

Interactive comment on “Glacial-Interglacial changes and Holocene variations in Arabian Sea denitrification” by Birgit Gaye et al.

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Reply to reviewer 4:

Thank you very much for the review and the valuable suggestions which will help to considerably improve the manuscript.

As reviewers 1 and 2 also suggested we will expand the introduction of Arabian Sea water mass structure and dynamics. In the revision we will check if the presentation of some highly resolved individual records, as has also been suggested by reviewer 3, could strengthen some of our points. We will also add more literature on N-cycle in general and specific Arabian Sea literature. A new organization of the Introduction and study area and the removal of the latter from Materials and Methods to make it more

C1

visible will be another improvement.

Lines 378-395: we will check records and show those with very high resolution (possibly in the Supplement or as a new Figure in the main paper) to make this point (high $\delta^{15}\text{N}$ during IS) more convincing.

Terminology will be checked and corrected throughout the ms.

Lines 390/391: this refers to the IS events during the glacial conditions.

Lines 411-412: we will check this and will either eliminate this or show individual records if they clearly show this.

Lines 417-418: We will expand on this point of remote forcing.

Lines 421-422: we will be more specific. The major change is in the northern Arabian Sea.

The two southern “west” cores have troubled us for some time during ms. preparation and as the SST records are not very different from the more western AS records off Oman we binned them together with the former. But, as Figure 4 implies Holocene SST are very similar at the two southern locations while glacial SST are higher than at the other locations. We will check if there is additional information when plotting these two locations separately. Unfortunately, there are no $\delta^{15}\text{N}$ data from these two locations.

Lines 445-460: We will check if it makes sense to separate the records into west, north etc. or otherwise delete the TOC MAR.

Lines 461-473: A comparison of model results with WOA data will be included and we will work on the model-data comparison and try to evaluate remote forcing vs. local effects on the OMZ.

Discussion and Conclusion

C2

We believe that the contribution of the paper is to provide a synoptic view of the processes responsible for the glacial-interglacial as well as the stadial-interstadial increases in denitrification and the regional variability within the basin. The other and more important contribution is that we can show that the present position of what is often called the core of OMZ and denitrification in the northeastern Arabian Sea is evidently a recent development. We suggest that this is due to a strengthening of the NE monsoon but also and may be more important to remote forcing. We will concentrate on these aspects in the revised version.

Minor comments

Lines 72-73: Sommes et al. 2017 will be cited (and read)

The remaining minor changes will be made.

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