

Interactive comment on “Jena Reference Air Set (JRAS): a multi-point scale for isotope measurements of CO₂ in air” by M. Wendeborg et al.

Anonymous Referee #3, Nov. 6, 2012

General comments

Having a unifying scale anchor is important for integrating isotopic measurements from different networks worldwide to constrain the sources/sinks of atmospheric CO₂ at both global and regional scales. The manuscript is a brief summary of JRAS measurements through IMECC program. Some valuable information has been reported to update the status of variability in isotopic measurements of air CO₂, in comparison with the results from a project (CLASSIC) carried out about 11 years ago. A very good reproducibility over ~ two years was presented for both MAR-J1 and OMC-J1 measured by MPI-BGC. As a community, we applaud for the effort and for that JRAS has been recommended as official scale anchor for isotope measurements of CO₂ air in WMO Expert meeting in Wellington (2011).

However, to well establish the unifying scale anchor for isotopic measurements of CO₂ in air, it is expected to have more comprehensive evaluation and much deeper discussions for those discrepancies between the reported results. More data (i.e., the $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ datasets from individual labs) and associated information should be presented (i.e., types of IRMS used, types of ^{17}O corrections used, the date of analysis and etc.), at least to the extent as shown in the report of CLAASIC project (Allison et al., 2003). It is suggested to add a new Table for the originally reported data and associated information.

According to the authors, 13 labs have participated in the IMECC-JRAS project. I am wondering why not all the datasets are reported. Are those datasets are not available? It would make the paper stronger including more datasets from the participating labs, particularly from those labs which were also participated in IMECC_Sausage project (e.g., CSIRO, EC, LSCE).

It is obvious that lots of effort has been dedicated to having a unifying scale anchor since CLASSIC and more understanding has been reached for the measurement discrepancies between the labs, there should be lots of aspects which can be analyzed and discussed, based on these JRAS measurements. The structure of the manuscript shows a little bit unusual. There is section 1.1 without section 1.2 and there is section 3.1 without section 3.2. You may need considering to add more discussion as sub-sections in section 3 or other sections.

The above concerns together with the specific comments should be addressed in the final version.

The specific comments

P6628L11: The sentence is not clear to me. Did you mean that mixing reference CO₂ in air is unique?

P6628 L15: Please spell out the “IMECC” and any acronyms at the first time.

P6629 L2-4: Please be consistent with the names of the participated labs/organization, i.e., “CAR/CSIRO” and INSTAAR/NOAA need to be spelled out. The Center for Atmospheric and Oceanic Studies should be replaced with Tohoku University (TU), which has been conventionally used for Dr. Nakazawa’s group (Allison et al., 2003).

P6629 L7- P6630 L2: Based on the statements in the CLASSIC report, the authors introduced that the root of the problem, i.e., the discrepancies for both pure CO₂ and CO₂ in air between labs, is scale definition. At the same time, the scale contraction caused by cross-contamination, inconsistencies in ¹⁷O correction and the algorithms for N₂O correction are listed as the contributed factors by the authors. It is expected that a thorough discussion to advance our understanding for those factors will be provided in the following sections to narrow down the dominant factor. But this was not done... The comparison results with different ¹⁷O corrections and N₂O algorithms applying to the JRAS measurements should be provided in a table (in the following sections) to infer the dominant factor causing these discrepancies.

P6630 L24 - P6631 L2: Based on the content, JRAS-06 is the local scale of MPI-BGC Isolab, which is firmly anchored at VPDB scale and continuously maintained. Please describe/define the JRAS-06 scale (are the two 5L flasks made from MAR-J1 and OMC-J1 in 2006?) and how the scale is maintained over time? It would be more convincing to show the data for scale maintenance in a table from 2006-2010.

P6631 L14-15: Does it mean that a JRAS set consists of three flasks after the spring of 2010? It is not clear if the three-flask sets of JRAS have been analyzed and evaluated by all the participating labs.

P6631 L20-21: Based on the last paragraph in section 2, the local scale at MPI-BGC is JRAS-06 scale. Is the evaluation of JRAS-06 (shown on Fig.2) by the MPI-BGC local scale independent? It seems that both axes are at the same scale (i.e., JRAS-06). A linear regression has been applied to the three data points shown on Fig. 2. Could you please provide the information in a table, including all the measurements for each of the three points (the MAR-J1, OMC-J1 and the dry ambient air) and the date for individual measurements?

P6632 L19- L26: Again, it is not clear if the three-flask sets have been measured by all the participated labs. If yes, please present the data ($\delta^{13}\text{C}$ and $\delta^{18}\text{O}$) which was used for the regressions (in Tables 2 & 3 and Figs.4 and 5) for each participated labs in another table. The date for each analysis should be also included for showing the evaluation of the comparison over time instead of one time exercise.

P6632 L23: Please change the VPDB_{gas} to VPDB-CO₂ and be consistency of using “VPDB-CO₂” throughout the paper. The same changes should be made for the axes in Fig.3 and Fig. 4.