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Atmospheric Chemistry and Physics Discussions

Interactive comment on "High abundances of water-soluble dicarboxylic acids, ketocarboxylic acids and α-dicarbonyls in the mountain aerosols over the North China Plain during wheat burning season" *by* K. Kawamura et al.

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Authors' Responses to Ref. #2

Thank you for the careful reading and valuable comments on our paper.

Anonymous Referee #2 Received and published: 30 May 2013 General comments: This manuscript presents chemical speciation data from aerosol particles collected at a remote high-altitude site in east China during the MTX2006 campaign. Following

earlier reports by the same authors on detailed organic speciation, this paper reports specifically on low molecular weight dicarboxylic acids and related compounds, besides total carbon (TC), total nitrogen (TN) and water-soluble organic carbon (WSOC) aerosol content. Interestingly, rather high concentrations of these species were observed at this site (situated in the free troposphere at times), which even exceed those levels measured at polluted urban locations in China. Significant impact from biomass burning activities (agricultural waste combustion) was reflected in the diacid levels, indicating atmospheric processing/aging during transport of the smoke emissions to the measurement site, as previously demonstrated by the abundance of biomass smoke tracers as well as fire counts and air mass history analysis. These findings nicely support other recent investigations of secondary organic aerosol (SOA) derived from biomass burning emissions, which provide new insights into regional-scale emission sources and transformations of organic aerosol. As pointed out for earlier companion papers by this group, the data reported here are based on a sound scientific approach with adequate QA/QC measures. The discussion of the findings and their implications are presented in a concise and well organized fashion, and fit well into the scope of the journal. Therefore, I recommend publication of this manuscript in ACP after some technical corrections as suggested below. Specific (and technical) comments: 1. The use of definite and indefinite articles, as well as the correct use of singular andãĂĂplural forms should be checked throughout the manuscript. Response: We rechecked all the words and sentences in the revised MS and made appropriate corrections.

2. Page 3699, line 12: Change "LWM" to "LMW". Response: Thanks. Corrected.

3. Page 3701, lines 21-28: While the authors state that they performed a blank corrections on the data (which was actually rather small), they don't mention a correction for the recoveries, which in some cases (e.g., methylglyoxal) are substantially low. Response: We did not perform the blank correction although the recovery of methylglyoxal is substantially low. We feel that actual recovery of methylglyoxal in the real samples is higher than the recovery with authentic standard. Due to the acidity and coexistence

of many chemicals in the real samples, hydration reaction to the aldehyde functional group may be enhanced causing an increase of recovery of methylglyoxal. However, we need to better check the recovery of glyoxal at various conditions in the future work.

4. Page 3711, lines 10-12: The discussion of "anthropogenic" versus "biogenic" source contributions is very valuable, yet a bit tricky. Biomass burning is technically an anthropogenic activity (at least this is the case for 90% of all fires on a global basis), as the authors indicate here, although the material is actually of biogenic origin. Specifically, it is mentioned in this section that a low adipic/azelaic acid ratio indicates predominant influence from anthropogenic sources derived from the oxidation of cyclic hexene (which is mainly of anthropogenic origin, yet not necessarily emitted during biomass combustion). Thus, the authors may want to add a slightly more detailed explanation about the relationship between biomass burning emissions and these diagnostic ratios. Response: Following the comment, we added several sentences. Please see lines 427-437.

5. Page 3713, lines 8-10: The authors suggest that oxalic acid can be formed in the late afternoon or evening, following oxidation of glyoxylic acid which is produced photochemically during day time. How do they relate this to earlier statements that SOA formation, e.g., reflected in high WSOC abundance, preferentially takes place at night, when relative humidity is significantly increased (up to 95% in this study), which was also supported by peak WSOC/TC ratios in the early morning? Response: We modified the sentence to “In the late afternoon or night to early morning when relative humidity increases,” in the revised MS (see lines 486-487).

6. Page 3723, Table 1: The apparent heading ("Sub total") for the bulk properties (TC, TN, WSOC, and C/N ratio) needs to corrected, i.e., the lines should be moved to show the association of "Sub total" with the alpha-dicarbonyls and perhaps find an appropriate heading for the bulk parameters. Response: Thank you for the comments. Corrected. Please see the revised Table 1.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 3695, 2013.