

Interactive comment on “Different methanotrophic potentials in stratified polar fjord waters (Storfjorden, Spitsbergen) identified by using a combination of methane oxidation techniques” by S. Mau et al.

Anonymous Referee #2

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This manuscript describes a field study of methane oxidation rates in a stratified fjord system in a polar environment. The authors used two different methane tracers, labeled with either ^3H or ^{14}C , with the ^3H tracer being almost non-perturbing of the natural methane concentration and the ^{14}C tracer causing >10-fold increases in methane concentrations. The ^3H tracer therefore provided rates that would be close to the in situ rates, while the ^{14}C tracer would give the potential rates at near-saturating substrate concentrations. In addition to depth profiles of the rates, the authors also present some $\delta^{13}\text{C}$ values for the dissolved methane pools as a function of depth in the fjord. All

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of the data is interpreted in the context of three different water masses, representing different depth layers. It is a well written manuscript and presents some interesting and useful data. I have just a few comments and suggestions offered to help improve the manuscript.

The distinction between the $^3\text{H}\text{-CH}_4$ and $^{14}\text{C}\text{-CH}_4$ methods is not always clear throughout the paper. It was not just a different isotope that was used, but a very different concentration of CH_4 tracer that was applied in the two cases. While they describe this in the method, the distinction is lost in the Results and I think they should try to make this clearer throughout the text. Note –not to the authors but to the journal. It is extremely inconvenient to review the “print version” of the manuscript, with page sections numbered 6463 etc, with seemingly random breaks... A continuous line numbering would help.

Abstract. L14. Add comma after surface L18. ...at 60 m, AND PEAK RATES WERE found in ArW/BSW... L19. I believe it should be ^{13}C not ^{14}C that were increasing in residual methane pool. L25. ...attesting TO the ubiquitous... L 27. I think you need something after “unusually long” – what does it mean? Also, spelling error in Methylosphera Introduction. L10. PREdominantly ... Also, replace carbonate with CO_2 as that is the actual substrate. Sec 6464. L5. Remove “of” L7. ...has proven TO BE... L8. I think it is incorrect to state that the two tracers are converted at the same rate as the natural pool of methane since the ^{14}C increased the concentration 10-fold and actually reduced the rate constant for most incubations. L11. Exist not exists. Sec 6465. L2. Water not waters Sec 6466. L22. Remove “gas mixture comprised” It is not needed and it wasn’t a mixture, just one isotope in each sample, right? Or did you add both isotopes to the same sample? Sec 6467. L4. It is not clear what you mean by “ambient”. It could mean in situ concentration, or the ambient concentration in the particular sample (which in the case of the ^{14}C would be much higher than in situ). L14. WERE carried out. L20. What percentage of the remaining methane was in the headspace? L21. Was trapped L27. Phenylethylamine Sec 6469 L13. Add “at 60

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m" after respectively. L16. ...decreased WITH DEPTH... Sec 6470. L6. ...showed DISTINCT DGGE ... L15. Add comma after waters Sec 6471. L5 attesting TO L8. What does it mean that non of the amplicons matched known pmoA genes? Are they sure they did this right? This section seems weak. L22. Use salt instead of ion L23. Delete "with" Sec 6472. L3. Replace "with" with "at" L10. There are probably other possibilities besides DMSP for the source of the methane in the water column. Section 6474. Just a discussion point. The deep population of methanotrophs might be poised to respond to methane release events, which might have been missed in the snap-shot sampling Sec 6475. L1...attesting TO THE ubiquitous... L17. Add "IN CONTRAST," the comparably short... L25. Give the range of enrichment factors rather than just ~1 order of magnitude.

Check all references for typos. Bender and Conrad has a typo in the title.

I printed the figures in color and in Fig 2 it was difficult to see the stations and the text labeling the coastal current arrow. It was easier to see on the computer screen.

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