

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

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1) Reviewer 3’s suggestion to create a table listing field observations of isoprene oxidation products or tracers is an excellent idea. We were going to include this table, however, another SOA review paper, (Hallquist et al., 2009) submitted to ACPD within a few days of this paper has such a table (Table 4) that lists all of the field studies mentioned in our article, (with one exception), where isoprene SOA ‘tracers’ were identified in field samples. Replication of that information in a table in this paper may not be appropriate and so we now make reference to Hallquist and Table 4, in particular, in section 2.1 of the revised manuscript.

2) The detection of SOA formation from isoprene in the atmosphere was accomplished primarily through GC-MS (Claeys et al.) and basic smog chamber experiments (e.g.,

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Pandis, Edney, Kroll, etc.). Other analytical techniques have contributed to our understanding of isoprene SOA. At various places in the text we have now included more specific details regarding the analytical techniques used. Some examples are listed below:

- the AMS (p. 8268 lines 4-7, p. 8272 lines 5-6) - chemical ionization mass spectrometry (p. 8270 line 20, p 8271 line 4) - LC-ESI-MS (p. 8269, p. 8271 lines 24-25)

3) p 8267 last paragraph – 8268 line 10. Reviewer 3 suggests this discussion could be moved to section 3. We have moved most of this text as suggested and this sentence now ends section 2.2

“A detailed discussion of chemistry of the SOA formation mechanism is discussed in Section 3. “

4) The net affect of the proposed esterification reactions is that the molecules get larger by  $C_3H_4O_2$ . The process is not that an actual  $C_3H_4O_2$  subunit adds on, rather that is the net effect. For example, the proposed esterification process is a reaction with a hydroxy acid ( $C_3H_6O_3$ ) followed by a loss of water ( $H_2O$ ). The remaining added material is comprised of  $C_3H_6O_3 - H_2O = C_3H_4O_2$ . This is added to the molecule's elemental formula. Naming the "subunit", which is really just a change in the elemental formula, is not appropriate.

5) In response to Reviewer 1's first comment we now present a  $NO_x$ -dependent yield formulation for isoprene SOA formation based on the work of Presto et al.

6) Section 5: The area of marine isoprene emissions and the contribution to SOA is an exciting development. This text was added to the first sentence of section 5 to incorporate the Reviewer's suggestion: "...importance of isoprene SOA on regional and global ... from terrestrial sources and recently from oceanic isoprene emissions as well (Arnold et al., 2009; Gantt et al., 2009).”

A synthesis table with field observations of isoprene oxidation products identified. ...to

supplement section 2.1

7) The modeling study by Henze 2008, referenced elsewhere in the manuscript, is now included in Table 2.

8) Table 2 has been expanded to include SOA production estimates and isoprene emission inputs. Not all of the studies are directly and explicitly comparable but this information provides important details and perspective.

9) The Henze and Seinfeld reference has been corrected (i.e., 2008 instead of 2006). A note regarding the enthalpy of vaporization value, now explicit in the updated version of Table 2, is listed at the bottom of Table 3.

10) Page 8283, line 9: The units for the atmospheric burden were changed from Tg yr<sup>-1</sup> to Tg.

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