Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2017-410-RC2, 2018

Biogeosciences Discussions

Interactive comment on "Methane oxidizing seawater microbial communities from an Arctic shelf" *by* Christiane Uhlig et al.

Anonymous Referee #2

Received and published: 3 January 2018

Review bgd-2017-410: Methane oxidizing seawater microbial communities from an Arctic shelf

Uhlig et al. present novel data of the methane oxidizing community structure from in situ samples and incubation experiments from ice and water at an Arctic shelf. They sequenced both the pmoA gene and the v4/v5 region of the 16S rRNA gene, which has not been done often. They compare these results to hydrophysicochemical data and net methane oxidation rates. (Part of?) The methane oxidation rates have been presented in Uhlig 2017 (L&O methods). Although the data is interesting and is a valuable addition to the presently available pool of research the MS needs more work and several points have to be clarified before it can be published.

Major concerns

Sampling and incubations: I think it is difficult to compare two ice cores when one of them was melted at 5 degC for 1 week, the other at room temperature for 1 day. The authors mention it but also for further experiments experimental setups should be kept consistent between samples. The same is true for the incubation time of short and long incubations. They are not consistent between treatments. Why? Was it due to a limitation of the research station? Why where there not always replicates and dead controls taken? That should not be a problem if sampling takes place with a pump. Are the IMB samples all from the same day and did you do the replicates all from one depth so that the initial community composition and methane concentrations were the same? What about the water mass that was different during several days? Did you compare the community composition during the two different 'conditions'? I would expect a different community since temperature and oxygen, as well as ADCP data both show the presence of a different water mass.

Data: Are you presenting the same net oxidation rates as in your paper in L&O methods? If yes, this should be mentioned more clearly.

Discussion 4.1.: The discussion about CH4-isotopic composition in the ice is incomplete and not very clear. This should be changed.

Figure 6: Did you exclude one point for the correlation of IC1? If yes, why? If no, how can the correlation look like this? For IC2, you make a linear correlation mainly dominated by one point. Do you think that is ok?

Other concerns:

Page1 L21: Please write "...80%. Total MOB abundances.. L22: methLylotrophs L22: "present in abundances compared to .."; present in SIMILAR abundances? L23/24: (last sentence of abstract) not very clear sentence. please change L27: 25x higher radiative forcing is only true if you consider a certain time period. please specify

Page2 L9: what about dilution effects? L23: development OF communities L29: what

about the primers developed by tavormina et al. 2008? why did you not use them, especially in a marine environment?

Page3 L3: are methanotrophs not methylotrophic? please specify L4: what do you mean by: “THIS is attributed.. L29: afterwards, you talk about the two sites in a different order. first IMB, then EL. Check for consistency throughout the MS since it is much easier to follow

Page4 L5: add YSI, Ohio, USA to the sonde L26: What is IC1 and 2. First, talk about 1, then 2 and add abbreviation

Page5 L2: how do you get 0.2x of in situ concentrations? did you remove methane? (ok, explained on page 13, add explanation on page 5)

Page6 L8: is it not common to write v4-v5 region or v4/v5?

Page7 L15: between and spiked? I don’t understand L15 and bellow: why do you call the 0.2x treatment spiked? you did not add methane to it as far as I understood

Page8 L10: in supp. fig.1 the maximum seems to be -0.9 degC L18: here and throughout the MS, check 103 etc.

Page9 L1: why no cell counts for IC1 L10/table2: why did you not incubate all different treatments the same amount of days? it makes it more difficult do compare the data L28: do you have an idea in what processes members of oleispera could be involved? L29: slightly more abundant..compared to what?

Page10 L3: “deviated further” further than what if short incubations were similar to in situ samples?

Page11 L15: add “depths AT IMB exhibit..” for better understanding. it is confusing when you’re talking about which site L24-L30: you only talk about methanogenesis. what about methane oxidation? it would also alter the isotopic composition of the remaining methane..

Page12 L11: change the position of “also” to “ might also have taken place L11: remove the comma after study L15/16: what is a possible explanation of higher oxidation rates during ice covered conditions? L19: “fall into the middle”? mid-range might be clearer L22: how many points did you have to calculate the fractionation factors?

Page13 L3: please make sure that you’re always talking about net methane oxidation/production as you’re not directly measuring rates. here, and throughout the ms L9: why make a new paragraph? L11: do you mean “phosphonates” or “methylated phosphonates”? L3-L22: a lot of discussion for data, for which you do not have a killed control..please shorten

Page14 L9: delete the in before in situ L15: remove the “the” before kox

Page15 L1: correlation between what and what? L25: what about IC1? L25: abundance OF MOB L25-27: I do not understand this sentence

Page16 L7-10: very long sentence. shorten? L11: comma is wrong before suggests L13/14: if you consider possible methane production within the ice, why not methane oxidation?

Table 1: What is the difference between nutrients and nutrients depth profile (IMB2/3)? you also did cell counts for IC2, right?

Table 2: why did you not take any samples for pmoA of the sea ice?

Table 3: please indicate the initial and final dissolved methane concentrations. maybe add a line between EL and IMB.

Figure1: why does the hand held YSI indicate warmer temperatures but the adcp not? how do you think would a regularly melting ice (due to warmer water from the south) influence methane concentrations and the community structure?

Figure 2: grey box is missing

Figure 3: the blue dot is not visible for “IMB”

Figure 8: “..Above the entIRE cell gain..”

Please check for double-spaces in between words.

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