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Interactive comment on "Methanesulfonic acid (MSA) migration in polar ice: Data synthesis and theory" *by* Matthew Osman et al.

B. Alexander (Editor)

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Dear Matthew Osman,

Thank you for submitting your responses and revisions. In addition to the reviewer comments that you have already addressed, I have a few minor suggestions detailed below that I think will improve clarity. Please let me know if you have any questions.

Regards, Becky Alexander

Page and line numbers below refer to the revised manuscript.

Page 2 Line 14: Photolysis also results in postdepositional alteration of some chemical species. Perhaps this should be explicitly mentioned in this general statement about

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possible processes impacting chemical species in ice cores.

Page 3 Line 9: “lack of wintertime MSA deposition” implies zero MSA deposition flux during winter. Do we really know that it is zero? MSA has an atmospheric lifetime of several days, and thus can be transported over significant distances before deposition. Perhaps replace “lack of” with “relatively low”?

Page 3 line 11: “OH-“ should read “OHËŚ” or “OH radical”.

Page 6 lines 19 and 24 have confusing wording. “increasingly shallow depths” is confusing. Maybe replace with a description of the relationship between snow accumulation rate and the depth over which MSA migration occurs. “depths lower” is also confusing. Does “lower” mean above or below a certain depth in this context?

Page 9 line 7: Does this mean that the depth at which movement of MSA stops is deeper, or that MSA moves a larger distance in total?

Page 9 line 8: Can “small values” be replaced with “low concentrations”?

Page 20 line 7: The textbook Seinfeld and Pandis [2006] is probably not the appropriate reference for the Cl:Na molar ratio in seawater.

Page 32 line 6: Can you be more quantitative with the statement “high accumulation and low core-averaged [Na+]” by giving some numbers of range of numbers for “high” and “low”?

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