

Reply to the second round of reviewers' comments on **Database of nitrification and nitrifiers in the global ocean**

We thank the reviewers for their constructive comments that helped to improve our manuscript. The detailed response to each comment is shown in blue below.

Reviewer 3:

The authors have generally addressed my concerns and I am pleased to see that the readability of the data tables has been greatly improved. I think the current manuscript is in an acceptable form for ESSD.

Some minor issues:

Figure 13 Nice figure. However, given the large difference in the number of observations for the two rates, the differences in the median profiles could also be brought about by regional differences, authors can consider marking the paired profiles with different colors.

We acknowledge that the median profiles of ammonia oxidation and nitrite oxidation could be biased by the number of profiles available for ammonia oxidation (203) vs nitrite oxidation (96) and the distribution of these profiles (see the number of observations separated by ocean basins in Figure 2 (and below) and discussion in lines 456-461). In fact, the relative distributions of ammonia vs nitrite oxidation rates are similar, so regional bias may not be a factor. We now use grey lines and black lines to show non-paired and paired profiles (i.e., ammonia oxidation and nitrite oxidation were measured concurrently), respectively in the updated Figure 13 and below. The median profiles are represented in red lines.

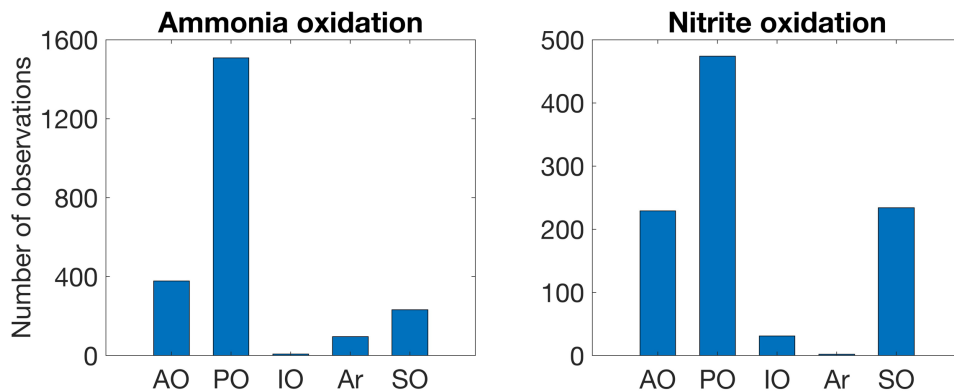


Figure. Number of ammonia oxidation and nitrite oxidation in major ocean basins (AO: Atlantic Ocean; PO: Pacific Ocean; IO: Indian Ocean; Ar: Arctic Ocean; SO: Southern Ocean).

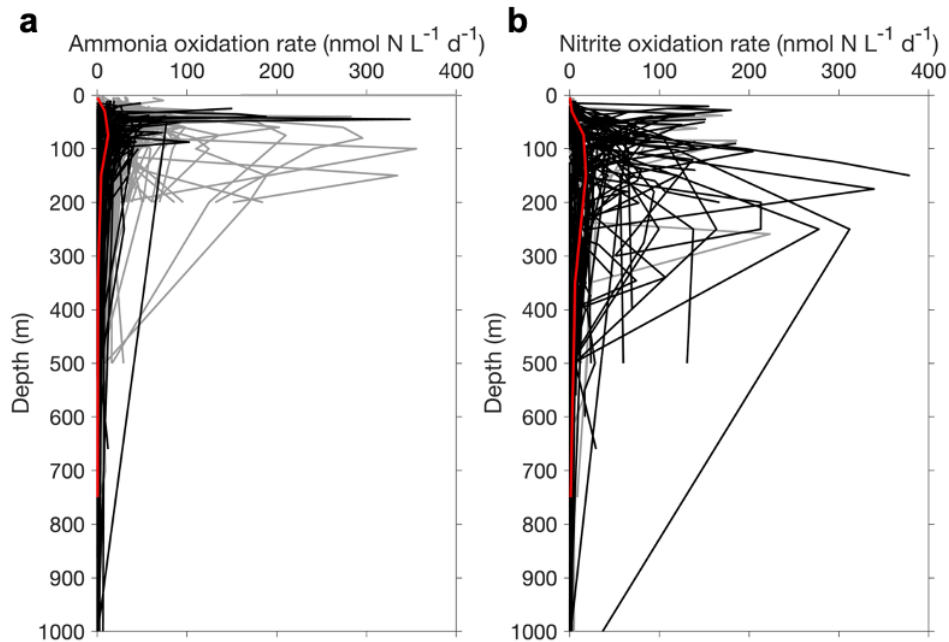


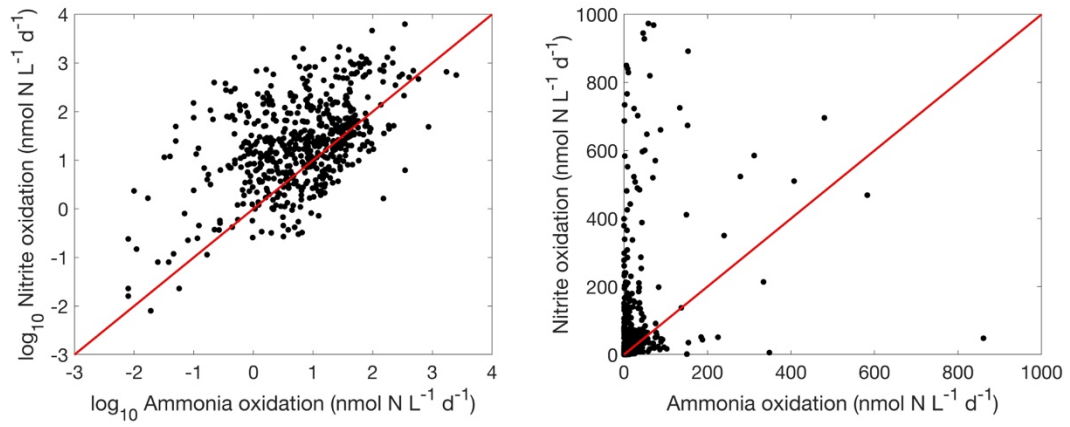
Figure. Vertical profiles of ammonia oxidation and nitrite oxidation rates. Grey lines are non-paired measurements. Black lines show the paired observations (concurrent measurements of ammonia oxidation and nitrite oxidation). Red lines are median rates.

Lines 573-576 Ammonia are also very low in the deep sea, and the results here (Fig. 21) seems cannot reflect the different ammonia affinity of WCA and WCB

We thank the reviewer for capturing the error: WCA AOA was mislabeled as low-ammonia group AOA while WCB AOA was mislabeled as the high-ammonia group AOA in Figure 21. WCA AOA is the high-ammonia group while WCB AOA is the low-ammonia group or likely has higher affinity for ammonia, dominating in the deep ocean. The mislabeling has been corrected in Figure 21.

Line 489, 513, 629, 724-725 The formulas here seem to be exponential because x and y are taken logarithmically. Personally, I think it might make more sense for the formula here to give the relationship under linearity.

We provided the equations in log10-transformed format because the data have roughly log-normal distributions rather than normal distributions. Linear regression could be obscured by the large anomalies in a normal scale. We compared the figures with and without log10-transformed data. For example, the comparison between ammonia oxidation and nitrite oxidation is shown below. The linear fit for the log10-transformed data is $\log_{10}y = 0.53 \times \log_{10}x + 0.91$ ($r=0.5$, $p<0.01$) while the linear fit for the data in normal scale is $y = 0.6 \times x + 116.8$ ($r=0.2$, $p<0.01$). Due to the better correlation in the linear regression, we decided to keep the log10-transformed format.



I would still recommend merging some similar figures together if possible. But the decision can be left to the editor.

We would like to keep the figures separated for better visualization.