

Interactive comment on “Coral reef-derived dimethyl sulfide and the climatic impact of the loss of coral reefs” by Sonya L. Fiddes et al.

Anonymous Referee #1

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Dimethyl sulfide (DMS) is the major sulfur source in the remote marine boundary layer. It affects aerosol abundance and cloud formation and growth and thus is very important for the climate. Fiddes et al. conducted model simulations to investigate the impacts of the loss of coral reef, a source of DMS, on the sulfur, aerosol and climate. This work is novel and shows interesting and important results to the community. It could offer useful guidance for making climate change policy. The manuscript is in general well written and scientifically sound. The manuscript can be improved by describing how DMS emission is parameterized (e.g. as a function of wind speed) and how to get the weighted concentration of DMS_w (e.g. up to 50 nM). Some minor comments are shown below before acceptance for publication.

1. Line 8: “global flux”: is it DMS flux or sulfur flux? Please clarify.

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2. Since DMS emission is critical in this work, the introduction section should include how DMS_w and DMS_a were parameterized in the model in previous studies.
3. Line 29: It is not clear what the “global cooling effect of up to 0.45 C” is relative to.
4. Line 38: Please clarify “when stressed”.
5. Line 40: How big is 0.02 Tg/year compared to global DMS flux? Please introduce here.
6. Line 50: Please clarify where the DMS flux is.
7. Line 87: Please show how Lana et al. (2011) calculated DMS emission flux and show more details about the Liss and Merlivat (1986) flux parameterization.
8. Line 97: Please explain how to get the weighted concentration of DMS_w.
9. Line 102: Please explain how to get the 50 nM climatology, and provide references.
10. Section 3.1: Please introduce here or in the introduction section how DMS is converted to sulfur dioxide. In addition, please it is useful to show the conversion ratio of “DMS to SO₂” in this study and compare that to previous studies.
11. Line 152: Please show the dependence of DMS flux on wind speed.
12. Figure 3: Is the DMS_a concentration surface or tropospheric mean? Not clear.
13. Please define the size of nucleation mode, Aitken mode, accumulation mode, and coarse mode aerosols used in the model.
14. Line 178: “decreases by -4.6%” should be “decreases by 4.6%”. Also see lines 220-221.

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