

## ***Interactive comment on “Acidic reaction products of mono- and sesquiterpenes in atmospheric fine particles in a boreal forest” by M. Vestenius et al.***

### **Anonymous Referee #2**

Received and published: 31 March 2014

This manuscript describes observations of particulate organic acids obtained at the SMEAR-II research station in the Finnish boreal forest. This study addresses the need to better understand the role of low-volatility organic compounds in aerosol formation. Because of this, it is suitable for publication in ACP. I have some concerns, however, and I feel must be addressed before the manuscript is suitable for publication.

My first concern regards the large number of grammatical mistakes in this manuscript. I have attempted to point out some of these; however, it is beyond my expected role to fully proofread this. I urge the authors to carefully review the text and correct the grammar, if possible by a native English speaker.

The discussion on page 2865, line 17, is critical to the subsequent analysis, so I feel

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some additional details are needed. In particular the sentence “This is expected since the measurement times of VOCs and corresponding acids did not cover whole months and most of the time they were not matching.” is key as it calls into question the usefulness of the calculated ratios. In my view a more careful analysis of the data, in which the acids and their precursors are measured over the same period, is needed IF one is to use the data to infer such things as organic acid yields. In addition, what is the specific criterion for not including a monthly mean due to partial month measurements?

In many of the plots, there is no presentation of measurement uncertainty. This should be added to the plots so we can better interpret the trends in the data.

If terpenes and their acid products are derived from emissions from the industry (e.g., sawmills) then one would expect no correlations with aerosol. In addition, might it be possible that for some terpenes a local source would skew the concentrations towards the precursors. After mentioning the role of sawmills in high terpene levels at the site, the authors provide no further discussion as to their contribution to their observations. This should be corrected.

Some (not all) minor corrections are provided here:

page 2858:

6, insert “respectively” at end of sentence

13, yields “from”

15, “precursors”

15, “winter, indicating”

16, during “the” cold

24, “products, e.g. acids”

page 2859:

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10, for atmospheric studies

24, more specifically, specific acid reaction products

24, one sentence paragraph. Can you make this more informative? Just saying "reaction products were analyzed" tells us very little.

page 2860:

6, "nearest" does not seem to correct word . . . most common?

11 "A total of" and "Before sampling,"

16, "using a"

19, don't understand ". . . using pumped adsorbent sampling." Please rephrase this sentence because it is not clear how the efficiency is being checked.

24, "electrospray" is one word typically

page 2861:

3, ACN is not defined.

17, "its" (no apostrophe)

Section 2.3: in my opinion, a brief paragraph should be provided for discussion of the standards and the details of the synthesis should be provided in the SI.

page 2864:

4, phrase "especially pinonic acid. . ." is a sentence and should be separated from the larger sentence.

8, "The results, together with the length of each measurement, are tabulated in Table A1." Why is the label A1 used for this table?

13, Limonic acid emissions are distributed more evenly. . ."

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28, R<sup>2</sup>? I have not found a precedent for using a subscript to indicate this.

28, "precursors, i.e. they"

page 2865:

1, "Averagely" is not a word

8, is there no reference for this statement? Without specific mention of what we are comparing to, this is not a very useful statement.

16. "We compared these emissions with the corresponding acid concentrations (Fig. 4) and found them to be in quite good agreement." in this respect, "quite good agreement" means different things to different people. Please be more specific.

18, I would say that the correlations shown by the data in Fig. 5 are very poor.

page 2868:

2, "and/or"

Comments on the figures:

Figure 2: I suggest spelling out "mean temperature" in the legend. Also I think it would be important to show the uncertainties of the measurements on this plot. Also it is quite difficult to see trends for individual species since a stacked bar graph is used. Perhaps a separate plot showing individual concentrations could be also presented here.

Figure 3. Again it would be important to indicate uncertainty on the plot.

Figure 4. To be clear, the left side of the figure are the measurements from this study, and the right side is from the modeling study, correct? Please make this clearer in the plot and caption.

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 2857, 2014.

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