

## ***Interactive comment on “Ambient aerosol concentrations of sugars and sugar-alcohols at four different sites in Norway” by K. E. Yttri et al.***

### **Anonymous Referee #1**

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This manuscript deals with the characterisation of atmospheric organic aerosol relatively to poly hydroxyl compounds, namely sugars, sugar alcohols and sugar anhydrides, at kerbside, urban, suburban and rural locations, in Scandinavia.

The authors measured the concentrations of these species, together with OC, WSOC and EC, during different seasons of the year, using an innovative HPLC/MS analytical technique, in size segregated, PM<sub>2.5</sub> and PM<sub>10</sub> samples.

From these measurements the authors evaluated the contribution of the analysed groups to the carbonaceous aerosol load and discussed and interpreted the results in terms of sources and formation processes.

I found the paper quite informative and useful, giving an important contribution to the

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knowledge of sources and mechanisms responsible for the presence of oxygenated organic material in particulate pollutants in the northern European atmosphere. In principle I agree with most of the discussion and interpretation of the data provided in the paper and I have no further suggestions concerning the evaluation of the results. I found particularly interesting the evaluation summarized in Figure 3, relating temporal concentration peaks with pulses of biological productivity which looks quite convincing.

So, in conclusion, my opinion is clearly positive in relation to acceptance of the paper for publication.

Specific Comments:

Besides agreeing with the specific comments and corrections of Magda Claeys I have the following further comments and suggestions:

1- It is a pity that different sampling methodologies and sampling protocols were used for the sampling of aerosols in different locations because this makes more difficult a correct interpretation of data.

2- Page 5771, line 12-27 - The aim of the discussion about di-carboxylic acids, highly oxygenated compounds and HULIS is not evident, in the context of the paper. Only in the next paragraph it is understandable that through the crossing of data from previous surveys and source analysis data carbohydrates are possibility of importance in the OC mass balance. Even in this context, the purpose of the reference to DCAs is still not clear.

3- Page 5771, line 8 - Falkovich

4- Page 5772, line 19 - it would be useful to refer the size range of “ambient aerosols” studied by Graham et al. (2003).

5- Page 5776, lines 23-27: Clarify the meaning of “shift towards higher particle diameters”. Are you referring to the true size cut-off the impaction plates or to the estimated mass size distribution, when using quartz filters as impaction surfaces? If available,

give a relative value of cut-off changes and add a reference. Other authors use usually aluminium foil when sampling particulate carbon with Berner impactors because of the problems of correct cut-off impaction evaluation when quartz filters are employed as impaction surfaces (although aluminium surfaces hinder the possibility of pyrolysis correction during thermal analysis of OC and EC).

6- Page 5776, Section 2.3 - Give a short explanation of how WINSOC was calculated and refer to possible loss of particles during the water extraction of WSOC.

7- Page 5780, lines 1-4. It is not clear nor evident that it is re-suspension of PBAP (as result of turbulence by vehicular traffic) the main cause of the predominant presence of sugars in coarse particles at the kerbside site. The levels of coarse sugars and some sugar alcohols (taken from Tables 2 and 3) are not higher at the kerbside by comparison with the urban background Oslo sites, as they should be if traffic re-suspension was so important.

8- Page 5780, line 5 - A concentration of 45ng/m<sup>3</sup> for levoglucosan is referred, in order to explain that some of the sugars measured at the Kerbside site could possibly originate from wood burning. It is expected that ambient air masses impacted by residential wood burning exhibit concentrations in the range of hundreds of ng/m<sup>3</sup> for PM<sub>10</sub>. The concentration referred is probably due to open biomass burning, more likely to occur at the time of the year at which sampling took place (end of spring, beginning of autumn). Being the levoglucosan level so low, and keeping in mind that primary sugars are a very minor group of compounds emitted by biomass burning, in relation to levoglucosan, it does seem not evident from these data that biomass burning contributed significantly to the observed primary sugars levels.

9- Page 5786, line 19 - are present

10- Table 4 - Not clear or explained why monosaccharide anhydrides were only analysed in PM<sub>10</sub> particles, while the other poly-hydroxyl compounds were measured in both PM<sub>2.5</sub> and PM<sub>10</sub> size ranges.

11- Table 6b - Clarify if the values are corrected for polar VOC adsorption on the filter, or not.

12- Figure 3 - Make the different lines representing the variability of concentrations more clearly distinguishable.

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