Interactive comment on "Direct measurements of OH and other product yields from the HO2+ CH3C(O)O2 reaction" by F. A. F. Winiberg et al.

G. Tyndall (Referee)

tyndall@ucar.edu

Received and published: 21 November 2015

We would like to thank the referee for their constructive comments and thorough reading of this manuscript. We address the suggested minor corrections below, with our comments in blue.

28819, 21. "linked to …high OH concentrations:, not "linked to an… concentrations"

Corrected.

28820, 13. These branching ratios look like those from Hasson, not Jenkin (cf Table 4)

Correct. The reference has been changed to Hasson et al.

28833, 24. Do you really mean removal of CH3CHO? Isn't the primary removal by Cl atoms? Probably meant to be CH3CH(OH)O2.

This line was meant to refer to the $CH_3CH(OH)O_2$ radical, and not the CH_3CHO precursor. Corrected.

28834, 24. HO2 radicals are initially produced from CH3O radicals (produced by AcO2 + CH3O2); no need to wait for HCHO to build up.

Quite right. P28834, L23 now reads:

"…through Reaction (R19). HO_2 radicals were produced almost instantaneously in the system through the decomposition of CH_3O (R22) from the reaction of $CH_3C(O)O_2$ with CH_3O_2, (Reaction R20b), as well as the subsequent reaction of Cl with HCHO, where HCHO was produced in reaction R20b and R22. However, reduced yields for reaction R5 were calculated as there was no excess of HO_2 in the system. This trend has…"

28836, 5. Which branching ratio? Reaction 5?

Yes. Corrected.

28842. I think a little extra clarification as to the PAN/NOx is required. I think that the logic is that the faster reaction rate leads to lower CH3C(O)O2, and in turn lower PAN over source regions. Since the PAN is transported to remote regions where it releases NOx , the overall effect in remote regions is less NOx. This is clear from the red and blue colors in Supplemental figure, but not immediately from the text.

The manuscript has been changed to clarify this point. The paragraph now reads:

"The enhanced rate coefficients for Reaction (R5) of this work and of Groß et al. show up to a 30% decrease in PAN concentrations (Fig. 9a) by reducing the available acetylperoxy radicals for reaction with NO_2. As PAN is responsible for the transport of NO_x to remote regions, such as the marine boundary layer, the reduction in PAN results in less background NO, as shown in Fig. 9b, and hence less remote O_3 (see Supplementary Information). Only very slight increases in O_3 are observed over the tropics as the direct O_3 yield from R5 is only significant when NO concentration. In these plots the comparison is between the branching ratios and rate coefficients of this work and the IUPAC recommendations. Further comparisons, including vertical profiles, can be found in the supplementary information."

28852. Table 2. The rate coefficient for the pressure-independent channel of HO2 + HO2 should have a pre exponential factor of 2.2E-13, not 2.2E-15. As written, the overall rate coefficient is about half the true value. Is this a typo, or was the wrong value used in the model?

Values in the model are correct, the text is wrong. This has been corrected in the manuscript.

28853, Table 2. I think there are two reactions of CH3CH(OH)O2 that ought to give CH3COOH as product (currently written as HCOOH product); the reaction with CH3C(O)O2 and with HOCH2O2.

Quite correct. The error lies in the table. These reactions were correctly included in the model (CH_3OOH instead of HCOOH).