Atmos. Chem. Phys. Discuss., 4, S2246–S2248, 2004
www.atmos-chem-phys.org/acpd/4/S2246/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measurements of organic gases during aerosol formation events in the boreal forest atmosphere during QUEST" *by* K. Sellegri et al.

Anonymous Referee #2

Received and published: 29 October 2004

The main gist of the paper is to report an observation of correlation between a number of oxidation products of biogenic VOCs and the condensational sink during nucleation events and to discuss the significance of such a correlation. The authors argue that the correlations indicated that the oxidation products participate in the growth of the nucleated particles through condensation. Such an observation was only made possible through the use of a chemical ionization mass spectrometer (CIMS), which permitted high time resolution measurements of the biogenic VOCs and their products. This demonstrates the utility of the CIMS instrument. The paper has presented new data that shed helpful lights into our understanding of new particle formation and particle growth in a BVOC dominated environment. I recommend the publication of the paper after the authors address the following issues.

1.The term condensation sink was used repeatedly in the paper; but the description for how to calculate the level of condensation sink was buried in the caption of Figure 2. Please move the description to where condensation sink was first mentioned in the text.

2.Throughout the paper, the authors wrongly call methyl vinyl ketone and methacrolein terpene oxidation products. The two are oxidation products of isoprene, not the terpenes. [The definition of a terpene is “a compound whose carbon skeleton can be divided into two or more units identical with the carbon skeleton of isoprene.”].

3.Figure 4 plots the daily mean concentrations of various species against UTC time; however, the relevant discussions in the paper were in relation to local time (e.g., midnight, midday, dawn, see pp. 4650). I found it difficult to relate the text to the figure as a result of different time reference frames used by the authors. I suggest changing the time in Figure 4 to local time.

4.The authors conclude that significant correlations of BVOC oxidation products with the condensational sink (CS) indicate that a fraction of these compounds participated in the growth of the nucleated particles (see abstract). From the data presented, it is more likely that the measured oxidation products were representative of less volatile oxidation products that actually contributed to condensational growth. The reasons are given below. First, if the measured oxidation products actually participated in condensation process, one would expect an inversed relationship between the measured organics and CS, as CS was a sink for the organics. Second, CO was also found to have a positive correlation with CS; however, it was hard to argue that CO participated in the condensation process.

Minor points: 1.The spelling of Hyytiälä was Hyytiala in some places and Hyytiälä in other places.

2.Figure 1 caption indicates radiation as part of figure 1, but no radiation measurements were shown in Figure 1.

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Interactive Comment

3.pp 4645, line 23, as is missing after such.

4.Figures 3 and 5: What is the unit of CS?

5.pp 4646, line 7: the full name MVK and MACR have already been defined earlier (i.e., pp 4644, lines 1 and 2).

6.pp 4647, line 3: cloud chamber should be smog chamber; line 23: what is unary condensation?

7.pp 4648, line 28, Spauling should be Spaulding.

8.pp 4650, line 1, the same Ĕ than should be the sameĔas (The same mistake appeared at a few more places in the paper.); line 3, specie should be species.

9.Figures 6 and 7: The top panels should be labeled as (MVK+MaCR)/CS and (MVK+MacR)/Isoprene, respectively, if the description given by the captions are correct.

10.pp 4652 line 18, what unit is ppq?

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 4641, 2004.