Biogeosciences

Discussions

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Interactive comment on "Effects of Sea Animal Colonization on the Coupling between Dynamics and Activity of Soil Ammonia-oxidizing Bacteria and Archaea in Maritime Antarctica" *by* Qing Wang et al.

Anonymous Referee #1

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The manuscript "Effects of Sea Animal Colonization on the Coupling between Dynamics and Activity of Soil Ammonia-oxidizing Bacteria and Archaea in Maritime Antarctica" investigated the abundance, diversity, community structure and bioactivity of ammonia oxidising bacteria and archaea in Antarctic maritime soils. colonized by sea animals. The results found that soils colonized by seals and peguines exhibited higher AOB than AOA, as well as higher ammonia oxidizing rates than the control tundra soils. These findings suggest that AOB may play a more important role than AOA in driving ammonia oxidizing in peguine and seal colonized soils, while AOA more important in

control tundra soils. The research provided very interesting findings, which contributes to understand the nitrogen cycling in Antarctic coastal soils. Here are my concerns: 1. Too many abbreviations for samples and sites, authors got PS, PL, MS, SS and BS for sample IDs and PTS, PLS, MS, STS and BS for sites. This is just too confusing to read. 2. Line 25, Nitrosospira is an AOB, Nitrososphaera is an AOA, need to change their order in the sentence. 3. Line 41, Comammox (COMplete AMMonia OXidiser) is an abbreviation, please provide its full name. 4. line 40-41, "Only recently...", this sentence seems to be out of picture, I would suggest to remove it. 5. Line 56, "However, there has been limited...", I don't think this sentence is correct, especially after the authors listed so many studies on ammonia-oxidisers in line 52-56. 6. Line 210ïïjŇ "mean pH range of 5.3-6.6", The word mean and range seems contradict to each other, I guess the work "mean" here represents the mean of each sampling site. This is better to be clarified. 7. Line 211, "Penguin and seal colony tundra soils, PTS and STS, had lower TOC..." Firstly I couldn't find the C:N ratio in table 1; secondly the table 1 used id SS, PS, PL etc, but main text used PTS, STS etc, therefore lacking consistency, lastly, the TOC level of PS (PTS) site was not significantly different from the PLS, MS and BS sites. I think the lack of significance was due to large variations? 8. Line 213, "as expected, soil nutrient levels...", why is this expected? I could understand that TN may be higher with penguin guano and seal faeces input, but why TP and TS? Furthermore, there was no significant TN difference in BS with SS, PS and PL, similarly for TS, TP, and even ammonia. This greatly reduces the reliability of authors' claim. After a close inspection on the numbers provided in the table 1, it seems that the large ammonia in SS and PS was due to a single sample in each site, I don't know how far SS1 and SS2 are to generate such large differences. Furthermore, this may not make much sense, the SS1 has ammonia concentration of 650 mg/kg, the highest among all other SS samples and 35 times higher than SS2, but its total nitrogen was only 1.2%, even 0.4% lower than SS2. Similar unusual pattern was also in the ammonia concentration in PS2 sample I would strongly suggest the authors to recheck their measurements. As these environmental factors are the basis of many statistical analysis performed

later, this would completely make authors conclusion invalid. 9. Line 219, "likewise, soil ...", which site is author referring here? PTS or PLS? Or stating a generally pattern from PTS, PLS to MS? Please clarify. As PTS is clearly not showing this pattern.. 10. Line 222, "therefore, the soil TP and NH4..." this is a very bold statement, and lacking proof. Something like linear regression would be required. 11. Line 229, (fig. 2), figure 2 has 3 parts (a, b and c), please specify which part of the figure 2 is referred to. 12. Line 229, "overall..." please provide a scatter plot to visualise this (can be put in supplementary) 13. Line 231, " the archaeal amoA gene showed a heterogeneous distribution" what does heterogeneous distribution mean? 14. Line 232, there was a mixed usage of AOA amoA and archaeal amoA in the manuscript, please make them consistent. 15. Line 237, "fig 3", similar to a previous comment, there are 6 parts of figure 3, please specify which part does this refer to. 16. Line 235, "Soil AOA amoA gene abundances were significant..." This statement is inappropriate, I would agree that animal activity reduces archaeal amoA gene abundance, but the statement of increasing archaeal gene abundance with reduced animal activity need a better proof. A correlation analysis between the activity intensity index and archaeal amoA gene abundance would be required. 17. Line 240, "The soil AOB amoA gene abundances increased ..." this is incorrect, author stated that the order of sampling reflected the intensity of seal activity (highest in SS1 and lowest in SS5) (line 123-127), but clearly the abundance of bacterial AOB gene reduced with reduced penguin or seal activity. 18. line 242 "The ratios of AOB to AOA amoA..." please cite figure 2c for this sentence. 19. line 250, " The PAOR was significantly higher in STS...", this is not fully correct, the PAOR of PS samples was not significantly different from the BS site. 20. Figure 3, again, archaeal results appeared before bacterial results, thus their figure should appear before bacterial figures. 21. Line 258, "Interestingly, the PAOR..." Please confirm this statement with a statistical analysis, as PAOR increased from SS3 to SS5. 22. Line 271, "Specifically, the AOA amoA gene ..." please present these results as a table or a figure. 23. Line 276 "Phylogenetic analysis showed that the AOA..." Why and how phylogenetic analysis was used to group sequences into OTUs? In addition, the entire

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sentence is confusing, please revise. 24. Line 289, "Phylogenetic analysis showed that AOB amoA..."Why and how phylogenetic analysis was used to group sequences into OTUs? In addition, the entire sentence is confusing, please revise. 25. Line 312, "The AOA richness and phylotypes were evidently inhibited..." what does this mean? The richness of AOA is indeed lower in STS and PLS, but this result has already been presented in line 269. 26. Line 323 why RDA was used to investigate the correlation among amoA gene abundance, diversity and etc? I would think RDA is used to deal with matrix dataset, but all these variables are vector variable. If only correlations were required, Pearson or partial Pearson correlation would be sufficient. If the contribution of each variable is required, I would think VPA analysis would be a better option. 27. Line 325, "The AOA amoA gene abundance...", which type of correlation is this? Please report the r value, and may be also scatter plots in the supplementary. Furthermore, authors stated that both AOA amoA gene abundance and diversity were related to C:N ratio, but only one P-value was reported. 28. Table 1 need to provide full name of site, also the site codes do not match those in the main text. 29. Figure 2. The order of figure need to change, Figure 2b appeared first in the manuscript, and they should appear first in figure 2.

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