

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

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This is a fine manuscript, demonstrating convincingly that sugars and sugar- alcohols, tracers for primary biological particles including pollen and fungal spores, are important constituents of ambient aerosol. The article contains a valuable dataset on PM10 and PM2.5 concentrations of sugars and sugar-alcohols for different sites in Norway, as well as size-fractionated data for a suburban site. The results have been thoroughly interpreted taking into account the seasonal occurrence of specific pollens and fungal spores and have been compared with results of previous aerosol studies. The article is also well structured and reads fluently.

Specific comments:

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1. Page 5570 (Abstract) - I. 17: I suggest to specify that trehalose is a dimeric sugar: "... and the dimeric sugar trehalose."

2. Page 5571 (Introduction): In the introduction, a review is given on the various classes of compounds that contribute to the hydrophilic properties of ambient aerosol. With respect to water-soluble humic-like substances (HULIS), I would like to point out that recent evidence became available that part of the HULIS correspond to organosulfates. Methods based on electrospray ionization mass spectrometry are now available that allow to efficiently address the chemical structures of the polar polyfunctional HULIS present in ambient aerosol.

Refs:

Romero F, Oehme M. Organosulfates - A new component of humic-like substances in atmospheric aerosols? *J. Atmos. Chem.* 2005; 52: 283-294.

Surratt JD, Kroll JH, Kleindienst TE, Edney EO, Claeys M, Sorooshian A, Ng NL, Offenberg JH, Lewandowski M, Jaoui M, Flagan RC, Seinfeld JH. Evidence for organosulfates in secondary organic aerosol. *Environ. Sci. Technol.* 2007; 41: 517-527.

3. Page 5772 - I. 14: Here, the authors write: "The recent finding and characterization of 2-methylthreitol and 2-methylerythritol (Clayes et al., 2004), which are hypothesized to be oxidation products of isoprene, supports this." In the meantime, laboratory evidence has become available that the 2-methyltetrols, 2-methylthreitol and 2-methylerythritol, are formed through photooxidation of isoprene. Therefore, I suggest to correct/update this sentence: "The recent finding and characterization of 2-methylthreitol and 2-methylerythritol (Clayes et al., 2004), which were confirmed to be oxidation products of isoprene (Edney et al., 2005; Surratt et al., 2006), supports this."

Refs:

Edney EO, Kleindienst TE, Jaoui M, Lewandowski M, Offenberg JH, Wang W, Claeys M. Formation of 2-methyl tetrols and 2-methylglyceric acid in secondary organic

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aerosol from laboratory irradiated isoprene/NO_x/SO₂/air mixtures and their detection in ambient PM_{2.5} samples collected in the eastern United States. *Atmos. Environ.* 2005; 39: 5281-5289.

Surratt JD, Murphy SM, Kroll JH, Ng NL, Hildebrandt L, Sorooshian A, Szmigielski R, Vermeylen R, Maenhaut W, Claeys M, Flagan RC, Seinfeld JH. Chemical composition of secondary organic aerosol formed from the photooxidation of isoprene. *J. Phys. Chem. A* 2006; 110: 9665-9690.

4. Page 5573 - l. 10 (no action required for the manuscript): As reported by the authors, significantly higher concentrations of sugars and sugar alcohols were found for summer than winter in our study (Pashynska et al., 2002). After our study appeared, we became aware that the peak observed for the sugars (in June) coincided with the grass pollen peak in Belgium. This thus agrees with similar observations made by the authors for Norway, discussed later in the manuscript (p. 7783 - lines 6-15).

5. Pages 5777 - l. 11: I suggest to clarify here that m/z 379 is the ³⁷Cl-containing isotopic ion: "... m/z 377, and m/z 379 (³⁷Cl isotopic ion) ..." According to IUPAC recommendations, m/z should be written in italic font.

6. Page 5777-5778: I wonder whether the method did not allow for the detection and measurement of 2-methyltetrols in summer samples from rural sites?

7. Page 5780 - l. 14: The high mean concentration of levoglucosan during winter (605 ng m⁻³) and the much lower mean concentration of levoglucosan during summer (47 ng m⁻³) may be compared with data obtained for Ghent, Belgium, where mean concentrations of 477 ng m⁻³ and 19.4 ng m⁻³ were found for a 1998 winter and summer episode, respectively (Zdráhal et al., 2002), while mean concentrations of 420 ng m⁻³ and 19.1 ng m⁻³ were reported for a 2000-2001 winter and 2001 summer episode, respectively (Pashynska et al., 2002).

Ref:

Zdráhal Z, Oliveira J, Vermeylen R, Claeys M, Maenhaut W. Improved method for quantifying levoglucosan and related monosaccharidic anhydrides in atmospheric aerosols and application to samples from urban and tropical locations. *Environ. Sci. Technol.* 2002; 36: 747-753.

Technical corrections:

1. Page 5571 - l. 2: "... commonly fractionated according ..."
2. Page 5785 - l. 18: "The study ... that polyhydroxy compounds (e.g. sugars and sugar-alcohols) are present in the WSOC fraction not isolated by ..."
3. Page 5783 - l. 12: "... (fructose, glucose and sucrose)"

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 7, 5769, 2007.

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