

Interactive comment on “The distribution of methylated sulfur compounds, DMS and DMSP, in Canadian Subarctic and Arctic marine waters during summer, 2015” by Tereza Jarníková et al.

Tereza Jarníková et al.

tjarniko@eoas.ubc.ca

Received and published: 11 December 2017

Dear Anonymous Referee #3,

Thank you for your thoughtful criticism of our work. We have reread and revised our manuscript according to the corrections you provided. Please find responses to each of your points, below. We have done our best to address each statement carefully, and look forward to your responses. An updated manuscript is also available.

Best, Tereza Jarnikova PhD Candidate, UBC

Interactive comment on “The distribution of methylated sulfur compounds, DMS and

C1

DMSP, in Canadian Subarctic and Arctic marine waters during summer, 2015” by Tereza Jarníková et al. Anonymous Referee #3 Received and published: 1 November 2017 1. General Comments In this paper, authors measured the concentrations of DMS and DMSP in the surface seawater from the Labrador Sea to the Canadian Arctic Archipelago during the summer of 2015. In addition to the distributions of DMS/P concentrations with information of seawater parameters (hydrographic parameters, taxonomic compositions, and sea ice cover) in this area, they detected the abrupt increases in the DMS concentration at the front of hydrographic parameters by measurement with fine spatial resolution. The data obtained from this observation contributes to the accumulation of database in the Canadian Arctic waters and to discussion on the response of DMS to changes occurring in the Arctic Ocean. This paper would be acceptable if the authors reconsider and correct the part described in Specific Comments and

Technical Corrections. 2. Specific Comments (1) Authors conclude that the results obtained from this cruise (shallow MLDs and mixed phytoplankton assemblages) support the results of previous studies by Gabric et al. (2004) and Levasseur (2013). I wonder whether the spatial changes such as the differences between the sea-ice free area and the locations where sea ice has just melted can be compared with the result caused by sea ice reduction in future Arctic waters.

>We do not believe that it is possible to compare recent sea-ice melt regions with a highly-stratified ice-free Arctic - it is likely that the processes governing DMS production in a recent ice-melt region (eg ice diatom water column release) are quite different from those in the stratified ocean. However, interestingly, we believe that our technique may be able to capture ice-melt effects.

»(2) The authors discuss the sharp increase in DMS concentration obtained from the measurement of high spatial resolution. Then what happened where the DMS concentration sharply decreased for example at 2600km, 3600km, 4000km, and 7600km?

>As these are transect measurements, our paper suggests that the areas of sharp

C2

increase correspond to encountering watermasses with high DMS production - we discuss the potential role of fronts in DMS production later in the paper. The regions mentioned here are directly after the spikes in DMS - it may be inferred that the ship left the high-DMS zones at this time.

(3) L262: In Equation (1), do you need to include the DMS concentration in the surface atmosphere? When you use this equation, you need to mention about omitting this.

>We do not include any surface atmosphere DMS in our calculation. We will mention that we are assuming no surface DMS in the revised manuscript.

(4) L269: The exchange coefficient of the flux calculation is a function of the wind speed at the 10m height from the sea surface. Please note that the height of the anemometer. And if the height is far from 10m, then you need to mention about the influence of the height difference.

>This is an issue that has been brought to our attention. We have 10m anemometer data available, and will revise the appropriate figure with this data.

3. Technical Corrections (1) When reading bg-2017-337.pdf, I found the following typing mistakes. I think that there are other typing mistakes in this draft, so reread and fix them.

(2) About the use of "Figure" and "Fig", if "Figure" is used at the beginning of a sentence and "Fig." is used in sentences, "Figure 3" at L317 is not at the beginning of the sentence, is this correct?

>To minimize stylistic problems, I've written out the word "Figure" everywhere.

(3) Figure 5 is referred (L329) prior to Figure 4 (L368). You need to swap Figure 4 and Figure 5.

> Thank you, this has been fixed.

C2 (4) Table 4 is referred prior to Table 3. You need to swap Table 3 (L375) and Table C3

4

>Thank you, this has been fixed.

(L291). The order of Table 3 and Table 4 is also the same

>Thank you, this has been fixed.

(5) Is the writing style "km 7000" in L309 correct? This notation can be found in several other places such as L309, L322, L326, L331, L334, L336, L343, L346, L386, L403, L590, and L598.

>This style is commonly used in geographic survey literature. We use it consistently in this paper as we believe it to be both concise and unambiguous.

(6) In "Reference list", journal names written by full notation and abbreviations are mixed.

>This has been corrected using the standard abbreviations.

(7) In Figure 2, gray shaded areas denote not only the part of sharp increase in DMS concentration, but also the part of its high concentration (and its sharp decrease). If you want to highlight only the part of its sharp increase, carefully mark the part only where the DMS concentration increases.

>Our approach was to highlight localized regions of DMS accumulation, which include both sharp increases and decreases. We believe that showing the entire signal for each DMS pulse helps the reader visually compare coherence between DMS features and other hydrographic variables

(8) List of technical errors L53: Is "three order" correct?

>This is written as "can vary by three orders of magnitude", and a citation is provided.

L59: At the end of L59, not period but comma.

> Thank you, this has been fixed. L70âL71: Invalid way to cite the references written

C4

in L70-L71; DMS emissions (Chang et al., 2011), (Mungall et al., 2016) ==> DMS emissions (Chang et al., 2011; Mungall et al., 2016)

> Thank you, this has been fixed.

L92: mixed layer depth => mixed layer depth (MLD) L234, L280, L290, L534, L615,

> We have added the abbreviation MLD into instances of mixed layer depth mentions.

L914: mixed layer depth => MLD

>We believe it is correct to have both the full name and the abbreviation in this case, as it is a table caption.

L128, L155, L200: The notation of "membrane inlet mass spectrometry (MIMS)" is to be used only at the first quotation, and the abbreviation (MIMS) should be used at subsequent citations.

>Thank you, we have changed this.

L130, L156 The notation of "OSSCAR" is same as my comment for "MIMS". We have changed this.

L138: "(July 10-August 20, 2015)". Is parenthesis "()" necessary?

>We have adjusted this stylistically.

L147: shallow, narrow straits => shallow and narrow straits

>We would prefer to keep "shallow, narrow" straits.

L263: Where => where

>Thank you! Fixed.

L306: 18nM => 18 nM

>Thank you! fixed.

C5

L316, L317: 29nM => 29 nM, insert half-size space after "29" 52.31mmol => 52.31 nmol

>Thank you! fixed.

L314: Is "(measured with OSSCAR)" necessary? If so, () is necessary?

>Though this is implied by our instrumental setup, we've opted to remind the reader that DMSP is measured by OSSCAR here to emphasize the source of the data.

L331: sea-air flux observed => sea-air flux calculated (or estimated)

>We have changed this to 'calculated'.

L348: (Fig 2c) => (Fig.2c) insert period after "Fig".

>We have opted to write out "Figure" everywhere.

L360: Is (G) in "Gradients (G) for each variable" necessary here?

>We believe that this links the text to the formula shown, and have opted to keep it.

L416: Quotation "Wolfe et al (2002)" at the end of L416 and the same author's quotation at the end of the sentence of L418 are duplicated (the latter is unnecessary).

>Thank you! Fixed.

L444: Fig 6a,=> Fig. 6a

>We have opted to write out "Figure" everywhere.

L446: Insert a half-size space between "(Fig. 6b)." and " The result""".

>Thank you! Fixed.

L459: heavily => mainly

>Thank you! Fixed.

C6

L461: drawn => obtained

>Thank you! Fixed.

L474: in the Northwest Subarctic => in the northwest subarctic

>Thank you! Fixed.

L474: Lizotte et al (2012) => Lizotte et al. (2012)

>Thank you! Fixed.

L500: Either "Previous" in L500 or "previously" in L501 is unnecessary. >Thank you! Fixed.

L514: (Tremblay et al., 2011) in the end of sentence should be deleted.

>Thank you! Fixed.

L540: (Matriai et al. 1997) => (Matriai et al., 1997) Need comma after "et al."

>Thank you! Fixed.

L553, L554, L556: nM ug-1 => nmol ug-1

>Thank you! Fixed.

L560^{iij} DMSP:Chl and HPLC => insert "a" after chl in italic. DMSP:Chl a and HPLC C4

>Thank you! Fixed.

L585: [30a] Reference?

>Thank you! Fixed.

L601-L602: Gali et al. (Gali et al., 2010) => Gali et al. (2010)

>Thank you! Fixed.

C7

L613: Gabric et al (2005): Need period after "et al". Year of publish of this paper is 2004, not 2005.

>Thank you! Fixed.

L616: DMSP:Chl a ratios :Chl a should be italic.

>Thank you! Fixed.

L844: 20244. => 20244 (Delete period after 20244.)

>Thank you! Fixed.

L885: Adapted from (Coupel et al. 2015). => Adapted from Coupel et al. (2015).

>Thank you! Fixed.

L997: show denote =>Choose either "show" or "denote".

>Thank you! Fixed.

L1024-L1025: What are the grey area in these figures? Are the same as Fig.2?

>Thank you! Fixed.

L1040-L1041: Explain the panel (a) and (b).

>Thank you! Fixed.

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2017-337>, 2017.

C8