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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A review of Secondary Organic Aerosol (SOA) formation from isoprene" *by* A. G. Carlton et al.

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Response to Reviewer 2

1. Page 8264: As suggested by the Reviewer, we added "e.g." when referring to the field and laboratory studies on page 8264. We also added the Reviewer's suggested reference to the Hallquist et al. (2009) article, specifically table 4.

2. Page 8265: We incorporated the Reviewer's suggestion to add reference to the Hallquist et al. (2009) ACPD article.

3. Page 8265: We added the reference to Wang et al., (2004) in Section 2.1 as suggested.

4. Section 2.1, Page 8265: Reviewer 2 is correct, the word "adducts" can be misleading. This wording was changed to "accretion products."

5. Section 2.1, Page 8265: The reference to the Szmigielski et al., (2007) was removed from discussion of the hemiacetal dimmer as suggested. In this section we added text (italicized below) to describe the esterification of the acid residues and we changed the organosulfate discussion to include nitrated derivatives. The Jaoui, Gómez-González and Surratt references are now included in the text.

"Organosulfates, including nitrated derivatives (e.g., nitrooxy-organosulfates) have been detected in ambient aerosol collected in the U.S. (Surratt et al., 2007a; 2007b) and Europe (Gómez-González et al., 2008). Diesters, hypothesized to form via esterficication of two 2-methylglyceric acid residues, previously characterized by Suratt et al. (2006) and Szmigielski et al. (2007) in high NOx laboratory-generated isoprene SOA, were detected in ambient aerosol by Jaoui et al. (2008).

6. Figure 2 in the manuscript has been revised to incorporate the Reviewer's comments. The new caption is listed below (italicized text) in order to describe how the suggestions were incorporated.

"Fig. 2. Compounds found in ambient aerosol sharing the carbon skeleton of isoprene or methacrolein. All compounds other than 2-methyltetrol and 2-methylglyceric acid have multiple isomers (not shown). Superscript refers to the first study reporting ambient measurement of the species: (a) Claeys et al. (2004); (b) Wang et al. (2005); (c) Surratt et al. (2007); (d) Gomez-Gonzalez et al (2008); (e) Surratt et al (2008) (f) Ion et al. (2005); (g) Surratt et al. (2006). All compounds shown, as well as nitrated and sulfated analogs, have been measured in laboratory-generated isoprene SOA (Surratt et al., 2006, 2007a, 2008)."

7. Section 2.1 Pages 8625: The Reviewer makes an important point that isoprene SOA products likely contribute much more than 10 -100 ng m-3. This sentence, as originally written, did not convey that well, though that was our intention. We have revised this

discussion with the italicized text:

“Mass concentrations of tracer species typically total 10-100 ng m-3 in forest environments, but values as high as 365 ng m-3 have been measured for methyltetrols and recent estimates regarding sulfated and nitrated (i.e., nitrooxy organosulfates) derivates of isoprene suggest that isoprene oxidation may be an important contributor to total organic particulate mass, particularly during the summer (Kleindienst et al., 2007a; Lewandowski et al., 2008; Surratt et al., (2008); Lukács et al., (2009)).

8. Section 2.1 Page 8266: In order to incorporate the comments regarding possible explanations and interconnectedness of the Matsunaga work with that of Surratt, Gómez-González and Galloway the following sentence was added after the Matsunaga reference.

These higher-than-expected concentrations may arise from aerosol-phase accretion reactions of these isoprene oxidation products, (e.g., sulfate derivatives (Surratt et al., (2008), Gómez-González et al., (2008), Galloway et al., (2008)).

9. Page 8279, The Reviewer correctly points out that wall losses are important consideration and that atmospherically-relevant OH concentrations therefore are difficult to accurately define and specify. We added the italicized text to this discussion in the manuscript:

This suggests the need to conduct photooxidation experiments under atmospherically relevant OH concentrations, though this is difficult to constrain because of wall loss processes that occur in laboratory chambers but not in the atmosphere.

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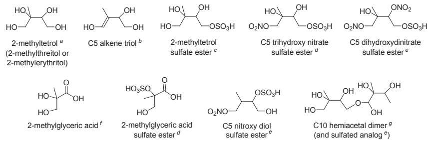

Fig. 1.