

Interactive comment on “Photooxidation of dimethylsulfide (DMS) in the Canadian Arctic” by A. Taalba et al.

Anonymous Referee #2

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Review of the manuscript “Photooxidation of Dimethylsulfide (DMS) in the Canadian Arctic” submitted by Taalba, Xie, Scarratt, Belanger, and Lefvasseur for consideration in Biogeosciences.

General comments:

I have examined the manuscript submitted by Taalba et al. and find it to be well written and a valuable contribution to further understanding of marine DMS cycling, especially in the Arctic. The scientific results and conclusions are presented in a clear, concise, and well-structured manner. I recommend the manuscript be accepted for publication once all the review comments are satisfactorily addressed. I expect the revisions will be mostly, if not all minor or moderate.

C2440

In addition to being concentration dependent, the AQY of DMS is temperature dependent. It isn't clear how or if the authors took the temperature dependence into account when comparing AQYs from different studies (i.e., Deal et al. 2005; Bouillon and Miller 2004; Toole et al. 2003). I am not sure how much it matters for the relationship between salinity and AQY (i.e., Figure 4), but the temperature corrected AQY can be calculated using the temperature dependence determined by Toole et al. (2003).

My understanding is that scalar irradiance accounts for light from all directions. Why was scalar irradiance not used in this study?

By my definition the seasonally ice-covered Bering Sea is included in the Arctic. Arctic sea ice clearly extends well into the Bering Sea. Also, the Bering Sea is north of the July isotherm of 10°C for the warmest month of the year, which is a common definition used for Arctic waters.

Please write out the abbreviations for MRE, CB, MS etc. instead of using the abbreviations throughout the text. This would make the manuscript easier to read.

Specific comments:

Introduction

Page 2095 line 3: “CCN increases cloud albedos...”. What is it about CCN that increases cloud albedos? I thought all clouds had CCN.

Page 2097 lines 4-7: This sentence, in particular following on the preceding one, gives the impression that these are the first measurements of the pseudo-first-order AQY in the Arctic. The Arctic marine environment includes the seasonal ice zone of the Bering Sea where at least one previous measurement of the pseudo-first-order AQY has been made. Perhaps “Canadian” should be placed before “Arctic” in line 6 or omit “Arctic” in line 6 for clarification.

Results and discussion

C2441

Page 2105 line 3: UVA also dominated DMS photolysis in the Bering Sea (Deal et al. 2005). To be complete, I think this reference should be included here as well. However Bering Sea waters would not be considered “warmer waters”.

Page 2107 line 20: Is “titled” the correct word here?

Page 2108 lines 17-18: From what I can tell, previous studies do not often implicitly assume that all underwater light was absorbed by dissolved chromophores. Your statement that previous studies do make this implicit assumption needs to be corrected or clarified. Because the chromophores involved in DMS photolysis are not known previous studies have used total absorption by CDOM as a proxy for reactant absorption.

References

Page 2114: Matsuoka et al. (2012) is cited in text but not included in references.

Tables and figures

Table 1: It would be more appropriate to replace the nitrate concentrations of 0.00 with “<” and the detection limit or an abbreviation (e.g., < DL) and state detection limit in the caption.

Table 2 caption: Should be “in an irradiation cell” or “in irradiation cells”, not “in an irradiation cells”.

Figure 4 caption second line: It seems like “(panel)” should be deleted.

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