

Interactive comment on “A novel Fast Gas Chromatography based technique for higher time resolution measurements of speciated monoterpenes in air” by C. E. Jones et al.

Anonymous Referee #1

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General Comments

This paper describes a fast gas chromatography method. This type of technique is very useful so that we can quantify speciated hydrocarbons on a faster time scale. Considerations were even made for different sampling mixtures – chamber, unpolluted ambient, and polluted ambient air. Compromises must be made to ensure the fast chromatography, and some co-elution of monoterpenes resulted.

Specific Comments

Are there concerns with the co-elution problem? Depending on the sample, this lim-

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itation might be substantial. If you used fast gas chromatography, but with a mass spectrometer detector, could you isolate the ions and thus still separate the co-eluted peaks? When some researchers are trying so hard to create more separation (e.g. 2D chromatography), it's surprising to see methods that are OK with less separation. There could be more instances, too, depending on the mixtures. The analyzed standards and field samples did not include every possible combination of BVOCs.

Measurements from this new technique are said to agree with PTR-MS data. Please quantify this relationship. The overlay of traces is a good visual clue, but correlation plots would be more affective to show the agreement. A correlation would show that the quality of the agreement may differ, depending on the sample source (and thus environmental factors, etc.). In addition, researchers allude to the impact from the typhoon on this instrument agreement, but more speculation should be made – humidity?

The structure of the “chromatography methods” section is confusing. It jumps back and forth from the chamber method to the ambient; maybe isolate the two methods.

Introduction:

There are other studies that indirectly show unmeasured primary or secondary BVOC, for example Holzinger et al. 2005 in Atmos Chem. Phys.

Methods: Page 10926: BVOC standards are mentioned here, but not explained. How do you prepare the standards? If it is the same as what is explained in the calibration section, then this should be noted.

Page 10928 line 1-2: it is stated that this is the first application of fast GC of terpenes in air, but the previous line says that fast GC was used with plant emissions. Plant emissions are in air. Is this, instead, the first use of fast GC in ambient air?

Plant chambers give “cleaner” BVOC signals because there is no/low oxidation and there is one species being studied, but using an enclosure will also concentrate BVOCs due to the small mixing space. This is the most striking difference from an enclosure

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vs. ambient air around the plants.

Page 10928, line 18: "... all at significant concentrations" – ambient VOCs are not very high, especially compared to that in an enclosure, because of the large space (the atmosphere) for diffusion and mixing.

Typically, when reporting GC column specs, film thickness is included.

Page 10929, lines 26-28: "peak identification and/or BVOC quantification was supported by independent offline GC-MS analysis" – explain. Is it the same sample? The same oven program?

Page 10930, line 19: "typical fast chromatography" - what is "typical"? I thought this was new for ambient air?

Where gas standards made by injecting pure volumes into nitrogen? If they are diluted, then what is the solvent? There are a lot of statements about effective gas standards and significant degradation, etc. Are there citations of this work? Others have shown the stability of BVOC gas standards. Can you not dissolve the solid camphene to create a standard? Why is b-pinene used (vs. an average response of all monoterpenes, for example) for compounds without liquid standard?

There is a long discussion in the ambient air section about ozone scrubbing and then a paragraph on the BVOC losses on the sodium thiosulfate filter – separate these "method" parameters from the data obtained in the ambient application (which is the title of the section).

Since the ambient samples are the only ones with the addition of a filter, is there any chance that other studies sampled particulate matter in addition to gas-phase BVOCs.

Page 10937, line 2: "tentatively identify" – can you confirm?

Page 10938, line 11: how can linalool be light and/or temperature dependent? Studies have shown that linalool is likely temperature and light dependent (like isoprene), but

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not temperature dependent only. Sole temperature dependence has a different diurnal profile, with significant ambient mixing ratios at night (like what was observed for α -pinene).

Fig 3: Define “unpolluted” ambient air. Was this an experiment? If so, where are the experimental details? There is no application of fast GC using the Ambient I method. Are the traces in Figs 2 and 4 not from the application of each in the field?

Technical Corrections

The title is awkward. “Chromatography-based” technique would be better, but it seems as if the authors want to name the instrument “Fast Gas Chromatography”. Maybe reconsider the title.

The abstract mentions “OBVOC” without defining this acronym

Page 10928, line 8: “typically relatively” very awkward phrasing

Page 10933, line 12: “to each species” or “of each species”

Page 10934, line 4: cut “a study by”, thus leave “Faiola et al. (2012) demonstrate. . .

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