

Interactive comment on “Oxygen minimum zone of the open Arabian Sea: variability of oxygen and nitrite from daily to decadal time scales” by K. Banse et al.

Anonymous Referee #1

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This paper has value in that it holds insights on the Arabian Sea OMZ by those who know it best, in this case the authors. So the paper will be a place for the reader to go to quickly learn those insights and use them for interpretation of their own data. The time spent on the analysis presented must have been great; we are fortunate that the authors invested their time this way. Organizing the tables in the Supplement alone must have taken great effort. But because of the ‘very deep’ insights by the authors, I often felt in reading specific passages that they have their faces far too close to the “trees” they are studying. The community would like to understand the system one or two levels above the “trees”, but the details given are often far too deep or they are on issues that are not adequately set up for consideration; the authors can’t seem to help

C6562

themselves in writing every idea and detailed observation that comes to mind, whether relevant to the paper’s topic or not. I do not know how to improve that problem other than to point out each of those ‘too detailed’ lines. I did some below, but the authors could be more aggressive about eliminating off-target statements here and there.

Page 15456 Lines 7-10: “The very low O₂ values obtained. . .” This sentence comes out of the blue and adds nothing to my understanding of what this paper is about. I suggest it be deleted. Lines 11-12: the word “besides” is not a good fit; rewrite to just list the 4 variables. “Besides” is irrelevant. Line 27: “trend to a similar increase” similar to what?

Page 15457 Line 1: what is “annual reconstitution of the decrease”? Makes no sense to me. Replenishment of O₂? Line 7: what is a “redox environment”? Which variables are being considered for this statement? Line 19: change to “occur in the water column of the global ocean, . . .” 15460 Line 7: “What to think” is not really a question than can be answered on pg 15461, line 1. Repose the question. Line 21: “next-to-fully”? There must be a better word for this meaning.

15461 Line 1: “In answer to the second question..” This question wasn’t well enough posed to even have an answer. The question was “what to think”. It needs to be improved so that the answer makes sense. Section 2. . .

15462 Line 21: sentence starting with “In turn..” is irrelevant to the manuscript. 15470 Section heading 3.2.3: Nitrite and Dinitrogen: I don’t see “dinitrogen” specifically addressed in this section, other than as an unmeasured product of denitrification. Line 20: delete “source of”

15472 Line 18-20: “The average turnover time of NO₂ in the central Arabian Sea of 49±20 years estimated by Lam et al. (2011) seems way too long by our lines of argument” I don’t see argument relevant to the point about Lam et al. and I don’t any reason to mention it here. The point is a throwaway. Section 3.2.6 Animal Life: I do not see the relevance of this topic given the title and the abstract (i.e., variability of O₂ and

C6563

NO2-2). It is interesting but off topic.

15474 Line 11: the nitrate deficit is a few 10's of meters deeper than NO2-2. . .what? Nitrite deficit, nitrite max, or??? Section 3.2.8 Age of the OMZ: Interesting, but I don't see its relevance.

15477 Line 12-13: There are several mentions of Fig. 3 that direct the reader to consider the boxes or the latitudinal ranges (e.g., "diapycnal heat transport demonstrated in Fig. 3 between 12 and 21_ N), but I do not see in that figure information on the boxes or the latitudes. Presumably I'd have to go to the supplemental data to figure out which datum in Fig. 3 shows a feature being mentioned, but that is far too much work for a reader. Maybe I'm just not seeing it, so I'm missing much of what the authors are pointing out in Section 4.1.2 (Fig. 3) in terms of spatial variability.

Table 3: caption holds inadequate information on content of table; "Mean values with S.D. . .". Mean values of what? Tables 4 &: the "median concentrations and numbers of samples for two seasons" should be given as (using data from first line of Table 5) 0.12/8; 0.00/3, so that it is in fact concentration/number as the footnote indicates. Fig. 1: I am unsure of what the "2" refers to, south of Karachi. It looks like it is on the 0.2 O2 isoline or on the 1000 m isobar. Fig. 4: the resolution of the print in the figure is too low. Hard to read.

Supplement Line 9: "...density of the water mass (26.5-26.8 kg m-3).." The density is 1026.5 kg/m²; sigma-t or sigma theta is being given here. Lines 13-16: "Note the greatly variable hydrography on four recent zonal sections near 8°N through Box A1, including the aeration, especially down to about 250 m depth (Chereskin et al., 2002; Stramma et al., 2002; Beal et al., 2003)". "Note" is where? Does the reader need to go to the references and find some relevant figures? Need more guidance on how to "note" the variability.

Lines 19, 21: I don't like the use of the word "apparent" here. The data are not "apparent", which is what the title implies. If there is a bias, fine; but is there a bias in the

C6564

apparent data? No, bias is indicated with apparent. In Line 28, you corrected reported O2 values; you did not correct "apparent" values. Please do not use "apparent" so freely.

Table S.1.b would be helpful, I think, to have the final 4 columns labeled with the variables included in each column; otherwise there could be some confusion.

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C6565