Response to Reviewer 3 comments for manuscript ID egusphere-2024-175. The comments are given in an italic typeface, and the responses are given in a bold typeface. The corresponding changes in the revised manuscript are highlighted in red.

3.1) This study led by D. Joge offers a valuable comparison of DMS flux parameterizations. Here are some additional thoughts to complement the two existing reviews.

In the introduction, it would be beneficial to clarify the distinctive contribution of this analysis. The authors briefly reference a previous intercomparison (lines 31–37) before delving into the specifics of their current work (lines 38–45). Inserting an intermediate paragraph summarizing the key differences between this study and prior research, along with the main outcomes from the companion paper (part A), would enhance the paper's coherence.

Response: The main outcomes of Part A are added to the introduction (L57- L59) and to the discussion section of the revised manuscript (L310 – L314).

3.2) Figures:

While the current version of the manuscript includes compelling figures, a few more could enhance reader comprehension. Here are some suggestions:

3.2.1) Section 2.1: Add figures to highlight the differences between the various parameterization methods (which may not be immediately clear from the equations alone). Potential figures could illustrate:

i) wind speed dependency of air-water gas transfer velocity for the different parameterizations, scaled to a Schmidt number at e.g., 20ºC;

ii) temperature dependency of air-water gas transfer velocity for the different parameterizations, scaled to different wind speeds (with one sub-figure per wind regime);

iii)temperature dependency of the Schmidt number for the different parameterizations.

Response: k vs u figures are added for all seven flux parametrizations in the supplementary text (Figs. S1 -S7), and the information related to these figures is added in the discussion section. The flux parametrization equations used in this study depend on the Schmidt number, which is a function of SST. The discussion related to this is added to this section (L316 - L320).

3.2.2) Section 3: While Figure 3 is commendable, Figures S3 and S4 could be more informative. A 'summary figure' combining results from these different figures could be beneficial. For instance, consider a figure where each grid box indicates the dominant contributing to the total uncertainty (using distinct colors for k, DMS, and wind). Alternatively, create one global map per parameter (k, DMS, wind) displaying, for each grid box, the percentage contribution to the total uncertainty.

Response: We tried to create a figure similar to the suggestion by the reviewer, but due to the coarse resolution of the data (1° x 1°), it was difficult to represent the information about uncertainty, especially in the monthly plots. Hence, we have not changed Figures S3 (now it is S10 in supplementary text) and S4 (now it is S11 in supplementary text) along with Figure 3. As the reviewer mentioned, the figures do show the needed information.

3.3) Additional comments:

3.3.1) Line 32: The statement "with the wind proven to be one of the most influencing factors" could be expanded upon. DMS flux measurements have revealed a decrease in gas transfer at medium to high wind speeds (> 10 m/s), attributed to wave-wind interactions and surfactant effects (Zavarsky et al., 2018), factors typically overlooked in traditional approaches (Bell et al., 2017). This discussion should be incorporated into the introduction.

Response: The text is now expanded with examples and citations (L43 - L45).

3.3.2) Line 43: A closing parenthesis is missing after W20.

Response: Parenthesis added (L56).

References

1. *Bell, T. G., Landwehr, S., Miller, S. D., de Bruyn, W. J., Callaghan, A. H., Scanlon, B., Ward, B., Yang, M., and Saltzman, E. S.: Estimation of bubble-mediated air–sea gas exchange from concurrent DMS and CO2 transfer velocities at intermediate–high wind speeds, Atmospheric Chem. Phys., 17, 9019–9033, https://doi.org/10.5194/acp-17-9019-2017, 2017.*

2. *Zavarsky, A., Goddijn-Murphy, L., Steinhoff, T., and Marandino, C. A.: Bubble-Mediated Gas Transfer and Gas Transfer Suppression of DMS and CO2, J. Geophys. Res. Atmospheres, 123, 6624–6647, https://doi.org/10.1029/2017JD028071, 2018*

Response: All the above references are cited in the revised manuscript.