

## Reply to anonymous reviewer #2

### General Comments

This manuscript is the second of a two-part series describing the deployment of a suite of five portable FTIR spectrometers for measuring XCO<sub>2</sub> and XCH<sub>4</sub> around Berlin. The first manuscript (“paper #1”) describes the characterization and calibration of the instruments, while the second presents the data acquired during a campaign that took place in June and July 2014, including comparisons with a simple dispersion model to quantify the CO<sub>2</sub> source strength in Berlin. The use of multiple spectrometers in this way provides a new tool for assessing local-scale emissions of greenhouse gases. The work should be of interest to both the measurement and modelling communities.

The manuscript is generally well written and I recommend publication. However, I agree with the other reviewer and with the two reviewers of paper #1 that the two manuscripts should be combined. There are frequent statements in this manuscript referring the reader to “the first part of this work” so that it does not stand on its own. In addition, each paper on its own is rather thin on results; combining the two would give a stronger publication, eliminate duplication, and ensure that the reader does not have to refer to another paper for relevant information. The detailed reorganization of the two manuscripts into one suggested by the other reviewer seems logical.

First of all, we would like to thank anonymous reviewer #2 for helpful suggestions and moreover for the careful detection of language errors and the technical corrections provided below. We have adopted most of the suggestions in the final version of the manuscript (in the revised version with tracked changes, changes requested by reviewer #1 are highlighted in blue, and changes requested by reviewer #2 are highlighted in red). However, we feel uncomfortable with respect to the suggestion of mixing the pair of submitted papers into one publication. We feel that the level of consistency between the spectrometers demonstrated in the work of Frey et al. is well beyond what has been demonstrated hitherto with ground-based solar absorption FTIR spectrometers, which in our opinion - given the orientation of AMT - merits a publication of these results in their own right. Moreover, we expect that the work by Frey et al. will in future serve as a valuable reference for defining a good practice in a much wider context than the actual application for the Berlin campaign. On the other hand, concerning the work by Hase et al. under consideration here, this describes the practical application and results of “*a new tool for assessing local-scale emissions of greenhouse gases*” (in the words of reviewer #2). For this reason we believe that both papers deserve publication, but we agree that unduly interdependencies should be removed and the results arranged into self-contained publications.

Therefore, we have extended the Frey et al. work, which now contains additional relevant information concerning the proposed calibration procedures and we have shifted all the material related to the Berlin campaign itself to the Hase et al. work. In our impression the revised and extended papers now have the desired character of self-contained publications and meet the

reader's expectation as produced by the new titles (now "calibration and instrumental line shape characterisation of a set of portable FTIR spectrometers for detecting greenhouse gas emissions", and "application of portable FTIR spectrometers for detecting greenhouse gas emissions of the megacity Berlin", respectively).

#### Technical Corrections

Page 2768, lines 2 and 14 – define FTIR in the Abstract and again in the text

Done.

Page 2768, line 3 – here and elsewhere in the text, add a hyphen in column-averaged (this is inconsistent throughout the manuscript)

Done

Page 2786, line 15 – holds great promise

Done

Page 2768, line 21 – space-based

Done

Page 2769, line 14 – form

Done

Page 2770, line 1 – delete "during"

Done

Page 2770, line 3 – knot is not an SI unit – is it accepted by AMT? why not use m/s?

We have changed this, now we use consistently m/s.

Page 2770, line 7 – delete "A"

Done

Page 2770, line 11 – southeast of the city center

Done

Page 2770, line 13 – delete "originally" ?

Done

Page 2770, line 14 – up to five

Done

Page 2770, line 25 – change "it could be shown earlier" to "it has been shown previously"

Done

Page 2771, lines 13, 15 and elsewhere – change to "on the order of"

Done

Page 2771, line 22 – an . . . bias (not biases)

Done

Page 2771, line 24 – the observed bias is comprised of

Done

Page 2773, line 6 – sites,

Done

Page 2773, lines 8 and 21 – five (not 5, e.g. four used in line 9)

Done

Page 2773, line 15 – information

Done

Page 2774, line 2 – replace molecules with particles

[Done](#)

Page 2776, line 12 – it's ambiguous what is delayed – state explicitly (the model ?)

[Done \(the model simulation is delayed\)](#)

Page 2777, line 1 – define MACC

[Done](#)

Page 2777, line 2 – complex structureS . . . are

[Done](#)

Page 2777, line 6 – sources ?

[Done \(sources\)](#)

Page 2777, line 11 – column-averaged

[Done](#)

Page 2777, line 22 – kernel

[Done](#)

Page 2778, line 2 – column-averaged

[Done](#)

Page 2781, Table 1 – Column 2 is hard to read: break it up into five vertically aligned

[Done](#)

subcolumns. Define the symbols used for quality in column 3.

[The figure caption now contains a definition of these symbols.](#)

Page 2782, Table 2 – State what the % contribution is for.

[The table caption now describe the context of these percentages.](#)

Figures 2, 3, 4 should be combined into a single figure with three panels in the combined manuscript.

[We have arranged the results for all gases into a single figure.](#)

Similarly, Figures 6, 7, 8 should be combined into a single figure with three panels in the combined manuscript.

[In this case, we hesitate to merge the results in a single figure \(note e.g. the different time intervals covered and the deviating treatment of the background level for July, 4\) and prefer to keep the separated figures.](#)

Page 2791, Figure 9 – Indicate the location of Berlin on this map.

[We have added the location of Berlin on the map.](#)