Interactive comment on "Sources and composition of urban aerosol particles" by M. Vogt et al.

Anonymous Referee #2
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This paper presents the aerosol measurements at two urban locations and one street canyon. The aerosol measurements consisted of BC, PM1, chemical analysis, particle number size distributions and volatility (diameter 250 nm – 1 μm), and particle and CO2 fluxes. They also accessed traffic and met data. Their analysis also contained emission factors based on the upscaling of NOx.

The paper does address relevant scientific questions within the scope of ACP. The description of the experiments and calculations are sufficiently complete only with the help of previous studies published by some of the authors. However, the novel part in the investigation is not yet pointed out!

Further careful reading of this paper revealed the following weakness:

1. The title is too general for the findings presented in this investigation. The reasons are: (1) the term urban is too general because they focused on traffic related emissions, (2) they did not have measurements for ultrafine particles, which is a very important part of the urban-traffic-related emissions, (3) they used a very limited part of their long data-set (spanning over 10 months), and (4) the analysis can be improved to include other sources from other wind sectors to give more support for their findings relating the emissions to traffic activity.

Author's response

(1) In agreement to referee 1 we changed the title.

(2) We agree that urban ultrafine particle sources are important in the urban environment. However, we published fluxes for ultrafine particles using a CPC with a cut at 11 nm from the same station already in 2006 (Mårtensson et al., 2006). Furthermore, while ultrafine particles are important and represent a large number source, the do not dominate the mass emissions, and all legislation is still focused on the larger sizes (using PM1, PM2.5, PM10 etc).

(3) We have previously OPC based aerosol fluxes for a longer time period (a whole year) from this station, but these were all unheated aerosols. In this manuscript we focus on the previously unpublished heated aerosol fluxes, and the difference between heated and unheated, or between air heated to different temperatures, because this indirectly reveal information of the composition. However, the long term measurements at this station has only access to one OPC. For the data set used in this paper, a 2nd OPC combined with a thermo-denuder. This was only available for a shorter period. So we use all of the heated data, but only part of the unheated data (that which correspond to the heated data).

(4). The authors disagree that data from the forest or domestic sectors would improve the paper. That would lead to a less focused paper, where we would end up discussing very different processes that do not relate. Furthermore, we do not have any street or roof level data in the forest or domestic sectors, so we can not repeat the same analysis in all sectors. Therefore, we have focused this paper on the traffic emissions both due to the scientific objective, and due to the available data.

2. While the authors credited their own related work clearly, they have not provided enough credit to other work outside their group. At the same time, they did not clearly indicate their own new/original finding and how it is different than their previous work. They could consider comparing their findings extensively with previous studies outside their group and also within their group.

Author's response

To the authors knowledge no previous study has been published using heated aerosol emissions in an urban environment. In addition we are not aware of any previous published study using OPC based urban flux and deriving size resolved emission factors, hence we end up referring mostly to our own publications when looking for directly comparable data.

3. The overall presentation is structured concisely, but needs slight modification to improve it. For example:

- A table is needed to list the instrumentation at each site, the measured parameter, the time period, etc.

Author's response

Time periods can be found in Table 1 and instrumentation and parameters of the measurement on site is show in section 2.2

- Section 3.1 is a part of the methods because it shows comparison between instruments and it is not a result.

Author's response

Section 3.1 has been moved to section 2 methods.

- Section 3.4 presents mixed topics between PM, emissions factors, etc. Those topics can be better presented and discussed separately.

Author's response

The authors disagree. All the parameters shown in this section are relevant for the emission factor and therefore need no separate section. Each emission factor is the result of at least two types of data, so these need to be combined. In addition, it makes sense to discuss our different type of emission factors (mass based on OPC, or black carbon) and to discuss them compared to other emission factors. The common topic of this sub section is "Emission factors".

4. The language is not fluent and not precise. They use long sentences with interruptions between the verb and object and the subject.

Author's response

It is not quite clear, exactly where those long sentences appear and where the structure is unclear. The manuscript has been checked language issues by the native speaking co authors on the paper.

5. There is a problem in terminology. For example, they referred to the "particle number size distributions" as the "particle number concentration" or "concentration size distribution" – see Figure 4 and related text as well.

Author's response

The terminology has been changed according to the referees suggestions.