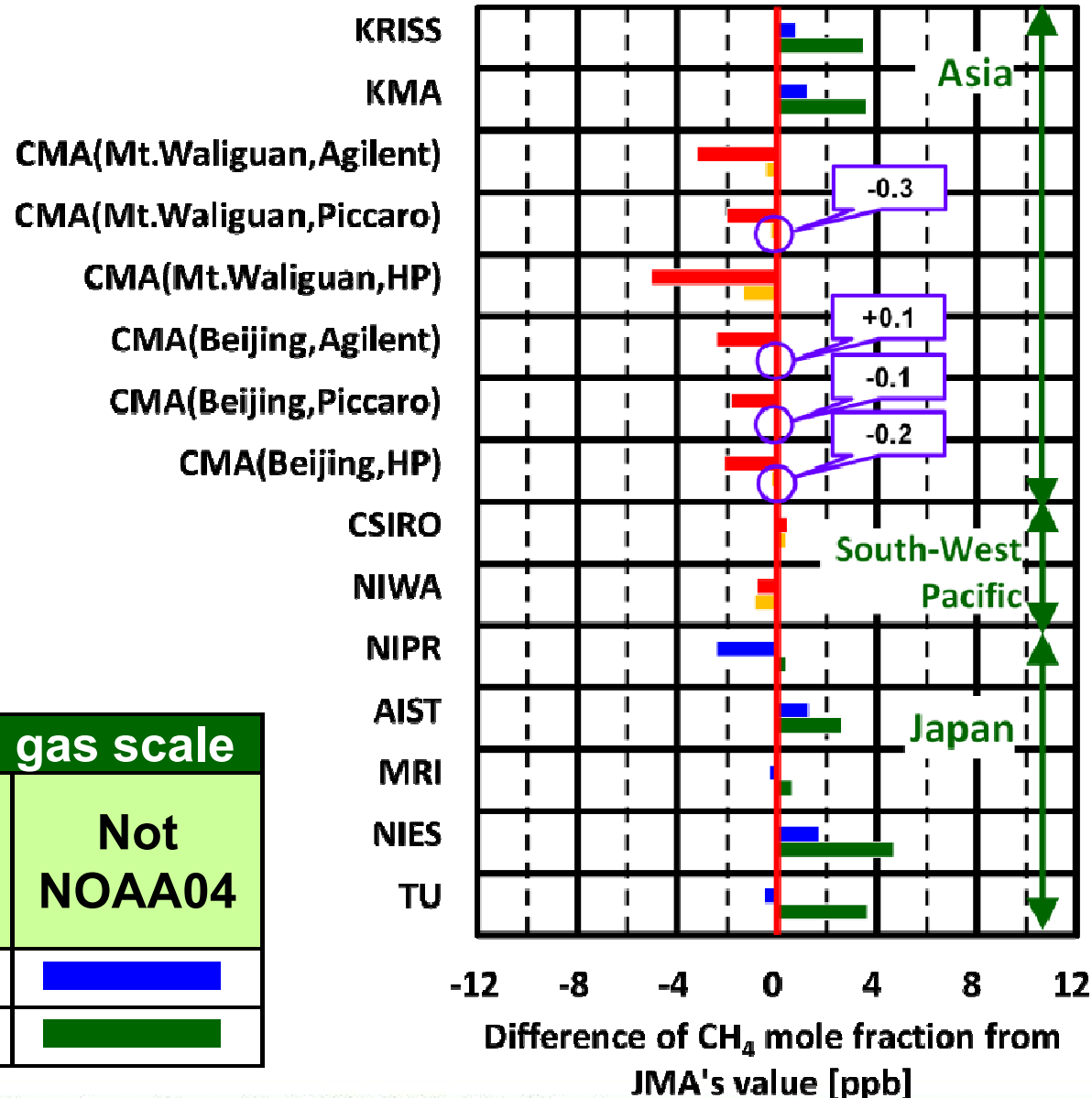
## 1st Round

## 2nd Round





# Results of the 3rd CH<sub>4</sub> Reference Gas Intercomparison



CH <sub>4</sub> mole fraction [ppb]	Standard gas scale	
	NOAA04	Not NOAA04
1665	<div style="width: 100px; height: 15px; background-color: red;"></div>	<div style="width: 100px; height: 15px; background-color: blue;"></div>
1850	<div style="width: 100px; height: 15px; background-color: orange;"></div>	<div style="width: 100px; height: 15px; background-color: green;"></div>



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# Overview of iceGGO



## Background

- JMA and major observation laboratories in Japan have established a national alliance with **National Metrology Institute of Japan (NMIJ)**.
- We started intercomparison experiments named iceGGO series in 2012.

## Purposes of iceGGO-1 (CH<sub>4</sub>)

- To compare CH<sub>4</sub> standard scales used by the observation laboratories with the **SI traceable** standards produced by NMIJ.
- To clarify the detailed differences of the standard gases which have a wider range of CH<sub>4</sub> mole fractions.

## Future Target

- To detect a drift of standard gas as well as analytical problems by repeated experiments.
- To make a compatible CH<sub>4</sub> dataset by integrating all of the measurements at various laboratories in Japan.



# iceGGO-1 (CH<sub>4</sub>) in 2012

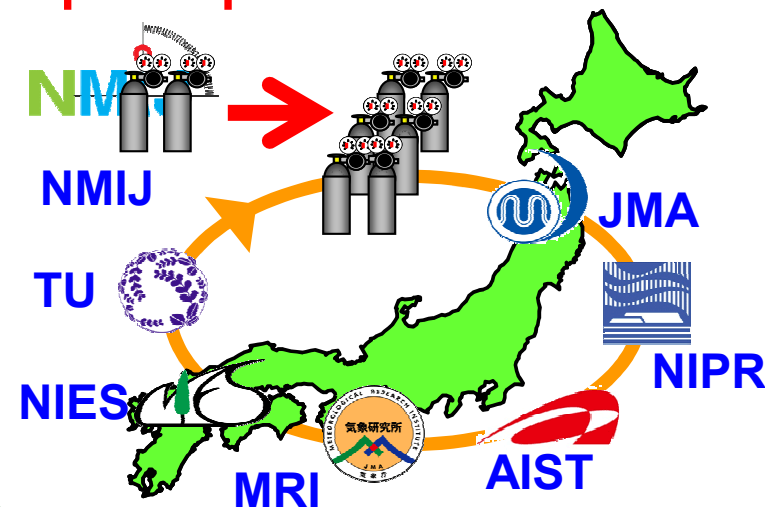


## 6 standard gas cylinders

(CH<sub>4</sub> range: 1665 ppb – 2240 ppb)

- 1) 4 standard gases were provided by JMA
  - 1665-1920ppb
  - (2 standards for WCC)
  - Purified natural air + pure CH<sub>4</sub>
- 2) 2 standard gases were prepared by a gravimetric method in NMIJ
  - 1830, 2240ppb
  - Synthetic air (N<sub>2</sub>, O<sub>2</sub>, Ar) + pure CH<sub>4</sub>

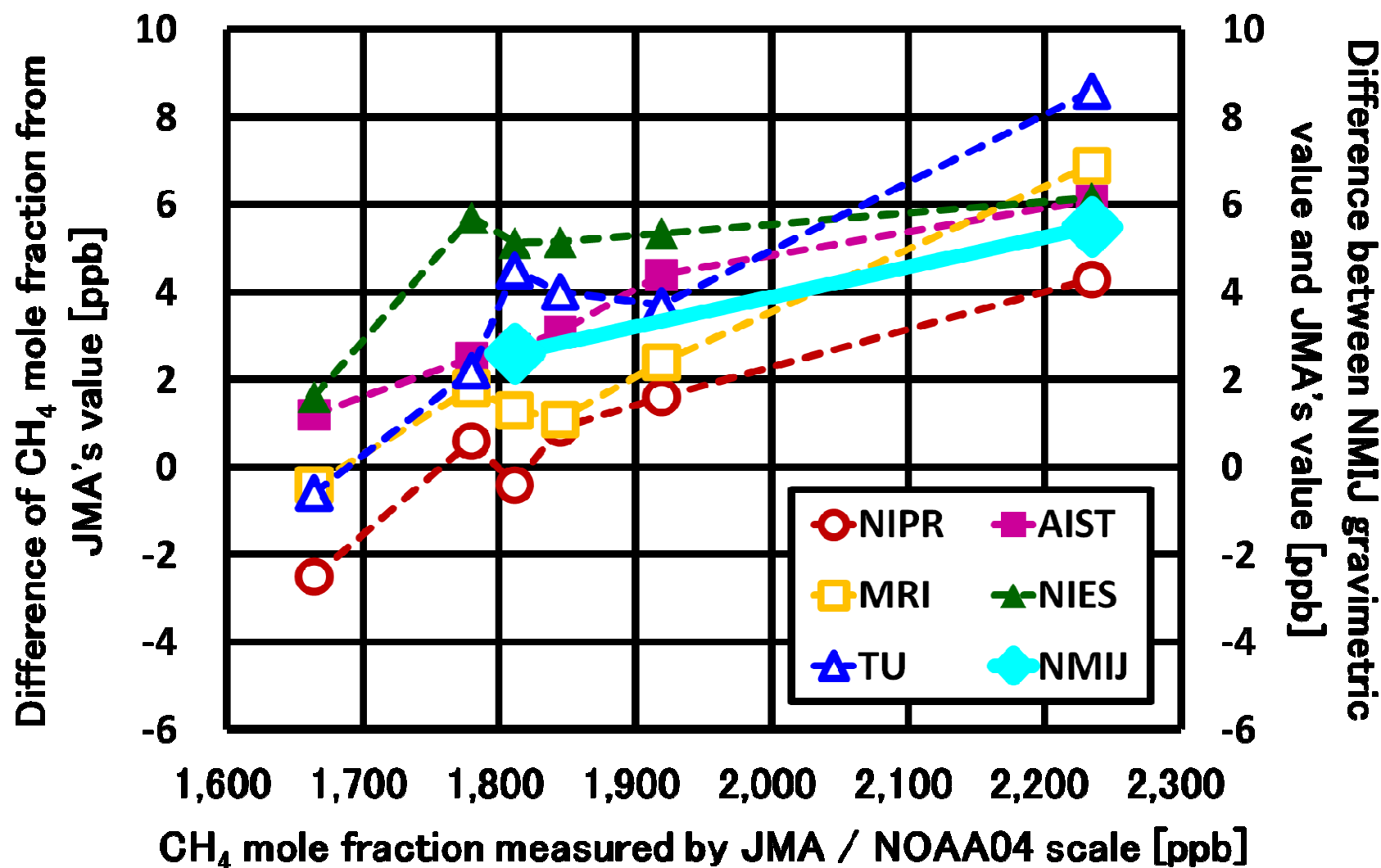
## 7 participants



	JMA	NIPR	AIST	MRI	NIES	TU	NMIJ
Standard gas scale	NOAA04	NIPR	AIST	MRI	NIES94	TU-X08	Gravimetric blending
Standard gas range [ppb] (Number)	1622-2109 (5)	1390-2282 (4)	1007-2534 (4)	1599-2102 (5)	512-3012 (7)	899-2503 (5)	
Instrument (GC-FID)	GC-14BPF SHIMADZU	GC-8A SHIMADZU	GC-14BPF SHIMADZU	AG-1F Yanaco	HP5890 Agilent	6890NF HP	
Precision $\sigma$ [ppb]	2.0	1.8	1.6	0.9	1.0	1.2	



# Result of iceGGO-1 ( $\text{CH}_4$ )





# Summary



- The differences of CH<sub>4</sub> concentrations measured in the 3rd methane reference gas intercomparison were smaller than those in the previous two intercomparisons.
- The difference of measured CH<sub>4</sub> mole fractions with each scale depended on absolute CH<sub>4</sub> mole fractions.
- The iceGGO-1 was successful. For various greenhouse gases such as CO and CO<sub>2</sub> besides CH<sub>4</sub>, the alliance will continue the series of the intercomparison to clarify the relation among laboratory's scales and to ensure their stability.



# Acknowledgment



**For more information on JMA's WCC activities,  
please visit the following page.**

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

**Thank you so much for your cooperation !**

