

Interactive comment on “Oxidation of low-molecular weight organic compounds in cloud droplets: global impact on tropospheric oxidants” by Simon Rosanka et al.

Anonymous Referee #1

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The manuscript presents a revisit to the aqueous chemistry of the superoxide anion in the atmosphere, using both a box and a global model. The focus of the study is on the impact of this newly implemented chemistry on VOCs, OVOCs, HOx, and ozone. Comparisons of the model against satellite methanol and ozone observations are shown, with updates decreasing EMAC's positive ozone bias. Overall the authors clearly demonstrate the importance of including this chemistry in global chemistry models. The science is generally presented in a clear and appropriate way and the manuscript as whole fits the remit of ACP. I would encourage publication effectively as is.

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— Specific comments —

Line 44 - A suggestion for flow of reading: Add “However” to the beginning of the sentence below.

”By not considering additional in-cloud HO₂(aq) sources, Liang and Jacob (1997) underestimated O₂(aq) concentrations dampening the in-cloud destruction of O₃(aq).”

Line ~175 — Please add a table to section 2.4 to make it easier for the reader to quickly decode the simulation acronyms used elsewhere in the text.

Figure 2 caption — Consider moving expansions of families (e.g. VOCs) here and elsewhere to a table in the supplement to make the text more readable.

Table 4 - Please add some reference numbers from a multi-model study such as TOAR as a column to Table 4. This enables the reader to put these numbers in context (e.g. Loss via bromine seems quite high in this model).

Table 3 and 2 - As with Table 4, is it possible to provide some context for the numbers to another model study? Few will know where these numbers are high or low without context.

Please expand all abbreviations/acronyms in table/figure captions or at least link to a table of these (e.g. “Scm” in Table 1).

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2020-1041, 2020.

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