

Interactive comment on “Maintaining consistent traceability in high precision isotope measurements of CO₂: verifying atmospheric trends of $\delta^{13}\text{C}$ ” by L. Huang et al.

Anonymous Referee #1

Received and published: 31 August 2012

Recommendation: Revision required

As the authors indicate, there have been few detailed descriptions of the traceability of atmospheric carbon dioxide (CO₂) stable isotopic composition measurements so this is a welcome addition to the literature. The detail provided clearly shows the attention to all aspects of the preparation and analysis required to produce a high-quality record of the stable carbon and oxygen isotopic composition of atmospheric CO₂. I cannot fault the approach or results obtained. However, there are several comments, detailed below, that I think should be addressed in the final version of this paper. For-

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unately, due to the detail provided by the authors, addressing these issues should be straightforward. There are many typographical and grammatical errors that also should be rectified; some are simple spelling errors while others are more complex (e.g. the use of “magnitude” instead of “value” in page 4014 line 27, and the use of “fluctuations of instruments” in page 4018 line 4) that can alter the meaning of sentences (and paragraphs) and could lead to misunderstanding. Unfortunately I find the style of AMT reviews does not lend itself to the easy suggestion of corrections to a manuscript. Perhaps an option for reviewers to download a “Review-friendly Version” in Microsoft Word would allow improved reviewing.

First, the detail provided is sometimes excessive and while important to the procedure, it distracts from the aim of this paper. For example, the Appendices (which are occasionally referred to as 1, 2 and 3; and as A, B and C: eg page 4013, line 8) contain procedural detail. The description of phosphoric acid preparation and use in Section 3 is slightly repetitive and essentially covers material that has been described elsewhere. The components of this description that are essential to the uncertainty should remain in this section but the bulk of this could be moved into Appendix B. I good “read through” by the authors, perhaps with the assistance of a colleague, could perform this task quickly.

Second, unfortunately for other researchers, the authors do not provide the oxygen stable isotope record, d18O that is produced when the d13C record is produced. Even if the precision of this record is not as “high” as the d13C record, the traceability is identical. Another shortfall is that the authors do not compare their d13C record to those produced by other laboratories, such as NOAA or CSIRO, both of which area available from international data repositories (WDCGG and CDIAC). This is especially puzzling as the NOAA record was used on in page 4005 line 6 to generate the annual “rate of change” for d13C. The title of the manuscript indicates a goal is the verification of atmospheric trends and without a comparison with another measured trend cannot be verified.

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Technical corrections: I have too many technical corrections to list here. A good proof checking should pick up most of them. Some examples are: P4005 L11: “analysed” becomes “produced”. P4008 L5: delete “through the web”. P4008 L7: “NBA” becomes “NBS”. P4008 L18: “via” becomes “by”. P4009 L11: What does “dependent on the configuration and the degree of cleanliness” mean? Does this refer to replacement of the stainless steel ion source elements with tantalum replacements and the removal of burn marks? P4011 L10-20: The ion correction procedure requires N₂O and CO₂ concentration; were they measured? Also, the choice of the 17O correction should have little impact on an internal record as long as it is consistently applied, however, to compare with an externally produced record it is necessary to apply a consistent inter-laboratory correction and I believe there is a different procedure currently recommended. Are the authors aware of this? P4013 L25: “Finnegan” becomes “Finnigan” (and is now “Thermo Scientific”). P4014 L12: “t” becomes “it”. P4014 L27: “magnitude” should be “value”.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 4003, 2012.