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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Inter-comparison of source apportionment models for the estimation of wood burning aerosols during wintertime in an Alpine city (Grenoble, France)" *by* O. Favez et al.

Anonymous Referee #1

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1 General

The authors use and compare three different methods (CMB, PMF and aethalometer model) to determine the contribution of wood burning to carbonaceous aerosol. To my knowledge this is the first intercomparison of these methods. It is an interesting topic and within the scope of ACP. But I do have some concerns about the aethalometer model and its reliability as specified below. I recommend publication after the following comments have to be taken into account.

2 Major comments

Pages 582-583: I have serious concerns about the aethalometer model and its results. The results are very sensitive to the initial conditions as the chosen α and C coefficients.

- The title of the paper talks about an "intercomparison". Thus I expect that you apply the aethalometer model as it is and compare its results. That means that you use the confirmed α as in Sandradewi08b and Faves09 with the confirmed C1 and C2 coefficients as obtained in the publications. You do not intercompare the model if you do a new regression (with different alpha, see next item) and determine a new and different C2! Please revise the approach!
- Page 582, line 10: Why do you use $\alpha_{FF} = 1$ while Sandradewi08b and Faves09 use $\alpha_{FF} = 1.1$? In particular I wonder how you can obtain α_{FF}=1 in winter (this study) compared to $\alpha_{FF} = 1.1$ in summer (Faves09) with negligible wood burning impact? Also, if you chose a different $\alpha_{FF} = 1$, I'm not certain if C1 is applicable at all.
- Page 582, line 13 and following: First: C1 is set to 260000. Neither Sandradewi08b nor Faves09 give any error estimates for the C1 parameter and the linear regression. This value is probably highly uncertain! There should be more discussion about the results from varying the parameters in the sensitivity tests (as mentioned in line 21) and a detailed error estimation.
- Page 583: If I understand the data correctly you use not more than 20 data points (12h filter data) for the regression. Can you add the correct number to the text? This number seems very small, how large are the errors in this regard?

3 Minor comments

Section 2, sampling: Discussion about aerosol concentrations and especially the size distribution is missing. Were there weekly/diurnal variations in the aerosol size? The size can affect light scattering and thus aethalometer data.

Page 569, line 6 and page 570, line 24: In both cases – do you mean a regression or a fit?

Page 569, line 13: BC_{PM1} or $BC_{PM2.5}$?

Page 570, line 6: Software – source, references?

Page 571, lines 1-11 and Figure 1: BC is a different measure than EC. Please use consistently BC or EC in both plots. E.g. determine conversion factor and convert BC. Otherwise explain difference between EC and BC more explicitly.

Page 572, line 9: "often applied" –references?

Page 573, line 19: Software – source, references?

Figure 4: I assume the interval in which the values have been determined is 6-18h etc, is this correct? It should be also stated in the caption. For clarity - could you fit your x-axis ticks with the bars? Besides maybe mark weekends? It could be also of interest to mark e.g. precipitation days, etc. – maybe also in Figure 1 and so on.

Page 577, line 6: PET – source, references?

Page 578, line 15, paragraph: I'm not familiar with the software and the "FPEAK"

parameter and can gain only limited insight of this paragraph. Explain the meaning of the parameter in more detail or add references.

Page 581, line 11: "much higher" – give number!

Page 581, line 27: Biogenic aerosols and SOA. Add a sentence how significant in winter and what the sources are.

Page 582, line 2: Oil and gas: I assume this combustion to be very clean – is the impact of significance?

4 Technical

Figure 5: Improve readability of y-axis tick legend.

Figure 10: For clarity use same x-axis scale in both subplots.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 559, 2010.