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Reply on RC3

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Author comment on "Improved prediction of dimethyl sulfide (DMS) distributions in the northeast subarctic Pacific using machine-learning algorithms" by Brandon J. McNabb and Philippe D. Tortell, Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-189-AC3, 2021

- What is the advantage of machine-learn algorithms for the DMS simulation, comparing with other models. As machine-learning algorithms requires large datasets for the training and testing process. How to solve the problem of sparsity observation data for different ocean.

One of the central advantages is that these techniques can be robust to complex relationships, which can result in improved predictions relative to other models in areas with limited spatial coverage, as shown in this study. Data sparsity, however, does remain a challenge whether using traditional statistics or machine learning techniques, and machine learning may not be the best approach in some areas with little coverage. In cases such as these, using data from similar regions with known analogous oceanographic conditions may be helpful in correctly training these models. Increasing data frequency and coverage of DMS observations in the coming years will also undoubtedly help.

- In the manuscript, the summer time DMS data from 1997 to 2017 was used in the modeling simulation. It is obscure that the author used the average of DMS concentration from 1997 to 2017. I suggest the author presents the modeling results of the temporal distribution of DMS from 1997 to 2017.

We considered this approach but found the data were still too sparse (both spatially and temporally) for the models to accurately represent inter-annual changes.

- Line301-303 Why the DMS correlated well with SST?

It is likely that, within this region, the correlation between DMS and SST mainly represents frontal patterns induced from mixing, which we allude to in the discussion with regards to SSHA patterns (L451-454).