

Interactive comment on “Quantitative long-term measurements of VOC concentrations by PTR-MS: annual cycle at a boreal forest site” by T. M. Ruuskanen et al.

Anonymous Referee #2

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General Comments This paper presents long-term measurements of VOC concentrations and as such presents an important technique and good results. The results, concentrations and their variations, are discussed, but beyond the data themselves, not much else is new. The paper lacks a scientific purpose. The methodology has been described in a previous paper and a detailed process analysis is planned for a future study. The paper is essentially a report of data and the data analysis is weak. The paper should be shortened by omitting basic discussion about seasonal and diurnal variations which are already well understood. The paper could be improved by concentrating on specific scientific questions along the lines suggested by the authors themselves, understanding key processes and their impacts on ambient concentra-

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tions. This requires more than a qualitative analysis.

1 Introduction Line 9-12: It is stated that the methods for long-term measurements with the PTR-MS has been described in another paper (Taipale et al, 2008) and that this paper reports over one year of continuous measurements. This paper, as written, presents data but does not have a scientific purpose.

If there are new methodological questions posed and dealt with in this paper, beyond the treatment given in Taipale et al., then they should be presented in the introduction, discussed in the body of the paper and presented clearly as new conclusions.

In line 25-27 it is stated that identifying and verifying key processes and their impact on ambient concentrations require continuous measurements, but these goals are not stated as the purpose of this paper. What is the purpose?

If identifying seasonal and diurnal variations, which occupies most of the discussion and conclusions of the paper, is the key issue of the paper, then more background on what is already known and what is not known concerning these issues should be given in the introduction.

2. Experimental The detailed information about land use categories in the area (Table 1) is not used, although it could be, and therefore may be omitted.

What are the detection limits and quantification limits for the measurements reported here? It looks like data below detection limits as reported in Taipale et al (2008) are used in the data analysis in this paper, for example Figure 6 and 9 in which even negative values are reported. Have quantification limits been used and the data filtered?

3. Stability of PTR-MS What is new here, that is, how does this information relate to Taipale et al and to the expressed purpose of this work?

4. Volume mixing ratios of VOC The introductory paragraph, Line 1-16, belong in the methodology section.

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Concentrations and their variations are presented but it is not clear what new knowledge has been gained. Diurnal and seasonal variations are well known. Most of the results presented here are expected and in accordance with existing knowledge. What is new? What were the questions being asked?

Line 20-21, page 90: Local and regional sources is suggested for methanol. Wind direction and trajectory analysis as well as analysis with other meteorological factors could be useful. The meteorological data presented in Fig 3 is not used and may therefore be omitted.

It is stated in the experimental section that measurements were made at several heights, inside and above the canopy. No analysis or discussion of these results is presented. Why were they made?

The paper discusses sources, sinks and mixing (for example in Section 4.2 Diurnal variation) but in order to gain a better understanding of the processes which govern VOC concentrations, model exercises including emission algorithms, atmospheric chemistry and atmospheric mixing should be conducted. It is stated in the last sentence on page 101 that model studies will be made in the future. The question remains then, what are the questions being addressed in this paper?

Conclusions Line 8: It is stated that VOC concentrations vary diurnally, seasonally and inter-annually. This is certainly not new information and should not be considered a conclusion.

Figures. Fig 1: Lines should not connect data points between Oct and Dec. Fig 2: Basic rule: Increase readability by using as much figure space as you can for the actual data. Adjust the x-axis to omit the empty space prior to and after the data series. Fig 3: Nothing unexpected here. May be omitted. Fig 6: Why are there negative values? See comment above. Fig 9: Why are there negative values? See comment above. Fig 13: This looks like the beginning of a process study, but it is not new and no new insights have been offered in this paper. It may be omitted.

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