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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A new comprehensive approach to characterizing carbonaceous aerosol with an application to wintertime Fresno, California $PM_{2.5}$" *by* P. Herckes et al.

P. Herckes et al.

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We modified the abstract following the suggestions of the reviewer.

We have included a comparison to the work of Sullivan and Weber (2006a; 2006b) as suggested by the reviewer. However, both methodologies, while similar, differ with respect to elution conditions and will consequently yield somewhat different fractionations. In order to consider the most comparable fractions we limited the comparison to the hydrophilic fraction of the water soluble organic carbon (WSOC) fraction.

Following the suggestion of the reviewer, we have added a paragraph summarizing the meteorological conditions during the study.

The reviewer was concerned that "..the isolation of the hydrophilic acids plus neutrals fraction demands an extensive use of solvents and concentrated acids and bases." Despite overall gentle extraction and elution conditions (pH, salinity), we cannot completely exclude the possibility of alteration of specific compounds. An example would be esters that might be hydrolyzed through the addition of water. However esters that are not hydrolyzed by water do not fractionate into the hydrophilic acid plus neutral fraction but into the methylene chloride extract and therefore do not experience concentrated acids and bases. Many aqueous degradation processes could also occur in natural particulate matter during hygroscopic growth and/or fog processing. Finally it is noteworthy that while HF is able to dissolve the quartz fiber filter, it is a weak acid (pKa=3.17) that is used here at a low concentration (0.2M).

The first comprehensive analyses of an unknown sample is necessarily the most complex and time-consuming because of the procedures used to remove inorganic constituents that interfere with spectral and elemental analyses, and because of its comprehensive design to quantitatively recover and cleanly fractionate organic matter into distinct compound classes. Once the initial comprehensive analyses is performed, subsequent fractionations of similar samples can be simplified based upon the results of the initial sample.

We agree with the reviewer that our labeling of the material that is neither water nor CH2Cl2 soluble as "particulate organic matter" could give rise to confusion; therefore, we have adopted the suggested label of "non-extractable carbonaceous matter"

Review of the NMR and IR spectra lead us to the conclusion that these spectra by themselves do not unambiguously prove the presence of anhydrosugars like levoglucosan. The spectra only show carbohydrate structures. While the speciation data (Gorin et al., 2006) clearly shows levoglucosan at high concentrations, we decided to remove in the present paper this discussion as the original data presented here does not sustain the discussion.

ACPD

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We have modified the text regarding the presence of isoprene oxidation products in winter time.

Figure 4 has been edited following the suggestions of the reviewers and some typos in IR peak frequencies have been corrected in the text.

References

Gorin, C.A., Collett, J.L. and Herckes, P. Wood smoke contribution to winter aerosol in Fresno, CA. J. Air Waste Manage. Assoc., 56, 1584-1590, 2006.

Sullivan, A.P. and Weber, R.J. Chemical characterization of the ambient organic aerosol soluble in water: 1. Isolation of hydrophobic and hydrophilic fractions with a XAD-8 resin. J. Geophys. Res., 111, D05314, 2006a.

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 8423, 2007.