

Interactive comment on “A novel Whole Air Sample Profiler (WASP) for the quantification of volatile organic compounds in the boundary layer” by J. E. Mak et al.

Anonymous Referee #2

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The manuscript is well-written and clearly presents the results of the study which will be of considerable interest to many others in the field. I recommend the manuscript be accepted but suggest the authors consider the following points and make the minor changes below in order to improve clarity of the manuscript.

The lab testing of stability was performed using a propene mixture at high concentration, which will likely give an overestimate of stability due to the higher mixing ratios compared with atmospheric samples. For example, calibration mixtures for VOCs (especially oxygenated compounds) are typically supplied at higher concentrations to limit the effect of surface losses. Where tests performed for species at lower concentrations

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for which more variability might be expected? A comment in the text highlighting the limitations of this would be beneficial.

On a related note; the written text makes no mention of the WASP being heated, which would help to limit surface losses of the more polar compounds. Where any tests performed to investigate possible losses to the surfaces within the (presumably cold) tubing?

Within the introduction there is discussion of the difficulties and limitations of making VOC flux measurements from aircraft. Some mention of VOC mixing ratio observations made from aircraft should be made here (and appropriate references included) since these can be made successfully with a range of in-situ and grab-sampling methods.

Within the description of WASP section, the authors state that the pulse injection times they chose suited the propene tracer that they used, but that this will be dependent upon a number of factors including the chosen tracer species. If this is the case, and the tracer is used to give a measure of the diffusion occurring within the sampling tube, then doesn't this affect the confidence in the observations? For example, if more polar compounds exhibit greater peak broadening than propene then results for those more polar compounds may be more greatly diffused within the tube and hence behave in a different way to the tracer compound. Some expansion of the text to improve the clarity here would be beneficial.

A list of recommended minor changes and typographic errors is given below.

Abstract, Page 2, line 2: “The emission and fate of reactive VOCs is of. . .” should read “The emission and fate of reactive volatile organic compounds (VOCs) is of. . .”

Abstract, Page 2, line 5: “. . .has limited the data characterizing. . .” should read “. . .has limited the availability of data characterizing. . .”

Abstract, Page 2, line 6: “. . .This is the important region where. . .” should read “. . .This is an important region where. . .”

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1 Introduction, Page 3, line 10: "...can determine emissions rates, chemistry, and transport within the forest canopy..." suggest changing to "...can determine emissions rates and describe chemistry and transport within the forest canopy..."

1 Introduction, Page 3, line 26 and subsequent occurrences: "The terms airplane and aircraft have been used interchangeably throughout the manuscript. For consistency I suggest always using aircraft."

2.1 Description of WASP, Page 5, line 2: "...pulsed into the airstream at fix..." should read "...pulsed into the airstream at fixed intervals..."

2.1 Description of WASP, Page 5, line 16: Please provide more details of the zero air supply used. Eg. Cylinder grade or if it is a scrubbed compressed air supply, what scrubbers are used.

2.1 Description of WASP, Page 5, line 2: "...is installed on front of the aircraft..." should read "...is installed at the front of the aircraft..."

2.2.1 Turbulent versus laminar flow during sample collection, Page 7, line 1: "...result in a vertical profile of 400 m at the most..." should read "...result in a vertical profile of no more than 400 m..."

2.2.1 Turbulent versus laminar flow during sample collection, Page 7, line 5: "...Because of practical considerations, a longer, larger tube is not desirable. So we decided to work with the 150 m length (3/8" OD) tubing..." doesn't read particularly well, suggest changing to something like "...Excessive weight and size makes the use of longer tube lengths impractical and so, despite its limitations, the 150 m length (3/8" OD) tubing was deemed acceptable for our purposes..."

2.2.1 Turbulent versus laminar flow during sample collection, Page 7, line 29: "...under all the flow rates conditions..." should read "...under all the flow rate conditions..."

2.2.3 Peak shape under lower withdrawal flow rate, Page 9, lines 23+24 and Page 10, Lines 6+7: "...eluded..." should read "...eluted..."

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2.3 Application of WASP during the PINOT-NOIR campaign, Page 10, line 16: "...designed for the quantification of reactive gases in mind..." should read "...designed for the quantification of reactive gases..."

2.3 Application of WASP during the PINOT-NOIR campaign, Page 11, line 9: "...VOC standard that including isoprene..." should read "...VOC standard that included isoprene..."

3.2 VOC mixing ratios during PINOT-NOIR, Page 13, line 17: The authors declare that isoprene was below the detection limit of the instrument, please include a statement defining the instrument performance and detection limits for isoprene.

3.2 VOC mixing ratios during PINOT-NOIR, Page 14, line 3: "...immediately after the sunrise..." should read "...immediately after sunrise..."

Fig.9: The units for FWHM should be "s" and not "a.u" as stated

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 4153, 2013.

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