

Interactive comment on “Reviews and syntheses: Marine biogenic aerosols and the ecophysiology of coral reefs” by Rebecca Jackson et al.

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General comments:

The authors thank the referee for their valuable insight and comments on this discussion paper. The referee has raised important points, which have each been addressed in the revised manuscript (see supplement with tracked changes).

1. Title: The title has been changed to ‘Marine biogenic aerosols, dimethylsulfide (DMS) emissions and the ecophysiology of coral reefs’ to better describe the paper.
2. Section 7: We have included a substantial re-write of section 7 and have renamed this section ‘Future research’ to better reflect the aim of the discussion. This section now highlights gaps in the literature and presents several specific recommendations

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for future research which will progress the current understanding of the role of DMS in coral reefs and local atmospheric properties (pg 16 - 18).

3. Section 8: The purpose of this section is to discuss potential ways to counteract the predicted decline in biogenic aerosol emissions with ongoing coral reef degradation and to mitigate the detrimental effects of further ocean warming. Section 8 has been rewritten to focus on alternative ways to conserve coral reefs, such as the propagation of temperature tolerant coral species and climate engineering to artificially mimic marine biogenic aerosol emissions (pg 18 - 20).

Specific comments:

1. We have clarified that corals are ‘amongst the largest individual sources of natural sulfur’ (pg 4 L2), when compared with individual micro- or macroalgae.
2. The sentence beginning ‘Particulate DMSP...’ has been reworded to read more clearly (pg 4 L25 - 29).
3. The sentence reading ‘...when ROS levels are...’ has been replaced with ‘...by reducing ROS levels to’ (pg 6 L24).
4. More context on the importance of DMS emissions from soft corals has been provided (pg 7 L9 - 13). Although the focus of the paper is Scleractinian corals, soft corals also contain large quantities of DMS and have been reported to increase in abundance in disturbed coral reef systems.
5. The findings of Six et al. (2013) and Schwinger et al. (2017) regarding changes to DMS sea-air flux in response to ocean acidification have been incorporated into section 4.2 (pg 11, L19 - 25). The importance of regional biogeochemistry and phytoplankton community dynamics in predicting changes to DMS emissions has also been made clearer (pg 11, L25 - 29).
6. The sub-heading ‘4.3 Complexity of the DMS cycle’ has been changed to ‘4.3 Complexity of the climate response to DMS’ (pg 12, L12).

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7. The phrase ‘...existing meteorological conditions...’ has been changed to ‘...prevailing meteorological conditions’ (pg 15, L9).

8. The sentence ‘If coral reefs significantly affect our climate...’ has been changed to ‘If coral reefs significantly affect local atmospheric conditions...’ (pg 16, L16).

Technical corrections:

1. Comma has been moved after ‘...emerging topic of research’ (pg 2, L10).

2. Comma after ‘approached’ has been removed (pg 6, L15).

3. The phrase ‘the radiative balance’ has been replaced throughout the paper with ‘the radiative balance over coral reefs’. We did not use ‘the Earth’s radiative balance’ in these instances as the discussion was focused on local effects over coral reefs.

Please also note the supplement to this comment:

<https://www.biogeosciences-discuss.net/bg-2019-207/bg-2019-207-AC1-supplement.pdf>

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2019-207>, 2019.