

Review

Scientific significance: (good)

Scientific quality: (fair)

Presentation quality: (good)

Comments

1. Does the paper address relevant scientific questions within the scope of AMT?
 - The monitoring of greenhouse gases is a fundamental requirement for sound scientific understanding of the drivers of climate change, and equally relevant for mitigation and adaptation.
2. Does the paper present novel concepts, ideas, tools, or data?
 - The European research infrastructure ICOS is a distributed facility with centralized data management. The paper describes in detail how the data management and quality assurance procedures are set up. Findings are illustrated by illustrative examples. The treatment of uncertainties along the traceability chain should be more rigorous.
3. Are substantial conclusions reached?
 - The network-wide application of the same procedures permits the early detection of data quality issues. The main conclusion is that the system works as intended, facilitating quick remedy in case of problems.
4. Are the scientific methods and assumptions valid and clearly outlined?
 - The treatment of uncertainties along the traceability chain should be more rigorous. The method of simple linear regression (e.g., Figure 9) does not consider the uncertainty of the standards against which is calibrated. To do this properly, a fully weighted regression technique, as described by Press et al, Numerical Recipes, Chapter 15.3 should be considered
 - Further, the calibration cycle suggested (cf. Figure 8A) could be improved by randomization, such that the sequence within the cycle changes and possible correlations are more easily detected.
5. Are the results sufficient to support the interpretations and conclusions?
 - Yes
6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?
 - Yes
7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution?
 - Yes
8. Does the title clearly reflect the contents of the paper?
 - Yes
9. Does the abstract provide a concise and complete summary?
 - Yes
10. Is the overall presentation well structured and clear?
 - Yes
11. Is the language fluent and precise?
 - Yes, a few systematic linguistic errors would be caught by a native speaker
12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?
 - Yes, except for the unit Mo/day and Go/day (p3L14, p3L20, and throughout manuscript)

13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?
- p11L16: A reasoning should be given to explain why this approach is considered superior (or why it even makes a difference)
 - p12L7: This statement is important and should already be used in the introduction/motivation.
 - Figure 7: The text on p8 should distill the main message better. This reviewer reads from the text and figure mainly that water-vapor-corrected data exhibit less of a bias than the raw (wet) data. Is this the message?
 - Figure 10: The Figure is extremely busy, and this reviewer finds it hard to identify the example discussed in the text. It is suggested to perhaps present most of the points in gray (losing their identity) but instead highlight those that are being discussed in color. Moreover, interesting features like



(blue dots), where the drift is towards smaller bias, should be discussed.

14. Are the number and quality of references appropriate?
- Yes
15. Is the amount and quality of supplementary material appropriate?
- No supplementary material is provided, but all information can be obtained upon authentication from the processing centre.

Jörg Klausen/2016-05-20