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Interactive comment on "Phytoplankton and dimethylsulfide dynamics at two contrasting Arctic ice edges" *by* Martine Lizotte et al.

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Referee #2 Alison Webb a.l.webb@rug.nl Interactive comment on "Phytoplankton and dimethylsulfide dynamics at two contrasting Arctic ice edges" by Martine Lizotte et al.

Received and published: 21 January 2020 This manuscript is a well written and comprehensive review of different parameters determining the dynamics of DMS and DMSP along the ice edges around Greenland and the Canadian arctic. It is a good addition to the currently limited dataset on the relationship between DMS and the sea ice, and highlights the differences between single and multi-year ice. As the Arctic experiences greater ice loss, the importance of the single year ice is going to become more important to the global climate cycle of DMS, but we need to understand the difference

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to multi-year ice too. This particular aspect was well covered in the final discussion. I recommend this manuscript for publication with the following minor revisions. Author's response. We thank Dr. Alison Webb for her constructive review of the manuscript. Below we address each point brought up by Dr. Webb.

Specific comments L71. Please include a comment to the potential of Bacterioplankton to produce DMSP (Curson et al 2017) as well as break it down. Author's response. A very good suggestion. Author's changes in manuscript. The following phrase was added from L70 to L72: "The biosynthesis of DMSP is not restricted to eukaryotic organisms, however, and has also been found in marine bacterioplankton who can both produce it and break it down (Curson et al. 2017)." Furthermore, the following reference was added to the reference section on L822: Curson, A., Liu, J., Bermejo Martínez, A., Green, R. T., Chan, Y., Carrión, O., Williams, B. T., Zhang, S.-H., Yang, G.-P., Bulman Page, P. C., Zhang, X.-H and Todd, J. D.: Dimethylsulfoniopropionate biosynthesis in marine bacteria and identification of the key gene in this process, Nat. Microbiol., 2, 17009, https://doi.org/10.1038/nmicrobiol.2017.9, 2017.

L426. 'Bared no significantly' should be 'bore no significant' Author's response. Yes this is correct. Author's changes in manuscript. At L426 (now L436), the word 'bared' was changed to 'bore'.

L577 Reference spell check Stefels and Dijkhuizen 1996 Author's response. Yes Dr. Webb is correct, the letter 'n' was missing from Dijkhuizen Author's changes in manuscript. At Line 577 (now L590), "Stefels and Dijkhuize 1996" was changed to "Stefels and Dijkhuizen 1996".

Fig 2 caption. Spell check Pannel to panel Author's response. Yes, there is indeed a spelling issue here. Author's changes in manuscript. In the following caption the word "Pannel" was changed to "panel". Figure 2: Ice charts adapted from the Canadian Ice Services (CIS) of Environment Canada showing the presence of ice edges in (a) Lancaster Sound with 9-10/10 ice concentrations (> 15 cm) extending from Devon Island

into the Prince Regent Inlet between Somerset and Baffin islands (July 22, 2014); and in (b) Nares Strait with 9-10/10 ice concentrations near Petermann Glacier (August 1, 2014); panel (c) shows the presence of MYI (2 to 5+ years) at the entrance of Robeson Channel as well as a band of FYI (1) (Ease-Grid Sea Ice Age, Version 3 data set, Tschudi et al. (2016)). See the Canadian Ice Services Archives website for more details about sea ice characteristics. Note that Nares Strait includes Smith Sound, Kane Basin, Kennedy Channel, Hall Basin and Robeson Channel.

Table 1 and 2 captions. Both these captions are the same, despite different parameters highlighted in the tables. Can the captions be made more unique to describe the data in each table? Author's response. The two captions are not the same but they are similar. They do describe different variables: physicochemical characteristics (Table 1) and biogeochemical characteristics (Table 2), but also present the same inherent structure, reason why several elements are repeated. Author's changes in manuscript. The caption for Table 2 was modified from its original version to include a more detailed description of the biogeochemical characteristics found in the Table per se.

Table 2: Biogeochemical characteristics (including concentrations of DMSPt and DMS) of the surface waters sampled during the ArcticNet/NETCARE campaign during July-August 2014 grouped within different regions of the Arctic. Chlorophyll a is noted as Chl a and values in italic between parentheses represent in vivo fluorescence. Percentage of dominant phytoplankton taxa is shown for stations where it was available. Ice-covered stations are marked with an asterix*. Stations in bold are included in the vertical cross section transect figures (Figs. 4 to 7). Values that were not available are noted as 'n.a.'

Additional changes proposed by Lizotte and co-authors The authors would like to thank the referees for their review of the paper. Some modifications were made to the Acknowledgements section to reflect this.

Original version (Lines 670 to 675). The authors wish to thank the captain of the

CCGS Amundsen, Alain Lacerte, as well as his officers and crew for their support during the oceanographic campaign. We also want to thank Jonathan Gagnon for nutrient analysis, and Sylvie Lessard for the taxonomic analysis. This study received financial support from NETCARE (funded under the NSERC Climate Change and Atmospheric Research program), ArcticNet (Network of Centres of Excellence of Canada) and the NSERC Discovery Grant Program and Northern Research Supplement Program (M. Levasseur, M. Gosselin and J.-É. Tremblay). This paper is a contribution to the research programmes of NETCARE, ArcticNet, and Québec-Océan.

Updated version (Line 684 to 691) The authors wish to thank the captain of the CCGS Amundsen, Alain Lacerte, as well as his officers and crew for their support during the oceanographic campaign. We also want to thank Jonathan Gagnon for nutrient analysis, and Sylvie Lessard for the taxonomic analysis. Finally the authors acknowledge both Dr Alison Webb and an anonymous referee for their constructive reviews of the original manuscript. This study received financial support from NETCARE (funded under the NSERC Climate Change and Atmospheric Research program), ArcticNet (Network of Centres of Excellence of Canada) and the NSERC Discovery Grant Program and Northern Research Supplement Program (M. Levasseur, M. Gosselin and J.-É. Tremblay). This paper is a contribution to the research programmes of NETCARE, ArcticNet, and Québec-Océan.

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