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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Polar organic tracers in $PM_{2.5}$ aerosols from forests in eastern China" *by* W. Wang et al.

Anonymous Referee #1

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General comments:

The manuscript describes a study to measure secondary organic aerosol (SOA) tracers found at four field sites in Eastern China. (In terms of particulate matter (PM), China is probably thought to have primary organic PM2.5 emissions which are far more predominant than the secondary emissions.) The tracer compounds have been previously reported in several studies most of which have been referenced in the manuscript. The study represents one of the first studies conducted in China to examine the importance of SOA and as a first step in this pursuit measurement of the abundance of PM tracer compounds from the isoprene and a-pinene atmospheric oxidation.

The work which is reported is more of a survey study than a comprehensive study. The

design is limited but probably acceptable as an initial effort. The sampling methods are conventional as are the analysis methods. As noted in the specific comments, some additional information is needed for the analytical methods. The paper and the manner in which it is written are of average quality. The data set is uneven in its presentation; for example, one of the locations has 24-h, daytime, and nighttime concentrations while another of the four locations has only 24-h concentration data. The experimental section should contain some information on the inconsistencies in the dataset for the four locations. The interpretation of the data is weak; only the most obvious findings are considered. Since this is an initial study of the OC component of PM2.5 in China, I believe it should be published. However, considerably more work will need to be done to better associate the biogenic emissions in Eastern China with the OC composition of PM2.5.

Specific comments:

I would recommend the following additional revisions before final publication in ACP.

1. The statement of the goals of the work could still be improved. They would be more effective, if they were not buried in the Introduction but placed toward the end of the last paragraph of the Introduction and expanded upon.

2. Tracers for the organics are based on the major emissions from vegetation being isoprene and a-pinene. Obviously, isoprene is the major emitted HC from deciduous trees. What information is available that, in fact, a-pinene is the major emitted HC from the conifers. I am surprised that the concentrations of the a-pinene tracers are so low in the temperate to tropic zones given that the major tree species listed are coniferous. How much of the vegetation might be specific to Southeast Asia and for which little emissions data exists?

3. (Section 3.2) The text needs to be more specific on the CO2 measurement using the "infrared light absorption analyzer." If this is a commercial instrument, a manufacturer and model number should give given. If a laboratory-built instrument, this should

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be indicated. The calibration method should also be stated especially in light of the relatively high CO2 values in Fig 2c.

4. (Section 2.3) Give the actual mass of internal standard used in the analysis. Stating "an appropriate amount" is insufficient for a scientific article of this type. Some information should be provided on the ionization method used for the GC-MS analysis. If chemical ionization was used, it should be stated. If electron ionization (EI) was used, some questions may exist regarding the correct identification, since these derivatives undergo extensive fragmentation and no standards exist for most of the tracers. If the identification approach uses a retention index (or quasi RI) approach based on a mixture of standards, it should be so stated.

5. I would suggest showing in a figure a sample GC a total ion chromatogram for one of the samples to get a sense of the quality of the chromatography. It would certainly be more valuable than the current Figure 1.

6. The fact that the correlation coefficients are high (p.12443, L25 ff.) means that the parameters are correlated and not necessarily that there is a direct impact.

7. The final sentence (ending on L9, p.12444) needs a reference.

8. (Section 3.2) The Chongming site not only has the lowest sum of tracers but also has the highest OC levels. It seems as though the SOA products aren't important here, at least for isoprene and a-pinene. This begs the question as to what is giving rise to the higher OC levels being observed here. Is it all primary emissions? With respect to the comment regarding norpinic acid, given the relatively high volatility of this tracer, it is not surprising that the levels in Hyytiala are substantially higher than those at the much warmer Hainan site (all other factors being similar).

9. (Section 4) I would not agree that all biogenic tracers contribute significantly to the OC at Changbai and Hainan or at any of the four sites for that matter. The comments should be more consistent with what is seen in Fig. 4. If the authors wish to make a

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statement with respect to the actual mass contributions from the precursors isoprene and a-pinene, a quantitative relationship will have to be developed between the tracer masses and the OC mass. The tracers themselves represent an insignificant portion of the OC mass.

10. (Figure 2) The scale on the CO2 plot is incorrect. It should be ppmv and not ppbv. On a ppm scale, the absolute values also appear considerably higher than one would expect considering that background values for CO2 in 2006 were around 380 ppm with around a 5 – 10 ppm annual variability largely driven by the photosynthetic uptake in the summer. It is hard to believe that values up to 70 ppm higher than background would be observed for CO2. Are the high values perhaps due to local power plant emissions. Another possibility might be that the calibration is off.

Technical comments:

In common parlance, a ratio of 1:3 is lower than 1:13.

Show the Hainan site in Fig 1; it currently appears to be labelled Jianfengling.

I suggest replacing diel with diurnal in the two place (p.12442, L.13; p.12446, L.10) and replacing discrepancies with differences (p.12442, L23).

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 12435, 2008.