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Atmospheric Measurement Techniques Discussions

Interactive comment on "A compact PTR-ToF-MS instrument for airborne measurements of VOCs at high spatio-temporal resolution" *by* M. Müller et al.

Anonymous Referee #1

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GENERAL COMMENTS:

The manuscript is a well-written and concise account of the PTR-ToF instrument for airborne measurements of VOCs. While the conclusions drawn from the field data sections is of limited stand-alone importance, they successfully achieve their aim of demonstrating the instrument performance in the field and allow the reader to place the instrument performance in the context of ambient measurements. The manuscript will be of interest to PTR-MS users and the wider measurement communities. I recommend the manuscript be accepted but suggest the authors consider the following points and make the relatively minor changes below in order to improve the clarity of the manuscript.

SPECIFIC COMMENTS:

1 Introduction

Page 5534, line 26 onwards: The instrument is compared to other techniques using the TOGA instrument as an example of a fast aircraft GC. Canister sampling from aircraft is perhaps the most common method of sampling VOCs aboard aircraft, yet this is not mentioned in the text, this should be addressed with a brief comparison here.

2.7 In-flight zeroing and calibration system

Page 5539, line 8: The heated catalyst used to create a zero/blank gas for the instrument is described in the text as ". . . efficiently destroys all VOC in the air . . .". Was this zero measured with another instrument? If so, details of this should be given here.

Page 5539, line 14: The discussion of the calibration of the system describes the use of a high concentration standard mixture being diluted into a zero air flow, a sentence to describe why lower concentration standards aren't / can't be used should be included here.

3.2 Mass resolving power, mass accuracy

Page 5541, line 18: Discussion of the high resolving power of the instrument uses methanol as an example. The calculated and measured exact masses differ slightly and a sentence to explain these differences should be included here.

3.3 Field data

Page 5543, line 25: The data plotted in figure 7 shows non-zero intercepts for both isoprene and furan. While the field data are used to highlight the instrument capabilities rather than necessarily provide a full scientific explanation, a short description of reasons for this should be included here – is it an instrumental artefact or is it "real"?

Page 5544, line 5: The data shown in figure 8 highlights one of the real strengths of the PTR-ToF over the PTR-QMS in that all data (albeit within the defined range)

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are recorded without any pre-selecting of compounds of interest. Compounds which may not have originally been thought of as important may be found to be significant in a particular data set. Parallels can be drawn here to the GC-MS community where instruments are often run in selected ion monitoring (SIM) mode to improve the sensitivity of the instrument (but this may lead to the loss of potentially significant findings?). I wonder if such a comparison could be drawn here to demonstrate that technological advances in instrumentation are leading to real-life improvements and advances in data sets and scientific outcomes?

Page 5544, line 17: During the discussion of the toluene-to-benzene ratio it is stated that the ratio corresponding to the traffic emission spike is 4.0 – it should be stated that this is in-line with the ratio expected from traffic related emissions inventories.

TECHNICAL CORRECTIONS:

3.2 Mass resolving power, mass accuracy

Page 5542, line 12: The first sentence in this paragraph doesn't read well: "The new airborne PTR-ToF-MS does not only resolve organic ions from their inorganic isobars."

Suggest changing to something along the lines of "Further examples of resolvable isobaric signals include organic isobars such as . . ."

3.2 Mass resolving power, mass accuracy

Page 5543, line 7: The final couple of sentences in this section don't read well here. Does the statement about reproducibility refer to masses above m/z 100 or all m/z's?

If to all m/z's then I suggest creating a new paragraph beginning "We find that the measured accurate m/z is highly reproducible. . ."

If only to m/z's above 100 then suggest including a linking sentence or two to explicitly state that this is the case.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 5533, 2014.