

Interactive comment on “Feasibility study of using a “travelling” CO₂ and CH₄ instrument to validate continuous in-situ measurement stations” by S. Hammer et al.

Anonymous Referee #3

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General comments:

The paper ‘Feasibility study of using a “travelling” CO₂ and CH₄ instrument to validate continuous in-situ measurement stations’ by S. Hammer et al. describes the results of an intercomparison study between a travelling instrument and the continuous atmospheric measurements at two European locations. The paper is well structured and although long it reads well. The concept of a travelling instrument for CO₂ and CH₄ measurements is very interesting and new and especially the results of the two first comparisons are important new information. I would recommend publication of this

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paper.

The concept of travelling audit systems, such as the system described in the paper is not new. WMO audits such as performed by EMPA are a comparable tool to assess the quality of atmospheric measurements. It might be good to include a reference to those audits.

The title of the paper includes the term ‘feasibility study’. However, only the feasibility of the measurements themselves is described and explained. It would be good to add information on the feasibility in terms of logistics, finances and available time and people. It might be helpful to include information on the amount of time it takes to perform such a campaign, including preparations and data analysis. Is it feasible to perform many campaigns per year? Do the authors expect that this instrument will be used frequently in the way as described in their paper? Are new campaigns planned? Will e.g. the ICOS project include quality control measures such as the use of a TCI?

Specific comments and technical corrections:

Page 7142 line 12: OPE has not been explained yet.

Page 7142 line 17: Insufficient flushing of standard gases: does this apply to the TCI or the in-situ instrument?

Page 7143 line 10: please explain AGAGE acronym.

Page 7144 line 13: please explain QC.

Page 7144 line 20 and 26 and 7145 line 5 and 21: replace Travelling comparison instrument by TCL.

Page 7145 last paragraph of section 1 has some overlap with section 2.1, text can be shortened here.

Page 7146 line 15: replace gas chromatographic system with GC.

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Page 7148 line 10: please explain 'level 1 site'.

Page 7148 line 13: replace smple with sample.

Page 7152 line 12: what do the authors mean with similar results?

Section 3.2: the SIS test at OPE gives a much better result than at Cabauw. However, at Cabauw the inlet lines are included in the test and at OPE they are skipped. In section 3.2.2. the authors suggest a relation between the length of the tubing and the results. Would the results of the SIS test at OPE have been worse when the tubing was included, or would the results at Cabauw have been better if they were not included?

Page 7153 line 15-16: the authors suggest an additional test, is this planned?

Figure 4: why do the plots of the differences (middle panels) have shorter time series/do they start later?

Page 7157 line 3: what do the authors want to add by saying: 'mainly driven by the diurnal cycle'? Maybe this sentence can be skipped.

Figure 5: the CH₄ difference at Heidelberg has a different scale than for OPE and CBW (-10 to +10 vs -2 to +2). Using the same scale could be helpful to have a more clear idea of the different results at the different locations.

Section 3.4: the authors explain a lot of general concepts in statistics here. Although it's helpful for readability, this is a section that can be shortened. Perhaps it's good to find a citation to explain the statistical procedures used, such as Inter Quartile Range?

Page 7161 line 13: the system does not reach a stable value within the given time frame. Does this problem occur also in the regular measurements, and to what extent does this affect them?

Page 7162 lines 9-11: another SIS test is suggested here without the intake lines. Could another test be performed with the CBW system only to check for problems with the intake lines? (See also my comment on Section 3.2).

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Page 7165 line 20: the TCI approach could in principle also be used to check flask sampling locations. Do the authors see any benefits there?

Section 5.2: the suggestions made by the authors to optimize quality control of atmospheric measurements are very thorough and well thought of. However, they are also labor intensive and costly. This approach can most likely not be applied at most stations. Can the authors add something about the feasibility of their suggestions? And if the researchers of a station want to 'upgrade' their quality control strategy, but cannot fulfill all suggestions, which do the authors think is the most useful, i.e. gives the most additional information versus the lowest costs? Is a quality control strategy such as suggested here part of the ICOS program in which OPE is included?

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 7141, 2012.

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