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Atmospheric
Chemistry
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Discussions

Interactive comment on "Seasonal variation of PM_{10} main constituents in two valleys of the French Alps. I: EC/OC fractions" *by* G. Aymoz et al.

Anonymous Referee #2

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General Comment:

This paper presents the results of a large data set of measurements of carbonaceous matter in PM10 aerosols collected in two French Alp valleys subject to important road traffic contamination. This large amount of data on the carbonaceous content of the atmospheric aerosol, taken along the various seasons of the year, was used to infer about the origins of the carbonaceous fraction of particulates. The relationships of the EC and OC contents and of the EC/OC ratio were used together with variation in temperature, weekend / working-day traffic and concentrations of NO and K to assess the origins of the carbonaceous aerosol. Based on these assumptions the authors concluded that an important fraction of the OC is resulting from biomass burning for home heating, principally in winter low temperature conditions. EC seems to have a more distributed origin and heavy road traffic seems to contribute also significantly to the carbonaceous aerosol load. The significant presence of SOA was not clearly demonstrated from the data evaluation, even in summer conditions.

I have to say that in general I agree with the various degrees of discussion and interpretation that the authors have developed in this paper and I have no substantial criticism to present or alteration to propose to the text. In my opinion the paper is well written and the experimental data is well explored. The conclusions about the importance of biomass burning in the regional atmospheric aerosol loading are well based and in agreement with other recent information that indicates or even demonstrates the presence of a large and predominant source of carbonaceous aerosol as result of biomass burning from home heating across Europe, at least during more colder months of winter.

Fine water soluble potassium is a good tracer for biomass burning, although in PM10 there is always contamination from other sources, such as soil and road dust (can desalting of snow be a source of potassium in road dust during subfreezing periods?). Contamination from dust is possibly one of the causes for the higher K/OC ratios at higher temperatures as shown in Figure 9. Therefore potassium is not a perfect tracer for biomass burning and the quite different ratios between K/OC for the two measuring sites, tentatively explained in the paper as result of burning different types of wood in different conditions, has to be taken with precaution. A more specific tracer for biomass burning, such as levoglucosan, would help in a more clear and quantitative interpretation of the data, if it was measured. However it is possible to filter the potassium data for contaminations from sea salt ,or from soil, by considering sodium or/and magnesium as tracers of salt and calcium as a tracer for soil dust, using for example Ca/K ratio envelops during periods of previsible low biomass burning.

Specific comments:

- In some sections of the paper the ratio EC/OC is used for data interpretation. In other sections it is the inverse ratio OC/EC that is discussed. For a matter of consistence it would be preferable to present the relative concentration values of OC and EC in only one manner.

- In Section 3.2, end of Paragraph 3 - “A last hypothesis is related to sampling artifactsĚĚ”. In my opinion “sample artifacts by more intense semivolatile adsorption at lower temperatures (not detected in PM10 total mass as result of constant heating at 50 žC of the mass analyzer) would give the opposite effect, that is - an increase in the OC/PM10 ratio with decreasing temperatures.

- In Section 3.2 paragraph 5, referring to the discussion of the EC/OC ratios decrease at higher ambient temperatures: This paragraph also discusses the possible interferences of organic semivolatiles. A way of having an insight into the presence of more volatile organic components at lower sampling temperatures is to observe-inspect the first fraction of OC that evolves during measurement in the beginning of the analysis at low heating temperatures. The justification of lower EC/OC at low ambient temperatures as result of the semivolatile organics is in contradiction with the EC/OC ratios observed at the highest ambient temperature range.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 6211, 2006.