

## ***Interactive comment on “Fossil and non-fossil sources of organic carbon (OC) and elemental carbon (EC) in Göteborg, Sweden” by S. Szidat et al.***

### **Anonymous Referee #3**

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#### General comments:

The paper presents an interesting study on the fossil carbon fraction in aerosols in Scandinavia.  $^{14}\text{C}$  measurements are supplemented by levoglucosan to characterize the different subfractions. The  $^{14}\text{C}$  technique has only been applied in few regions before, and comparisons to the Zurich results are presented. The paper also discusses error ranges, which are considerable. Unfortunately, the graphical presentation that the authors have chosen in figure 3 (additive bar) and 5 (pie chart) does not allow indicating those error ranges. I suggest using a format (e.g. single bars for individual fractions) that allows indicating the error bars.

1) It would be useful to include a brief classification of typical WINSOC/WSOC compounds in the introduction, and then maybe refer to this at times in the discussion of results, like done only once in the manuscript on page 20, end of first paragraph.

2) Wood burning also emits SOA precursors, therefore the estimate of OCwood via OC/EC ratios (or levoglucosan/EC ratios) determined directly at the source might be somewhat skewed. It is possible that the contribution of SOA from biomass burning is negligible, but this issue should be mentioned and if possible a crude estimate should be given. A new paper in ACPD (Grieshop et al., Atmos. Chem. Phys. Discuss. 8, 15699 - 15737, 2008) finds that photochemical oxidation of biomass smoke produces substantial new OA in the matter of a few hours.

3) Wittmark et al., 2005 found that bioaerosols partially combust at temperatures comparable to or even higher than EC. This might have an influence on fm(EC), especially for the PM10 measurements.

4) Szidat et al., (2006) also separately analyze the water soluble EC fraction, which is likely polymerizable water soluble OC, and has a relatively high modern carbon fraction. This is not done here. What impact could this have on the estimation of wood burning EC?

Specific comments:

Abstract, last sentence: As long as it is not specified what those insights are, this sentence is better omitted

Page 3, line3-4: This sentence is not clear - the particulate character of the effects?

Page 3, line 5-9: These sentences do not necessarily describe the most important characteristics and effects of OC and EC and seem therefore a bit arbitrary. Moreover, "On the other hand" (line 7) suggests that OC does not have much impact on human health, whereas it is known to contain many toxins, allergens etc.

Page 3, line 9-13: These statements are essentially repeated in the next paragraph

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Page 7, line 4-6: Do you have any indication that fine particles actually dominated during the measurement period, e.g., typical size distributions for this area etc..

Page 7, line 20: was this preheating done in O2 or air?

Page 8, line 3-4: This statement seems in contrast to the previous one (Page 7, line 20) that the pre-heating was done at 390C for 4 hours

Page 10, last sentence, what is this "latter portion"; referring to?

Page 11 line 9: proximity to

Page 14, line 7-8: Might this be an indication that fossil WSOC is largely secondary and therefore more regional in character?

Page 16, top: Please state explicitly how the state of combustion technology and nature of appliances affect levoglucosan levels.

Page 17, bottom: amount to

Page 18, line 11: Replace "fossil impact" with "contribution of fossil sources" Next sentence: Shouldn't you better refer to Figure 3 here for the absolute levels? This figure indicates that on Feb 21, the ECwood fraction is about twice as high in Råö compared to Göteborg. Also, reword "nearly similar"

Page 18, line 15, (Fig 5)

Page 19, line 2: similarities were

Page 21, line 21: This statement is slightly misleading, as it seems to suggest that there was little wood burning in the urban environment, whereas later it is stated that EC wood is only slightly higher in the rural than in the urban environment. I guess what the authors mean is that high emissions of fossil EC decrease the relative contribution of biomass burning to EC (or TC?).

Figure 3, caption: I guess you mean vertical lines, not horizontal lines

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 16255, 2008.

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