

Interactive comment on “Field measurements of biogenic volatile organic compounds in the atmosphere using solid-phase microextraction Arrow” by Luís Miguel Feijó Barreira et al.

Anonymous Referee #2

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The study by L. M. F. Barreira et. al. describes a solid-phase microextraction (SPME) Arrow, intended to quantify atmospheric relevant monoterpenes and aldehydes. The sampling capacity is compared with the conventional SPME fibers and the results indicate considerable improvements for monoterpenes and aldehydes. In addition, different sorbent materials were tested and characterized under both laboratory and field conditions. The manuscript is very well written and deserves publication but several points that have to be addressed in a technical paper to warrant publication in AMT.

General comments

- I would have liked to see a detailed characterization of the temperature effect as this

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parameter is the main regulating force of monoterpene mixing ratios in a forested environment. The authors indicate considerable differences for α -pinene and D3-carene but I am still a bit confused on how one can deal with these effects under field conditions. I would assume that a reasonable approach would be to characterize the extraction efficiency along a wider range of temperatures and apply the respective correction under field conditions.

- It would have been valuable if the authors could demonstrate the advantages of increased sampling capacity as a function of detection limits.

- The amount of field data extremely low (15 points) and the assumptions on correlation (or not) with meteorological and environmental parameters should be more carefully approached and discussed. This is of particular importance especially when considering the title of the manuscript that at this stage could be misleading.

Specific comments

P1L19. If there is a technical possibility to additionally evaluate the effects of ozone under relevant atmospheric conditions it would have been a valuable addition to this study.

P2L26-L27. I don't think that the conventional GC-MS techniques are "laborious, expensive and prone to contamination". GC-MS is the most widely used technique for quantification of ambient monoterpenes, with no interferences on temperature or wind speed as demonstrated for SPME. Therefore, I would suggest removing this sentence completely.

P4L16. I was wondering if the sampling time could be reduced and if you could explain the reasons that you have chosen this approach. 45minutes is long time for sampling ambient mixing ratios that can dramatically change in such time frame.

P4L27. Have you tried to develop a method under SIM mode? It is commonly known that the sensitivity is much reduced when using a mass scan.

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P5 and P6. I would suggest bringing supplementary figures S2, S3 and S4 into the main paper.

P7L13-14. If the extraction efficiency is reduced at higher temperatures (where we expect higher emissions) the final results will be heavily influenced. Please elaborate in detail.

P7L16. A plot (rather than a table) would have been more useful.

Fig. 4. How many samples were used? Please add errorbars.

Section 3.4: The effects of meteorological parameters should be addressed in a more comprehensive and detailed manner. Some conclusions (e.g. P9L29-31, P10L3-4, P10L7-15) are drawn very easily and without strong evidence driven by data. I would suggest to completely re-write this section, using softer language and presenting the available data in a different manner. Maybe xy plots (where x is the SPME arrow PDMS/DVB and y the PDMS/Carbon WR) colored by a 3rd dimension which would be the respective meteorological parameter, would depict better both the differences between the materials and the impact of the parameters. It is however understandable that eg. temperature did not vary significantly during the sampling period but I would have liked to understand why the two materials match on the 12.8 and have 100% difference on the 14.08.

P10L11. While this may be true, no real evidence is provided that PNC was increased due to a particle formation event of not due to some transport. Please provide some evidence or revise the text accordingly.

P10L25-26. As above.

P10L31. The authors correctly recognize but only briefly discuss the limitations of their dataset.

P11L20. It is a bit strange to see a technical paper entitled “Field measurements...” to use as final statement the fact that “more studies are needed to develop a proper

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calibration method for field measurements”. It denotes that the current manuscript did not sufficiently fulfill its purpose. Please revise.

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C4