

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 #1

Received and published: 28 January 2009

This paper presents a long-term VOC dataset collected by PTR-MS. While the instrument has been carefully calibrated and monitored, and the diurnal and annual cycles in the data are discussed, the paper lacks new interpretation, technique development or significant scientific contribution. I agree with the previous reviewer that a clear scientific question needs to be quantitatively addressed before I can recommend publication - while collecting a long-term dataset with a PTR-MS is not trivial, the statistics of the result do not in and of themselves warrant publication, particularly considering that these are not the first measurements with a PTR-MS. The paper is quite lengthy, and the majority of the Results should be shortened (or removed entirely) and left to the existing statistics tables. Extensive literature review of previous VOC studies is

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made in the paper, but not used to interpret the data. For example, the authors postulate on numerous sources of acetone, but come to no conclusions. Using detailed models and back-trajectory analysis of air masses are needed if the authors wish to discuss sources, particularly in terms of understanding the spikes in VOC and other VOCs. Biomass burning should be identifiable using satellite based fire counts and a back-trajectory analysis. That said, this is a large dataset, and has the potential to yield exciting insights on the atmospheric chemistry of biogenic VOCs with new, quantitative analysis and significant re-writing.

The authors make a case for long-term measurements as a prerequisite for representing VOC concentrations accurately. This is a valid point, but needs to be accompanied by a quantitative discussion of whether or not VOC concentrations actually are represented accurately in models of varying spatial scales, potentially along with specific examples of improvements that could be made to models. Previous discussions of long-term VOC datasets have compared observations to models of biogenic VOC emission. This might be a good place to start in thinking about analyzing the dataset.

Specific Notes.

Much of the "Results" section is a literature review, and should be shortened and moved into the Introduction section.

P.86, l18. Should read "Prior to calibration..." ?

P. 87, l.5. Why would you use different criteria for monoterpenes and other VOCs? Should the exclusion be based on standard deviations away from a mean rather than a raw amount?

The Methods section should clearly state the detection limits and sensitivities of each compound described in detail - a Table/Appendix would be appropriate for this. Are the lack of winter-time diurnal cycles perhaps due to such low concentrations that the instrument was unable to detect variations?

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Section 4 (Volume mixing ratios of VOC) needs to be split into a Results and Conclusions section. The Results section could probably be mostly summarized in tables and figures.

P.89, I.25-27. Discussion of meteorological variables should be restricted to the Site description.

p.94, I.20-27. Discussion of logging effects and stump emissions is an example of data that could be quantitatively interpreted in detail. For example, see Goldstein et al. (GRL, 2004) for a useful, quantitative analysis of long-term VOC data.

A summary of diurnal and seasonal variations is inappropriate in the Conclusions section; this section needs to demonstrate what is new in the study.

Table 1 can just be referenced, it doesn't need to be reproduced in this paper unless analysis and interpretation relies heavily on the results.

Why is Figure 4 missing most of the acetonitrile data?

Final figure (13) adds no new information to the scientific community or interpretation of results in this dataset, and can be removed.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 81, 2009.

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