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Manuscript amtd-5-4735-2012 for AMT:

Evaluation of three new laser spectrometer techniques for in-situ carbon monoxide measurements: C. Zellweger, M. Steinbacher, and B. Buchmann

Scientific significance (general comments):

This is an interesting paper which provides very useful information on modern CO analysers suited for high-quality in-situ measurements of ambient air.

It is interesting to note that even among the advanced instruments these days, there are considerable differences in their analytical performance. The instrument features have been carefully tested and are clearly and meticulously described and evaluated. This is new material, which is well structured and presented. The title clearly reflects the content of the paper and the abstract is a good summary of the manuscript. The paper should be of interest to a wider readership involved in CO monitoring - notably within the WMO/GAW community.

The manuscript deserves the status of excellent and should hence be accepted for publication after a number of minor revisions have been addressed. Most edits are related to English language and general expression. However, this does not compromise the scientific content.

Presentation Quality:

The scientific results are unpacked very methodically and presented in a clear and well-structured manner. The Figures and Tables are very necessary and helpful in order to understand the text better. A few figures, however, need to be enlarged somewhat (see below):

Specific comments:

On the whole, the text is scientifically well written, however, a few typos and English style of expression should be tidied up somewhat.

Concerning the Manuscript as such:

- a) A few times "mixing ratio" is written, but mostly "mole fraction". Use uniform terminology.
- b) Spelling: "program" (Am. English) versus "programme" (Brit. English). Don't use a mixture of AE and BE.
- c) The hyphenation is a bit unorthodox in many cases. The authors should carefully adhere to the rules of English grammar.
- d) Reference to figures is partly made by writing "Fig." and partly by "Figure".

e) In some cases the same word is used within a short section. The word “observed” (Page 4748, line 2 and 4) could have been alternated by “shown, seen or detected” for instance. Another example: The word “setup” on page 4744 (line 11 -13) is used three times.

Figures and Tables: Most of the figures are somewhat too small. They need to be enlarged to make it easier for reader to see detail.

Language style and typos:

Page 4736, Introduction: References should be given for the older techniques.

p. 4737, line 1: "a number of comparison studies ...". Since only two ref. are provided, one should write "(e.g. Ou ...)" or say "and references therein."

p. 4738, line 4: Typo “...measurement technique....”

p. 4738, line 16: Re-write sentence: “A water vapour correction.....analogues to that of....”

p. 4738, line 19: Typo. Probably it should read: "except the one for the ..."

p. 4738, line 19: The word “lab” should be written out, i.e. “laboratory”

p. 4738, line 22: English language: “...was flushed at a high flow rate to keep the residence....”

p. 4739, line 2: Typo.calibration scale). This last bracket before the full stop should be removed.

p. 4741, line 11: English language: “...the technique also maintenance intensive...”

p. 4741, line 13: English language: “...was only a significantly contributing factor...”

p. 4741, line 22: Typo. Replace "for" with "four".

p. 4742, line 14: English language: ".....still possible, and the ICOS-QCL instrument, for example, is now also available...".

p. 4745, line 11: Replace "that implemented" with "that the implemented"

p. 4745, line 17: Typo: "function" should be plural, i.e. "functions".

p. 4746, line 21: English language: ".....laboratory; this obviously needs to be improved for....".

p. 4746, line 27: English language: ".....and need to be verified at regular time intervals as well...."

p. 4748, line 4: A possible source of error with the VURF instrument could be a difference between the zero as determined by the instrument during the zero/cal. cycle and the reading when CO-free (zero) air is analysed as a sample. Has this been tested?

p. 4750, line 12: Typo: ratio and not “ration”

p. 4750, line 18: Typo: “approx.” should be written out: “approximately”

p. 4750, line 20: English language: ”....other techniques indicates that the.....”

p. 4751, line 2: English language: “....to other techniques. Running costs are also...”

p. 4751, line 11: English language: “....intervals (of the order of one hour)...”

p. 4752, line 8-10: Is the long title correct in this way?

p. 4753, line 20: The co-author is "Mücke" (Muecke).

p. 4754: With reference to the "WMO/GAW Glossary of QA/QC-Related Terminology" (M. Steinbacher among the editors): Is it correct to use "precision" in quantitative expressions?

p. 4755, caption of Table 2: Do you mean "correlation coefficient", usually denoted by "R" or "coefficient of determination", is usually denoted by R^2 ?

p. 4761, Fig. 6: The bars in light grey are hardly readable. The authors should mind the basic considerations of colour contrasts.

p. 4763, Fig. 8, caption: Typo. Replace "open circle" with "open circles"