Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC1
https://doi.org/10.5194/acp-2021-782-RC1, 2021
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Comment on acp-2021-782

Anonymous Referee #1

Referee comment on "Exploring dimethyl sulfide (DMS) oxidation and implications for global aerosol radiative forcing" by Ka Ming Fung et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-782-RC1, 2021

The authors report an expanded scheme of the widely used CAM-Chem model to reconsider atmospheric DMS chemistry in a more detailed way. Observations of the new and existing scheme are compared to observations. The implications for natural aerosols and resultant radiative implications are then considered. The conclusions for sulfur chemistry in the Southern hemisphere and the importance of considering loss routes via clouds is notable.

The paper is well written, well structured, and broadly covers some questions the community has had since recent lab and field papers on novel atmospheric sulfur chemistry (i.e. HPMTF). I would recommend publication after considering the minor points and suggestions below.

Line 38 - Please expand the acronym “VAMOS”

Table 2 - Is 2000 a typical year to fix volcano emissions? Or a low, medium or high emission year?

Figure 1 - please consider rotating the figure 90 degrees, so have water to one side. Having the "water" at the bottom of the figure may confuse readers into thinking that sea-surface reactions are being considered, rather than aqueous-phase reactions in aerosols and cloud droplets.

Lines 300-315 - Please consider adding a comment on the comparability of modelled oxidants with other models (e.g. global tropospheric average values for NO3, Cl, and BrO), or the certainty of modelled values used here and agreement with observations. How much could a difference in this model's predicted fields impact the notability of a specific route? For instance, Cl & BrO show large differences between studies even within the same models or even observational techniques as some of the authors of this paper have recently reported [Wang et al 2021].

Line 416-418 - has the impact of meteorological variability been tested on the specific runs used here? Why not just use a single year (e.g. 2000) meteorology for all runs?

Wang, Xuan, Daniel J. Jacob, William Downs, Shuting Zhai, Lei Zhu, Viral Shah, Christopher D. Holmes et al. "Global tropospheric halogen (Cl, Br, I) chemistry and its impact on oxidants." Atmospheric Chemistry and Physics Discussions (2021): 1-34.