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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Carbonyl compounds in boreal coniferous forest air in Hyytiälä, Southern Finland" *by* H. Hellén et al.

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We would like to thank referee for the good remarks and critical comments. As a result of referees comments we are now able to submit improved version of the manuscript. Changes in the manuscript based on the comments are listed below.

General comments: More effort has been made to understand the results. Comparisons with similar studies in the literature have been made. Concentrations and their variability have been studied more and more effort has been made to understand the sources and sinks of these compounds.

Specific comments:

Abstract: line 8-9: Contribution of larger aldehydes to the total OH-reactive mass is explained more clearly. Line 16-17:-The main sinks- is corrected to -The main sink reactions-. Line 20: More support to the statement is given in the text of the paper.

2.2 Sampling and analysis: p2995, line 4-5: More information about detection limits is given in the corrected text and values of detection limits for all measured compounds are given in a new Table 2. Sampling efficiency has been tested and values are given for the lightest compounds in the text.

3.1 Ambient concentrations: p.2995, line 9: -by mass- is added to the text. p.2995, line 10: Results are compared to the other results reported in the literature and the data is presented and discussed in more detail e.g. by giving minimum, maximum, median and average values in the new Table 2, by conducting trajectory analysis and inspecting if the variations in temperature or in photosynthetic active radiation (PAR) explain the variations in the concentrations.

p.2995, line 22, 24 and thereafter: -OH-reactivity- expresses what is really meant here and therefore all -carbonyl reactivities- are changed to -OH-reactivity-. Numbers from Fig. 1: contribution is corrected to 29%. Words -total OH-reactivity- are corrected to -total OH-reactivity of carbonyls-. Parts of the text which are dealing the OH-reactivity scaled concentrations are moved to the new section 3.4 called -Importance of the carbonyl compounds as an OH-sink in Hyytilä-. In this section OH-reactivity of carbonyls is compared to the reactivity scaled concentrations of aromatic hydrocarbon, monoterpenes and nitrogen dioxide. Standard deviations of the Ceqv values are added to the figure 2. and to the text. Figure caption of the figure 1 is clarified.

p. 2996, eq (1): Term of the equation are defined and averaging procedure is clarified.

p.2996, line 6-7: The figure 3 is commented and variations of carbonyl concentrations are studied with the variations in the temperature and PAR.

p.2997, l.21-25: Uncertainty presented in the text is for estimating quantum yield values for MEK and is demonstrated by how quantum yields vary with wavelength. The uncertainty is not the uncertainty of quantum yield values found in the literature. Variations in quantum yields, adsorption cross sections and actinic fluxes with wavelength were used in calculations in equation 2 already in original paper. Used actinic fluxes

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were for the midday as was mentioned in the text. This part was clarified by some changes of words in the text.

3.3 Lifetimes: p. 2998, line 1-2: -Main sinks- is changed to -main sink reactions-, which describes the situation better.

3.4 Sources: Importance of anthropogenic sources is estimated by the comparisons with urban concentrations and with the difference of concentrations of aromatic hydrocarbons in the urban area and in Hyytiälä. Also trajectory analysis is conducted and different wind sectors are studied in the new version of the paper.

4. Conclusions: P. 3002, line 3002: Contribution of higher molecular weight aldehydes is described more clearly. p. 3002, line 15-19: As above -Main sinks- is changed to -main sink reactions-. p. 3002, line 15-19: More support to the statement, that secondary production from the oxidation of other organic compounds and primary biogenic sources are expected to dominate in Hyytiälä is given in the text by the comparisons with the urban concentrations and trajectory analysis.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 2991, 2004.