

Dear Dr. Abril,

Thank you again for your comments.

The Ms has been sent again to the same editing service and they have polished the whole Ms and I also have checked the Ms again. I have outlined our answers to your specific comments in the text below.

I think the language has now improved significantly and I hope you will appreciate the changes.

Yours sincerely

Ingeborg Bussmann

BG---2017---22

Dear Dr Bussmann

Thank you for the revision of your MS and your letter that was forwarded to me by the editorial manager. From my reading of this new version, I acknowledge the important changes in the MS that considerably improve the scientific argumentation. I think your MS has reached the overall scientific quality to be published in Biogeosciences, and this is why I will recommend publication. However, the publication can occur only after some more serious revision of the language. Indeed, the poor editing quality of your MS again disappointed me, and I find it hard to believe that it has been edited by a professional service as you mention in your letter (otherwise, I would recommend moving to another editing service). Like you, I am not English native speaker, and I understand it is not easy to publish in English. However, I cannot accept that the poor quality of language alters the scientific message. The problem is that at many places in your MS (see list below), the text seems more spoken language than written language. The scientific meaning becomes unclear and/or imprecise. A detailed language editing is absolutely necessary to make scientific statements unambiguous before publication.

I would like to point out that, contrary to what you mention in you letter, anonymous referee #3 was the same person during the first and second round of the review process. Her/his evaluation was much more severe the second time, because she/he considered you did not satisfactorily and seriously address her/his comments. Please keep in mind that reviewing is a volunteer time---consuming work. As associate editor, I ask you to consider my comments more seriously this time. Below, some citations from your MS that suggest it has not been edited by a professional service as you pretend. Again, I am not English native, so this list is probably not exhaustive and the entire MS needs language editing.

Looking forward a revised version of your MS,
With best regards

Gwenaël Abril, BG associate editor

L24 (and throughout the MS): “a higher “estimated diversity” in the “riverine water” than in the “polar water.” Ambiguous use of quotation marks; quotation marks can be use once a time when defining a term that will appear later in the MS, but not throughout the MS.

To my opinion, the quotation marks for names should be kept throughout the text, but probably I am wrong here and I have removed them.

L46 “global runoff” : change to “global river runoff”

Corrected

L61: “an important effect on reducing the greenhouse effect considerably” > please rephrase

Changed to “an important impact on reducing the greenhouse effect considerably”

L62 “the final sink for methane before it is released to the atmosphere” awkward sentence, what is the meaning of “final” here?

Changed to “therefore the final sink for methane before it is released from the aquatic system into the atmosphere.”

L95 “as modified from (Caspers, 1959).” Please refer to how to cite literature and use parentheses (same comment at many places in the MS)

Changed to “modified from Caspers (1959).” and throughout the MS. There are no specific instructions how to cite when the authors are part of the sentence. I have now changed all respective references to “ by Smith et al. (2011)

L107 “were calculated by differential weighing” >I suggest: “were determined gravimetrically”

Changed accordingly

L214: change “square” to “rectangle”

Changed accordingly

L234: “warm freshwater at the surface (0–5 m), followed by a mixed water body” not clear what “followed” means here... below? Above?

L235 “we found cold and saline water (= “polar water”)” please make a sentence
Changed to “. In September 2013, we observed a sharp stratification, with a warm freshwater layer at the surface (0–5 m) and a mixed water layer immediately below that. Water at depths greater than approximately 10 m consisted of cold and saline water (= polar water).”

L238 “the subsequent stations” unclear, please specify

Changed to “the stations farther off shore were characterised by polar waters”

L248 “When applying our water masses (riverine, mixed and polar), we observed...” awkward sentence

Changed to “We observed significantly different methane concentrations in the riverine, mixed and polar water masses, with medians of 22, 19 and 26 nmol L⁻¹, respectively (p = 0.03; Tab.1). Therefore, we conducted separate linear correlation analyses for each water mass.”

L257 ““riverine” sample) and excluding the very high water values of station TIII--1304; which made the correlation much stronger” Ambiguous use of quotation marks and semicolon. What made the correlation stronger, the high value or to exclude the high value?

*Changed to 2 sentences “With this two modifications, the correlation was much stronger ($r^2 = 0.62$, $n = 33$, **Error! Reference source not found.**)*

L272 “The fractional turnover (k') is a measure of the relative activity of the MOB” > how was k' calculated?

In the M&M section (L125) we explain “The principle of the MOX estimation is the comparison between the total amount of radioactivity added to the water sample and the radioactive water that was produced due to oxidation of the tritiated methane. The ratio between these values, corrected for the incubation time, is the fractional turnover rate (k' ; $d-1$)”

L279 “The abundance of MOB can either be given either in cell numbers or as relative abundance” awkward sentence

Changed to “The abundance of MOB can be expressed as cell numbers or as relative abundance”

L290 “Additionally, the “estimated diversity”, as OTUs per station,” ambiguous use of quotation marks.

The quotation marks have been removed and the sentence changed to “Additionally, the estimated diversity (OTUs per station), showed a weak but significant”

L334 “reported a range of 10 to 100 nmol L⁻¹ (estimated from Figure 2 in (Sapart et al., 2017).” inappropriate use of parentheses (also at many other places in the MS) corrected

L339: “A more detailed comparison with temperate and tropical environments is discussed below, in the context of the diffusive methane flux, as most reviews rely on the methane emissions rather than on the concentrations.” What reviews? Please add references

Changed accordingly

L345 “seafloor methanogenesis resulting from the decomposition of organic carbon” this is a truism as methanogenesis IS decomposition of OC

Changed to “In the shallow Chucki Sea, the most likely source was also methane resulting from the decomposition of organic carbon at the seafloor “

L347 “However, low tides, low topographic relief and low precipitation in the present study area are not favourable for a high ground water input to the Lena Delta.” Low tides: do you mean low tidal amplitude? In addition explain the scientific reason for this statements.

Changed to tidal amplitude

In this section, we discuss possible source of methane in the polar /mostly bottom water. Thus, we discuss (beside sediment borne methane) other possible methane sources, which are known for arctic seas.

L353 “Thus, we cannot support ebullition as a methane source.” awkward sentence, please check

Changed to “so ebullition is unlikely to be a significant source of methane. “

L365 “However, for the latter two processes, it not clear yet if this methane production will result in elevated methane concentrations in situ.” Please rephrase
Changed to “However, the contributions of photosynthesis and DMSP production to in situ methane concentrations remain to be established.”

L368 “However, at the shallow stations (< 8 m, coastal stations of the transects), the water column was mixed; thus, sedimentary methane may diffuse into the water above.” Unclear, and oversimplified statement, please rephrase.
Changed to “However, at the shallower stations (< 8 m, i.e. the coastal stations of the transects), where the water column was mixed, sediments may be the source of the surface water methane.”

L372 “as rivers or estuaries are thought to import methane---rich water into coastal seas.” Do you mean “export” instead of “import”?
Sorry, yes it was “export”

L378 “However, even this scheme does not seem applicable to our data.” Please improve formulation to be more explicit
Changed to “However, none of the currently proposed schemes seems applicable to our data”

L393: “median methane oxidation rate of 0.32 nmol L⁻¹ d⁻¹, ranging from 0.03 to 5.7.” please avoid numbers without unit
Unit is now added.

L401 “The first order rate constant used for modelling the methane flux in the Laptev Sea is estimated to range from 18116 d⁻¹ to 11 d⁻¹ (= 2.3 × 10⁻⁶ to 3.8 × 10⁻³ h⁻¹)” Confusing: was this rate “estimated” or “used”; avoid “=” in the text.
Changed to “The first order rate constant used for modelling the methane flux in the Laptev Sea ranged from 18116 d⁻¹ to 11 d⁻¹”

L407 “The influence of the methane concentration on the MOX was also most pronounced in “riverine water”” inappropriate use of quotation marks
All quotation marks for “riverine” water (and the others) are now removed.

L409 “With the described method of qPCR and the water column specific primers (Tavormina et al., 2008), the relative abundance of MOB in our study ranged from 0.05 to 0.47% (median 0.16%) which is equivalent to 4 × 10⁴ to 3 × 10⁶ cells per L (median of 6.3 × 10⁴), except for the high values from station T1--1302.” Confusing. What is the high value ?
We decided to put this sentence to the result section, as we did not want to discuss the outliers. We also changed the wording to: The relative abundance ranged from 0.05 to 0.47%, except for the high values from station T1-1302, at 1.69 and 2.63% (surface and bottom, respectively, Fig. 6). These high values could not be explained by any environmental or methane-related parameters. In addition, they were statistical outliers and were excluded from further analysis.”

L412: “; thus, they are regarded as methodological outliers” awkward sentence, please justify how such methodological problem may occur.
They were statistical outliers, the definition is now given in the M&M section, 2.8

L422 “correlations between parameters important to heterotrophic bacteria,” please

rephrase, bacteria don't mind about "parameters"

Changed to "but we found correlations with parameters that are important for establishment of a heterotrophic bacterial population"

L451 "Thus, the ecological traits can be described as follows:" not sure "thus" is appropriate at the beginning of a new paragraph. I suggest changing "described" to "summarized"

Changed to "The ecological traits determined in the present study can be summarised as follows"

L454 "The relative abundance and "estimated diversity" (OTU/sample) of MOB" inappropriate use of quotation marks

removed

L456 "the MOB in the polar population were quite efficient at reaching a MOX comparable to riverine water." Do you mean MOB population in polar waters? do you mean MOX activity, or MOX rates? do you mean comparable to MOX activity of MOB in riverine waters? Please rephrase

Changed to "The MOBs in the polar population were lower in relative abundance and had a lower estimated diversity than the MOBs in the riverine population, but these microorganisms were quite efficient at reaching a MOX comparable to that observed in riverine water"

L469 "the classical concept of the r- and k- strategist has today been replaced by the C- S- R functional classification framework" please explain

Changed to "replaced by the competitor - stress tolerator - ruderal functional classification framework (Ho et al., 2013)."

L491 "ranging from 4–163 $\mu\text{mol m}^{-2} \text{d}^{-1}$." Ranging from 4 to 163 $\mu\text{mol m}^{-2} \text{d}^{-1}$

corrected

L494 "A comprehensive study by (Myhre et al., 2016)" inappropriate use of parentheses

corrected

L498 "(Graves et al., 2015) (Table 5 Table 5)." Please edit your MS

corrected

L509 "A comprehensive study by (Myhre et al., 2016)" inappropriate use of parentheses

corrected

L509 "aquatic methane emissions is presented by (Stanley et al., 2016) and (Ortiz-Llorente and Alvarez-Cobelas, 2012). inappropriate use of parentheses. Same in many other places in the MS

corrected

L512 "as well as from tidal systems, to which the Lena Delta would be classified" "to which" is not correct

Changed to "This finding contrasts with the review by Borges and Abril (2012) comparing worldwide estuaries, where an increase in methane emissions was evident from estuaries at high latitudes, as well as from tidal systems. (Notably, the Lena delta matches both of these classifications.)"

L514 “; thus they conclude” to what do “they” refer to ?

To the authors Ortiz-Llorente and Alvarez-Cobelas, changed to “the authors”

L520 and at many other places in the MS “(Borges et al., 2017;Lofton et al., 2014)”
insert a space after the semicolon

Corrected in the whole Ms

L525 “A molecular approach identified the salinity, temperature and pH as the most important environmental drivers of methanogenic community composition on a global scale.” Please add a reference

corrected

L534 a paragraph cannot start with “).”

corrected

L534 “he methane released by ebullition did not show any isotopic evidence of oxidation;” please provide a reference

The reference is at the end of the sentence (Sapart et al 2017).

L556 “However, one fact to be kept in mind is that our estimation is a static one”
poor English

Changed to “Our estimate of methane flux is a static one and does not take into account the currents and spreading of the freshwater plume.”

L561 “A more complex approach is taken by (Wahlström and Meier, 2014).” Poor English and inappropriate use of parentheses

Changed to “The simulations performed by Wahlström and Meier (2014) revealed the importance of the methane oxidation rate constant and the crucial necessity of obtaining an in situ measurement of it”

L576 “as no direct dilution of riverine methane occurs;” awkward sentence, how can “dilution” be “direct” (or “indirect”)?

Changed to “as we did not find evidence of a direct methane input of the Lena River”

L583 “; thus, we propose that it will compensate for any increase in methane concentrations.” Not clear, is this speculation? Do you mean you “postulate”?

Yes, corrected to “postulate”

L585 “he stratification of the water column will be broken up and the separate water masses mixed” looks like spoken English, not written English.

Changed to “However, increases in storm frequency or strength will disrupt the stratification of the water column and promote mixing of the different water masses”