

## ***Interactive comment on “Ozone-driven photochemical formation of carboxylic acid groups from alkane groups” by S. Liu et al.***

**c. emerson**

chrisemerson111@gmail.com

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I carefully read this manuscript due to my recent research interests, this is a good paper yet I also have a couple of suggestions, which I hope would be helpful.

(1) It is a bit strange to me that, from the title and the abstract, the paper will focus on carboxylic acid formation, yet when reading through the paper, I find a large body of the MS actually reports particle measurements by FTIR and AMS, and their comparison. Only section 4 is for discussion of carboxylic acid formation.

(2) In my opinion, the introduction is not well organized. In the beginning, “The major organic components identified in ambient particles include alkane, carboxylic acid, hydroxyl, amine, and non-acid carbonyl functional groups (Maria et al., 2002; Liu et

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al., 2009; Russell et al., 2009a).” (here, some other papers can be mentioned, for example, Pietrogrande et al., Environ. Sci. Technol., 2010, 44,4232–4240 on alkanes; Jaoui et al., Anal Chem. 2004, 76(16):4765–78 on carboxylic acids ; Ge et al., Atmos. Environ., 45, 524–546 on amines). Then, the authors talked about alkanes groups, and carboxylic acid groups. Why not other groups? (I understand that is because this paper is going to discuss formation of carboxylic acid groups from alkane groups, yet one or two sentences are clearly needed. In my opinion, this actually can go with later discussion).

(3)“Carboxylic acid groups are generally SOA components. . .” this is better to have its own paragraph.

(4)Page 7192: Suddenly, the authors start to talk about SOA. What is the relationship between this and previous paragraphs? And finally, “In this work, organic functional groups are quantified . . .”. Again, it seems like, that the formation of Carboxylic acid is only a minor component of this paper. The authors might need to specify the focus of the paper more clearly, for readers to follow (probably the title needs alteration too). Otherwise it is just confusing.

(4) I agree with reviewer 1 that the “Aged Combustion factor” should be introduced first, otherwise it is quite strange.

(5) It is better to give some detailed PMF analysis results (probably as supplementary materials), for both PMF-FTIR and PMF-AMS. For example ,for PMF-FTIR analysis, “Two- and three- factor solutions were excluded since only 85% of the OM was reproduced”, but later you actually used a 3-factor solution, but resulted from the 6-factor solution, what is the difference, how do they look like respectively, how do the authors recombined 3-factor from a 6-factor solution?

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