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Atmospheric Measurement Techniques Discussions

Interactive comment on "Optimization of a gas chromatographic unit for measuring BVOCs in ambient air" *by* Kenneth Mermet et al.

Anonymous Referee #3

Received and published: 13 August 2019

General Comments:

The paper describes an on-line gas chromatographic method which has been developed for the measurement of biogenic volatile organic compounds (BVOCs) in the atmosphere. It further offers a discussion of the issues relating to the measurement of BVOCs and focusses on the effect of ozone on the samples, evaluating three different options for ozone removal. The paper gives a nice comparison of the three selected ozone removal techniques and gives justification for selecting one of these for their system. Removal of ozone using heated stainless steel lines has not been considered here, which is a little frustrating since this appears to be the simplest ozone removal method to deploy, a short summary or comment regarding this method should be included. Co-elution of the targeted species with others commonly found in the

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atmosphere is considered here, but I feel expanding this discussion would benefit the paper.

Specific comments:

Page 1, Line 19: Within the Abstract the authors state "... detection limit ranging from 4 ppt for α-pinene to 19 ppt for sabinene." From the example chromatograms given in Figure1, they appear to have similar peak widths and both have ten carbon atoms and so in theory should elicit the same response from the FID detector. Could this indicate losses on surfaces during transfer of sabinene? Some discussion of why this range is so large would be interesting (perhaps under the "3.2 Thermodesorption" section.)

Page 1, Line 23: "...representing on average 60% of the measured terpenoïds." The authors should clarify whether this is 60% by mass or concentration.

Page 1, Line 23: "Uncertainties may be larger for the other compounds especially for those presenting a mixing ratio close to the detection limit." Isn't this the case for all compounds, including the BVOCs? As the detector signal approaches the limit of detection, the uncertainties increase? Some re-phrasing or clarification is needed here.

Page 2, Lines 14 - 18: This is true, but I'd also recommend including a statement that large uncertainties in observations, due to poor measurements of some species could also account for some of this gap, the effective removal of ozone in samples (as investigated by the authors) could help to address this.

Page 3, Line 12: Heated stainless steel lines have also been used to scrub ozone from samples (see Hakola et al. Atmos. Environ. (2012)) and arguably appears to be the simplest method to deploy. Did the authors consider using/testing this method? Most (if not all) GC systems contain heated stainless steel components so using this method and material should be suitable for observations of VOCs. If the authors have dismissed this method for any reason, it should be stated here since, on the face of it,

this is a “big miss” within the paper. Otherwise a statement regarding the potential use of this method should be included here.

Page 3, Lines 21 - 26: Two methods for quantifying terpenes are described, could the authors include here which method they chose and describe why?

Page 5, Lines 7 - 11: When discussing the relative humidity of the gases generated, the temperature of the lab should be stated since the absolute amount of water contained in a volume of gas will be dependent on temperature. For example, at 50 % RH, there is approximately twice as much water (by mass) in a volume of gas at 35°C as there is at 25°C.

3.1 Chromatographic separation, Pages 10 - 11: The authors have investigated co-elution of the targeted species with selected VOCs commonly found in Urban environments. It is difficult, or perhaps impossible, however to rule-out co-elution with species not contained in the 20 components the authors investigated here. A statement to this effect should be included here.

Specific typographic changes etc..:

Page 1, Line 16:

“Eluent was analysed using a flame ionization detection (FID)” Change to: “Eluent was analysed using flame ionization detection (FID)”

Page 1, Line 23: “. . .terpenoïds.” Change to: “. . .terpenoids.”

Page 1, Line 23:

“Uncertainties may be larger for the other compounds especially for those presenting a mixing ratio close to the detection limit.”

Page 2, Line 23: “If this type of instrument. . .” Change to: “This type of instrument. . .”

Page 2, Line 24: “. . .the feasibility for ambient . . .” Change to: “. . .but, the feasibility for

ambient . . .”

Page 12, Line 7: “. . .consistently with observations made . . .” Change to: “. . .consistent with observations made . . .”

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