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Atmospheric Measurement Techniques Discussions

Interactive comment on "Using in situ GC-MS for analysis of C_2-C_7 volatile organic acids in ambient air of a boreal forest site" *by* Heidi Hellén et al.

Anonymous Referee #1

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The authors present the development of an analytical method for the analysis of volatile organic acids (VOA) by a cryotrapping approach and in situ GC-MS analysis. Further, the method was applied to ambient air of a boreal forest measurement site in Hyytiälä, Finland, which can be regarded as a background site for biogenic emissions with low anthropogenic influence, thus presenting an analytical challenge in terms of limits of detection and limits of quantification in the analysis of VOA. For nine linear and branched aliphatic carboxylic acids the method was thoroughly developed, including a dedicated discussion and calculation of uncertainties and tests for inlet losses under different conditions. The manuscript is well suited for publication in AMT, because the presented analytical method allows for the quantification of VOA at ppt concentration levels, which are relevant for VOA other than acetic and formic acid in the ambient atmosphere, with a relatively high time resolution. However, organization and presen-

tation of the paper should be improved prior to publication as outlined in the specific comments below.

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.

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

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?

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.

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

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.

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.

Exemplary technical comments:

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

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

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

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

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