WMO ROUND-ROBIN INTER-COMPARISON: PROGRESS AND A NEW WEBSITE

Lingxi ZHOU[1], D.R.Kitzis[2], P.P.Tans[2], K.Masarie[2], D.Chao[2]

1. CAWAS, CAMS, CMA, China
2. GMD, ESRL, NOAA, USA

15th WMO/IAEA Meeting of Experts on Carbon Dioxide,
Other Greenhouse Gases
and Related Tracers Measurement Techniques

7-10 September 2009, Jena, Germany

Background

- At the 11th WMO/IAEA CO_2 Experts Meeting held in Tokyo (25-28 Sept. 2001), it was decided that we should go ahead with the 4th WMO Round-robin reference gas inter-comparison.
- All participating labs are urged to contribute the results of all systematic investigations of gas handling protocols and materials, whether the results were positive or negative.

Purpose

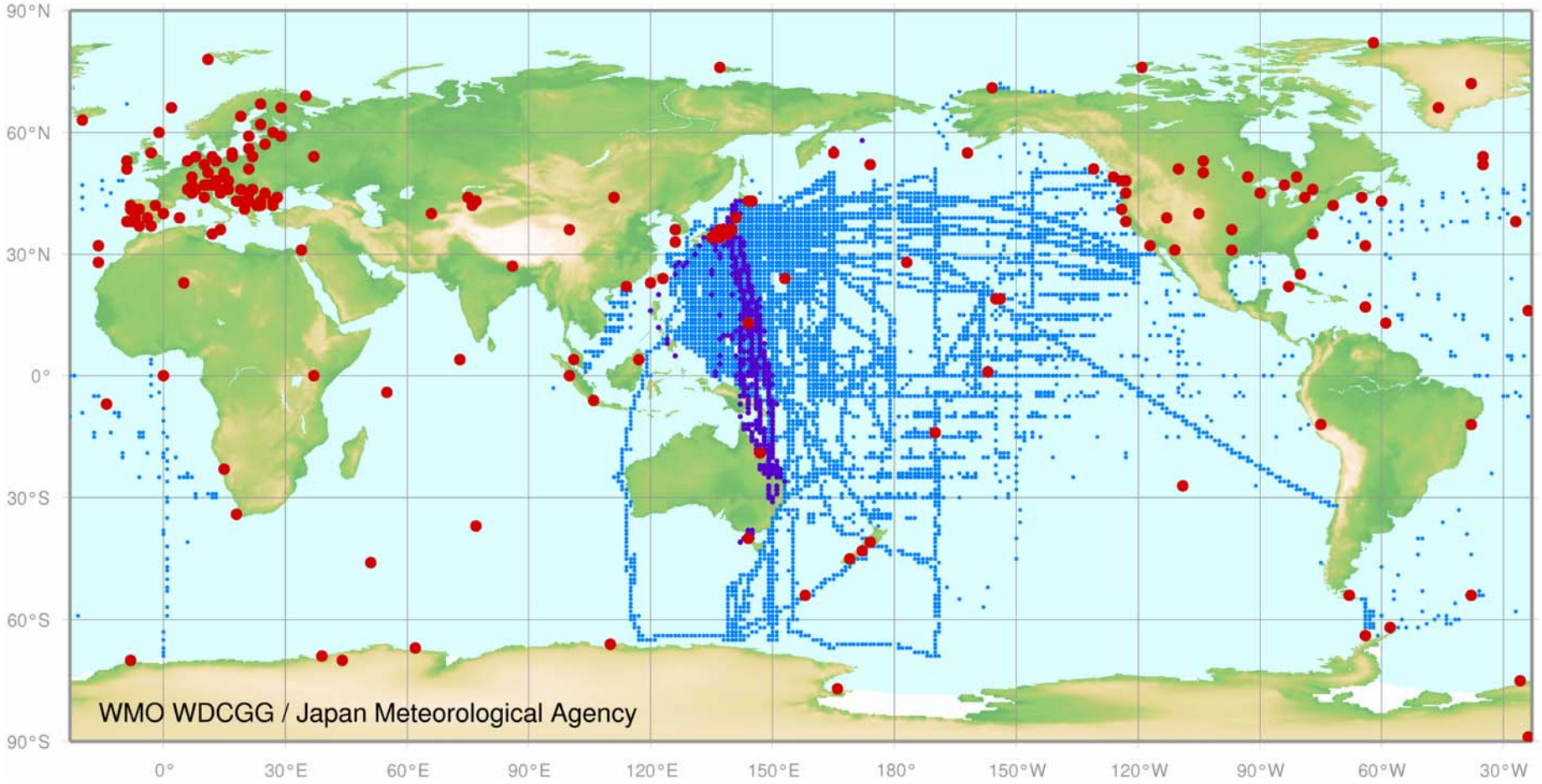
- **The purpose would be NOT to distribute calibration scales, but rather to determine the precision of the current practice of international calibrations.**

Blind test

This is a blind test of each measurement system to show scale offsets or inconsistencies.

The assigned values are only a baseline to compare results of each lab.

Data reported to the WDCGG



• **Fixed stations,** • **Aircraft observations,** • **Ship observations**

Up to 30 April 2009, curtsey SUDA Kazuto

Protocol

- **The protocol of the 5th WMO RR inter-comparison started in early 2009 was similar to that used for the previous ones held during 1991-1992 (1st) , 1995-1997 (2nd), 1999-2000 (3rd) and 2002-2007 (4th).**

However

- **4th RR, participants should also report values for several gases in addition to CO_2, if they have capability and time to do so.**
- **5th RR, reporting content details are emphasized……**

Experiment

- **NOAA ESRL prepared 9 high pressure cylinders (3 sets) of clean dry air, collected at Niwot Ridge for the intercomparison.**
- **labs were divided into 3 globally-distributed groups.**

Participants Schedule (1)

Each participant is responsible for keeping in a realistic time frame to measure your trace gas species of interest.

- **CO_2 only (3 weeks)**
- **each additional trace gas measure (1 week)**
- **Plus isotopes (2 weeks)**
- **Ship to next Lab/station (1 week).**

Payment for the shipping to the next participant is part of your laboratories participation.

Participants Schedule (2)

- **The greatest drawbacks to this exercise are the delays with some labs in finishing the measurement, delay in shipping and individual country customs offices.**

Please note:

- **If one lab cannot finish in a timely manner we may insist that you ship the set to the next participant at your expense without finishing them.**
- **We apologize for this but it will be the only way to finish this exercise in a fair and timely manner.**

- **Duane Kitzis, doorway at NWR**

Guidelines (1)

- **Each aluminum crate contains one aluminum cylinder, one Airgas regulator, two quick disconnect fittings [6 mm and 1/8 inch fractional tubing].**
- **Please use either quick disconnect fitting when blowing out the regulator but do not remove the fitting attached to the regulator.**

Guidelines (2)

- **The three cylinders are to be considered UN1002, AIR-compressed. The CO2 mixing ratios are approximately 370, 385, 400 ppm.**
- **After attaching the regulator to the tank valve, open and quickly close the tank, allow the pressure to vent, 3 times, then pressurize the regulator one more time, note the tank pressure and see if the pressure drops over a three hour period.**
- **If necessary retighten the CGA fitting and re-pressurize the regulator to leak check it. Once a leak tight CGA connection is established, measure the tank as you would any working tank or air sample.**
- **We suggest at least 3 measurements be made.**

To make the 5th RR faster

- **Contact next participant before you finish the calibrations**
- **Complete the calibrations within time frame**
- **Report the results to Referee within 3 weeks after you have finished the calibrations.**

Report to Duane Kitzis

- **Logistical planning**

please send the following as you complete

1) **Date cylinders are unpacked.**
2) **Pressure when conditioning regulators.**
3) **Final tank pressures when removing regulators.**
4) **Date shipped out to the next lab.**

Report to Referee

When reporting results please also include

1) References to publications/reports describing measurement procedures, and standard scale.
2) Instrument type and model.
3) Date of analysis start and end.
4) Cylinder numbers with trace gas mixing ratio average and 1 SD [n-1] if multiple analysis.
5) If you do send cross calibration results by different "Instrument type/model" deployed in one Lab for one species, report this separately as two distinct reports, compared only to the three inter-comparison tanks. Denote them clearly via location, use, instrument type.
6) We are mostly interested in the point where the calibration scale is transferred to the rest of your lab (propagate, traceability), not necessarily each field measurement.

4th WMO Round-Robin Final Report published

- *Zhou, L.X., D. Kitzis, P. Tans, 2009, Report of the Fourth WMO Round-Robin Reference Gas Inter-comparison, 2002-2007.* **WMO/GAW Report No.186, pp. 40-43**

Participants 4th WMO RR

- 26 labs reported CO_2
- 12 labs reported CH_4
- 8 labs reported CO
- 6 labs reported N_2O
- 5 labs reported SF_6
- 7 labs reported $\delta\,^{13}C$ and $\delta\,^{18}O$ in CO_2
- 2 labs reported H_2

WMO RR progress

- **5th Round-robin (2009 –):**
  41 Labs from 19 countries registered

- **4th Round-robin (2002 – 2007): 27 Labs**
- **3rd Round-robin (1999 – 2000): 24 Labs**
- **2nd Round-robin (1995 – 1997): 20 Labs**
- **1st Round-robin (1991 – 1992): 16 Labs**

Jim Peterson, Referee of our previous Round-robins (1st, 2nd and 3rd), has retired in the year 2001.

Lingxi Zhou (Referee since 2002)
Duane Kitzis & Pieter Tans (Coordinator)
Ken Masarie & Dan Chao (Web Site developing soon)

A proposed WMO/IAEA Round Robin Web Site

- **To be developed by NOAA/ESRL as CCL & WCC……**

Objectives

- **Improve access to published RR summaries and data**
- **Track progress of RR currently underway**
- **Direct reporting by labs**

Web Components (1)

General Information

- Mission Statement
- Measurement Guidelines (cylinder/regulator conditioning)
- Reporting Protocol
- Participant List & info
- Contact Us (request to participate……)

Products (available once WMO report is published)

- WMO Report (link to GAW)
- Statistical and Graphical Summaries (recent and archives)
- Comparison data (recent and archives) and meta data

Web Components (2)

Current Round Robin

- **Schedule and Progress**
- **Cylinder and regulator information**
- **PI Access (password protected)**

Reporting
(PI password protected, data entry and editing)

- **Inventory Status (cylinder receive/ship dates……)**
- **Results (values, uncertainties, metadata, comments……)**

Features (1)

- PIs can add to and modify their report while RR is underway
- PIs may report results from different detectors/systems
- Reminder messages sent automatically
- All pages publicly available except PI pages

Features (2)

Referee declares completion of RR

- Freeze PI accounts
- PIs may request late contribution but results may appear in an addendum to Report
- Present Referee Report including graphs, statistics, and digital access to user-friendly tabulated results.

Tools & Application

- **MySQL, PHP, Javascript/HTML**
- **Create/update a WMO RR group e-mail (may already exist)**
- **Templates for reporting results**
- **Accounts would be created by app administrators**

The proposed website function/design open for discussion:

- **Protocol; guideline; direction; Demo video; easily add account and password; log each entry; cylinder tracking; auto email reminder; statistics and custom graph plot; update of responsible person from each participating lab; results submission and update before/after deadline; search and visualization of the previous RR results; new participant application; and so on.**

Feedback from you are expected and appreciated……

Thank you for your kindest cooperation