

Interactive comment on “Measurements of I/SVOCs in biomass-burning smoke using solid-phase extraction disks and two-dimensional gas chromatograph” by Lindsay E. Hatch et al.

Anonymous Referee #1

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This paper presents detailed measurement of semi- and intermediate-volatility S/I-VOC compounds from laboratory burns of a range of wildland fuels using a novel approach, which employs Teflon membrane in front of solid-phase extraction (sorbent-infused) filters to capture particle and vapor-phase fractions, respectively. Derivatized extracts from these media are analyzed using high-resolution 2-D GC-MS and the resulting chromatograms are analyzed in several ways to provide insights into similarities and differences between I/SVOC profiles from the different fuels. For example, analysis points out that different benzenediol isomers (that would not be separately resolved by other analytical techniques) have distinctive emission profiles across the different fuels/burns. The authors also explore the volatility distribution of the analyzed com-

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pounds.

This is an interesting and well written paper, and I believe it should be published. I include some minor comments/clarifications below. My main concern is that this is more of a ‘methods’ paper (and so perhaps more appropriate for AMT than ACP) as it explores the application and some evaluation of a new and interesting method to a range of test burns. It does include a ‘survey’ of analysis across a few dimensions but does (and perhaps can’t) go as far as actually yielding quantitative estimates of emissions that may be of most interest to the ACP audience. The main contribution is to show the promise of this new measurement approach and give a ‘sampling’ of some of the insights that its application yields. In short, while it is definitely an important contribution, it is more exploratory than broadly quantitative. The paper itself generally makes this orientation clear, but perhaps the title and abstract could be slightly reframed to emphasize the nature of the study.

Specific points

P1, Line 23 – The abstract discusses ‘speciation profiles’, but the paper later specifies (P. 8, L25) that it will not provide speciation profiles (at least as this term is typically applied). As noted above, the abstract could be re-worked to clarify the scope/intent of the study.

P7, L20 – ‘error estimated to be approximately a factor of two’ – this phrasing doesn’t make that much sense, especially given that you reference RSDs of ~80%. Is it really intending to say an uncertainty of 200%?

P8, L25 – This framing, ‘investigating the diversity of emissions’ – should be more emphasized early in the paper, or else some effort should be made to present profiles (even in relative/approximate form). In general, I think there would be interest in having access to actual profiles in a supplement, as this is the key product that might be applied by the interested research community (apart from demonstrating the method). Are there are least some compounds for which you could provide emission ratios or

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factors?

P10, L33 – Why is this difference likely too large? Need to justify statement.

P13, L29-32 – I'm not sure this statement is supported. Doesn't this depend on the lifecycle of the VOC? Couldn't either of these be mostly reacted in the gas-phase if they don't find themselves around liquid water?

P14, L14-15 – How is it possible that particles in only one or other phase should be in a middle volatility bin? This needs justification.

P14, L24-31 – It would make sense to renormalize your distribution to the same C* range when making this comparison – it is good to show your entire distribution, but doing the higher volatility bins are presumably 'invisible' in the May distribution, so I would advise a version of this plot making the comparison with a version of your distribution normalized to the same range as the May et al. distribution. Also, note that the fuel and burn conditions are different, and this is another source of variability (in addition to different analytical approaches). This discussion also falls into the category of 'descriptive/exploratory'.

Minor/technical corrections

P9, L32 – minor quibble, but using 'fuels' where you mean 'burns' should be avoided for clarity. . .

P10, L12 – I believe this should be 10^3 , not 10^{-3} ?

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