

## ***Interactive comment on “Using in situ GC-MS for analysis of C<sub>2</sub>-C<sub>7</sub> volatile organic acids in ambient air of a boreal forest site” by Heidi Hellén et al.***

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Thank you for the very good comments. We have carefully considered all the comments and improved our manuscript according to them. Please, find below our answers to the specific and technical comments.

Specific comments: 1. The introduction could be improved by adding additional information on the relevance of VOA, especially of the investigated aliphatic monocarboxylic acids, in the atmosphere.

-Introduction was improved by adding more discussion on the sources and fate of studied VOAs in the atmosphere

2. The discussion of the reported uncertainties of benzene and toluene in section

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3.1 could be clarified, e.g., by referencing equation (2) and explaining the influence of measurements close to the DL on the respective uncertainty.

-Reference to Eq.(2) and better explanation was added to the manuscript in section 3.1

3. The authors tested losses of VOA in their inlet tubing. Could you please comment on memory effects of VOA other than acetic acid, which may be due to the evaporation of adsorbed VOA in the inlet tubes? Would this play a role over the timescale of sampling?

-There is some memory effect for all studied VOAs. Due to memory effects fast variations of mixing ratios would not be detected. However, this system is relatively slow (60 minute samples every other hour) and unable to detect fast variations anyway. Memory effect was clearly seen after running field standard gas which contained VOAs, but it was only <3% already in the first run after the standard as shown by running blank gas (N<sub>2</sub>) after the field standard. We deleted always 5 samples after running this standard. In inlet tests we did not detect any major losses of these compounds. Discussion on memory effect was added to the text and figures of blanks and first runs after field standards were added to the supplementary material.

4. In my opinion the paper would benefit from showing an exemplary GC-MS chromatogram, at least in a separate supporting information file. Which (pairs of) ions were used as mass traces for the respective VOA? This information could be included in Table 1.

-Examples of the selected ion chromatograms of calibration and ambient air for m/z 59.9 and 73.9 were added to the supplement and referenced in the section 3.1. In SCAN mode chromatograms background was so high that peaks of studied compounds were not detected. Mass tracer ions were added in the Table 1 and mentioned in the section 2.1.

5. Calibration curves could also be included in a supporting information file, to show more of the analytical performance of the developed method.

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-calibration curves for different VOAs were added as supplement Figure S3.

6. The discussion of diurnal patterns of VOA mixing ratios in section 3.2.2 should be backed up by more references, e.g., on P. 9 L. 16: please provide references for the production of VOA from ozone and nitrate radical reactions.

-References were added.

7. Correlation plots of VOA vs. other trace gases and meteorological parameters discussed in section 3.2.3 should either be included in the main manuscript or in a respective supporting information file.

-Correlation plots were added as supplement Figure S6.

Exemplary technical comments: P.1, L. 18 “were acceptable” – please be more specific here

-A range of values was added

P. 5, L. 2: “The second port of the three-way valve was used for this” - this sentence could be removed

-This sentence was removed

P. 11, L. 1: Remove the second “especially”

-This was removed

P. 19, Fig. 2: “devaitions” should be “deviations”

-This typo was corrected

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