

Responses to Referees' comments

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Title: Characteristics of methanesulfonic acid, non-sea-salt sulfate and organic carbon aerosols over the Amundsen Sea, Antarctica

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Note: Referee's comments are high lightened in **blue**, while our responses to reviewers are in **black**. The revisions in the manuscript was highlighted to make easily readable for the Co-Editor and the Referees.

Prof. Lynn M. Russell

Co-Editor

Atmospheric Chemistry and Physics

USCD, Scripps Institution of Oceanography

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Dear Professor Russell,

We have attached an electronic copy of manuscript file ready to go to press entitled "Characteristics of methanesulfonic acid, non-sea-salt sulfate and organic carbon aerosols over the Amundsen Sea, Antarctica" by Jinyoung Jung, Sang-Bum Hong, Meilian Chen, Jin Hur, Liping Jiao, Youngju Lee, Keyhong Park, Doshik Hahm, Jung-Ok Choi, Eun Jin Yang, Jisoo Park, Tae-Wan Kim, and SangHoon Lee for publication in Atmospheric Chemistry and Physics (acp-2019-133). We have modified our text based on the Referees' comments. We appreciated that the comments from Referees improved our manuscript a lot. We believe that the comments from Referees were clearly responded in our modified manuscript. We are looking forward to hearing about your decision. Thank you for your consideration.

Sincerely yours,

Jinyoung Jung

Anonymous Referee #1:

I do not understand the notation of these gas transfer velocity (k) values (W92, W99, N00, W14). Are these supposed to be velocity units? What equation was used for determining the uncertainty in DMS flux?

(Response) We thank Referee #1 for Referee #1's comments. The gas transfer velocity (k) values, W92, W99, N00, W14, indicate the gas transfer velocity values calculated from the equations suggested by Wanninkhof et al. (1992), Wanninkhof and McGillis (1999), Nightingale et al. (2000), and Wanninkhof (2014), respectively. The unit of gas transfer velocity is in cm hr^{-1} . We applied four different gas transfer values calculated from the equations suggested by Wanninkhof et al. (1992), Wanninkhof and McGillis (1999), Nightingale et al. (2000), and Wanninkhof (2014), respectively, to the equation for sea-air DMS flux calculation reported by Kim et al. (2017).

According to Referee #1's comments, we have revised our manuscript as follows: "When we applied four different k values (the units of k are in cm hr^{-1}) calculated from the equations suggested by Wanninkhof et al. (1992), Wanninkhof and McGillis (1999), Nightingale et al. (2000), and Wanninkhof (2014), respectively, to the equation for sea-air DMS flux calculation reported by Kim et al. (2017), the uncertainty in DMS flux in the Amundsen Sea region was about 25% (one standard deviation of the four different mean DMS fluxes)." (page 9, line number 10–14).

We also have added the references (i.e., Wanninkhof et al. (1992); Wanninkhof and McGillis (1999); Nightingale et al. (2000)) to our manuscript (page 24, line number 18–19; page 24, line number 22–23; page 22, line number 3–5).

References

- Nightingale, P. D., Malin, G., Law, C. S., Watson, A. J., Liss, P. S., Liddicoat, M. I., Boutin, J. and Upstill-Goddard, R. C.: In situ evaluation of air-sea gas exchange parameterizations using novel conservative and volatile tracers, *Global Biogeochem. Cycles*, 14(1), 373–387, doi:10.1029/1999GB900091, 2000.
- Wanninkhof, R.: Relationship between wind-speed and gas-exchange over the ocean, *J. Geophys. Res.*, 97(C5), 7373–7382, doi:10.1029/92JC00188, 1992.
- Wanninkhof, R. and McGillis, W. R.: A cubic relationship between air-sea CO_2 exchange and wind speed, *Geophys. Res. Lett.*, 26(13), 1889–1892, doi:10.1029/1999GL900363, 1999.