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Atmospheric Chemistry and Physics Discussions

Interactive comment on "First measurements of reactive α-dicarbonyl concentrations on $PM_{2.5}$ aerosol over the boreal forest in Finland during HUMPPA-COPEC 2010 – source apportionment and links to aerosol aging" *by* C. J. Kampf et al.

Anonymous Referee #3

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General Comments

An important and original work, this paper describes the first measurements of glyoxal and methylglyoxal in PM2.5 aerosol particles collected in a summertime boreal forest environment. Gas-phase measurements allow emission sources to be identified, and FTIR filter measurements suggest the age of the collected aerosol. The authors identify a trend of lower dicarbonyl concentrations in aged aerosol, consistent with the action of recently identified irreversible aerosol-phase chemical mechanisms. The paper is clearly and carefully written, remarkably error-free, and soundly reasoned. It will be

read and cited by atmospheric scientists who are interested in the sources and chemistry of organic aerosol particles. I have a few suggestions that I feel would increase the impact of this paper, given below.

Specific Comments

Because of the interest in reactions of dicarbonyl compounds with ammonium salts and amines, could the authors add a statement about the filter-based primary amine concentrations from the FTIR measurements? Are they detectable, and if so, is any correlation or trend relative to the dicarbonyls observed?

A second issue is that glyoxal and methylglyoxal are believed to enter aerosol particles during periods of high humidity (or cloud processing) when particle-phase water content is high. I am quite sure that an analysis of cloud processing is beyond the scope of this paper, but is there any correlation between ambient humidity at the field site and measured dicarbonyl concentrations?

It is relevant to the analysis that methylglyoxal can oligomerize by two competing mechanisms: acetal formation and aldol condensation. The latter mechanism is irreversible, and its products would not likely be analyzed as methylglyoxal by the analytical methods used in this study. This is an additional reason why methylglyoxal concentrations may be lower than glyoxal concentrations in this study. A statement to this effect should be added.

Technical Corrections

p. 8 line 1: The Henrys Law constant describes equilibrium, not flux.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 723, 2012.