

## ***Interactive comment on “Composition and sources of particulate matter in an industrialised Alpine valley” by N. Perron et al.***

### **Anonymous Referee #2**

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This paper continues a series of studies to understand the content and characteristics of aerosol in Switzerland. As such it adds valuable new information to the literature, although as noted by Referee #1 the statistical sample is very small. The paper is generally well written and deserves to be published after attention to the following points and those of Ref #1.

1. The OC/levoglucosan ratio found here, 3.5, is worrying. This is a very low ratio. As noted, studies by Puxbaum and colleagues usually find ratios of 7-10. Saarikoski (ACP, 2008) found an OC/levoglucosan ratio of 9.2, and Yttri et al. (ACP 2009) even higher. The text seems to argue wrongly here, discussing other non-fossil sources of OC. Surely the need is to discuss why OC is so low, rather than the opposite?

Can this low ratio be an indicator of biases and artifacts in the measurement or analysis

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system? For example, Page 9398 notes that recovery rates for OC and EC in the 14C analysis are only 80% and 60%. In general, determination of BC/OC is notoriously error prone, but this problem area is skipped over lightly here (an unreferenced comment on p.9398, line 5)

2. The discussions of the paper are very focussed on previous Swiss results. Although these are clearly most relevant, the work should be set in the context of other studies, at least Europe. How do these results compare with those of e.g. Glasius et al. (AE, 2006, 2008), Hedberg et al. (JAWMA 2006), Puxbaum et al. (AE 2004), Saarikoski et al. (WASP 2008, ACP, 2008) or Yttri et al., (JAWMA 2005, ACP 2009). Clearly a lot of similar work has been done, so the current paper needs to be set in context.

3. Page 9399, section 3.2.2. The OM/OC ratios are always difficult to specify, and one could plausibly argue for OM/OC = 2 for nf, and 1.2 for f. Would this affect the conclusions in any important way?

4. Page 9400, section 3.2.4. Why is K assumed to be entirely from mineral dust? It is more often used as a marker of wood-burning.

5. Page 9402, section 3.3.2. Matching PM1 from AMS to that from TEOM's seems to be quite an uncertain step to me. TEOM's also have artifacts, and PM1 can include components not mentioned here. Couldn't the authors have used a well-described component such as sulfate to get a more accurate estimate of CE?

6. Page 9403, lines 1-2. The link to heavy-duty trucks is made here. Although I agree it is very plausible, movement of normal passenger vehicles is also reduced on Sundays.

7. Page 9403. The drop in 26% in PM is attributed to "dominical" changes, but is this really proven? The day to day variation is anyway large.

8. I was also surprised to see that the wood-burning contribution on Sundays is as high as the working days. Wouldn't one expect more daytime emissions from wood-burning on cold winter days?

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9. Page 9405. The scatter plot for TEOM versus BC+AMS is said to verify the CE=0.5 choice. Isn't this a circular argument, since the CE was chosen to fit the TEOM?

10. Page 9408, section 4.2.3, last paragraph. I doubt the explanations given for the double peaks, which are all in terms of local chemistry without thought to the meteorology. It seems quite unlikely that local photochemical production (in December) accounts for the first peak, and here I would think it far more likely that we are just seeing entrainment of upper-level air to ground level. And doesn't the second peak correspond to a buildup of pollutants under the nocturnal boundary layer?

Minor comments —————

The title should reflect the season - wintertime.

Abstract, I would say wintertime rather than autumnal.

Abstract - I am not sure this paper has really made a link to heavy-duty traffic. This is plausible but not proven, so no need to specify.

Page 9400, line 6. Where does the EM/EC ratio of 1.1 come from?

Page 9400, section 3.2.3. It would help the reader to give some European examples of the use of levoglucosan here - it has been widely applied by now.

Page 9403, section 4.1.2. I wonder how many people know what dominical means? Wouldn't it be simpler just to say Sunday?

Table 1. What does medium, intense mean for traffic? Can you give vehicles/day or similar, or distance and type of road?

Table 3. The extra columns for the percentage contribution are not needed, since Fig. 3 does this job very well. It is important that the left-hand side (actual concentrations) is kept though.

Table 4. Better to say excluded rather than dismissed.

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Figs. 4-5, 10. Specify PM1 or PM10

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 9391, 2010.

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