

## Reviewer 1

This study highlights the minimal consumption of methane as a fraction of the dissolved gas, which is in flux to the atmosphere. Moreover, the authors demonstrated that in riverine, mixed, and polar water masses, MOX is significantly tied to methane concentration. The focus here is on the diffusive flux to the atmosphere, but we have no sense of how this diffusive flux compares with ebullition of methane from seeps in the study region. Since this study examined shallow water masses, discussion of any active seep/vent locations in the study area would be helpful, as ebullition is likely to play a major role in methane flux to the atmosphere, and, in turn what fraction of total methane release is available for consumption by MOB.

I am generally supportive of the publication of this study, although mention of marginally significant statistical findings or insignificant results and speculation leading from these should be addressed. In a few cases, grammatical errors and vague language should be rephrased, but addressing these items shouldn't be difficult.

*There is already a discussion on the effect on ebullition in lines 50ff, but we added some more points .....*

*L54: For lakes, it has been estimated that ebullition contributed to 18-22% of the total emission (Del Sontro et al. 2016).*

*L458: Ebullition of methane from the sediment in this area is also reported, resulting in very high methane fluxes 1 – 2 orders of magnitude higher than the other calculations (Table 3). The methane released by ebullition did not show any isotopic evidence of oxidation and thus will be released almost completely into the atmosphere (Sapart et al. 2017). However, if this ebullition really results in elevated atmospheric methane concentrations is a matter*

Specific Comments:

L15 – here “methane distribution” refers in parentheses to “headspace”, but this isn't a method and it is unclear what is meant. Suggest rewording.

*To our knowledge the measuring of methane concentration in a head space does represent a well-known method, we therefor reworded this to the methane distribution (via head-space method) and*

L44 – should read “The source(s) of methane...”

*Changed accordingly*

L55 – suggest rewording “water column MOX” to be consistent with first reference to an abbreviation (i.e. “water column methane oxidation (MOX)”).

*Changed accordingly*

L59 – this sentence seems vague and perhaps unnecessary. *We prefer to keep this statement*  
Suggest beginning with the following sentence and changing “for some authors” to “In certain studies”

*Changed accordingly*

L120 & L132 – change to methane [mono]oxygenase

*Changed accordingly*

L133 – were the same primers used here as above?

*Yes, changed accordingly*

L224-225 – “This was most pronounced...” the sentence is oddly phrased; suggest rewording.

*Changed to “This decrease off the coast was most distinct for the Transect 1 and 4, where also the maximal concentrations (218 nM) were observed”.*

L230 – 236 “significant” should have a p-value given

*The p value is now added to the text.*

L286 – remove mention of OTU “preference” for different water masses, especially where you didn’t find a significant trend. Perhaps use phrasing “association” or “link” instead of “preference” throughout.

*Changed to „association“*

L379-381 Perhaps MOB with divergent pmoA sequences were not detected with these specific primers? This possibility isn’t discussed, but instead speculation was raised that MOB might exist that lack pmoA genes.

*We agree that our wording was not precise. We re-phrased the MS as follows: This could be due to the fact that there are MOB which were probably not amplified. The primer set used in this study is the most frequently used, however a couple of different primer sets are available for amplification of specific monooxygenase genes in several subgroups, which are not targeted using this primer set (Knief, 2015). Thus, these subgroups e.g. Verrucomicrobia or the anaerobic methanotrophic bacteria of the NC10 phylum and others (Knief, 2015) were not quantified in our study.*

L395-396 The statement that “OTUs identified in this study cannot be related to known MOB” appears to contradict the taxonomic affiliations offered on Line 288. Do you mean that a subset of the OTUs identified in this study cannot be linked to known MOB?

*Yes this is correct we re-phrased the MS accordingly*

L415-416 This part is a reiteration of the results on L295. What is the importance of measuring a higher windspeed in comparison to Thornton et al.?

*Changed to „This is a bit lower than 1.879 for the outer ice free Laptev Sea in summer 2014 as reported from Thornton et al., (2016). In contrast, our wind speed was a bit higher ( $4.2 \pm 2.2$  m/s) than  $2.9 \pm 1.9$  m/s as reported from Thornton et al., (2016).. This would result in slightly higher equilibrium concentrations and higher gas exchange coefficient in our study”*

L443 Define (spell out) ESAS; not mentioned elsewhere.

*Changed accordingly*

Figure 3. I recommend changing the color for highest methane concentration from pale orange to something that isn't already on your color scale for lower concentrations (e.g., grey or black)

*I have dived into the program settings, but there seem to be no way to modify the range of colors.*

Figure 5. The omission of two data points is mentioned in the main text, but this should also be clearly stated within the figure caption.

*Changed accordingly*