

# ***Interactive comment on “Ocean Deoxygenation and Copepods: Coping with Oxygen Minimum Zone Variability” by Karen F. Wishner et al.***

## **Anonymous Referee #1**

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Ocean deoxygenation and zooplankton: very small oxygen differences matter

This is a large and somewhat complex paper that reports in detail primarily on the depth distribution of a number of different copepod species throughout the ETNP region in areas with prominent and persistent OMZs. The fact that these regions are expanding and that the productivity of the regions is often tied to the extent and magnitude of the deoxygenated area suggests the importance of understanding these regions. Zooplankton as mediators of energy and material flow through planktonic foodwebs are key to this understanding. The authors are well suited to report on the work, having a strong publication record on low oxygen open ocean systems, and the amount of data included in this paper is impressive.

The goals of the paper, to examine the distribution and migration of copepods that

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utilize the OMZ, and determine whether those distributions and migrations change with a changing vertical oxygen profile, are useful for understanding habitat use as these habitats change with climate. The text does a good job of answering these questions and describing the data but I think the paper would benefit from a better presentation of the data in tables and figures, and perhaps a summary diagram or two, as well as a summary table. The authors categorize 23 copepod taxa into 4 categories to better understand habitat usage, and while there are observed differences within each category, they are well described by the species included for each category. In addition, there are two basic habitat structures that are compared - one with an abrupt upper oxycline and shallow mixed layer, and another with a more graduate upper oxycline and deeper mixed layer. This would be a useful way to summarize the data: a table and/or diagram showing how each of the 4 categories (generally) responds to both habitats. As noted, this is described well in the text, but it would be especially useful for illustrating the patterns and comparing the graphs that are presented for individual species.

The data that were presented in graphs could be better represented in some cases as well. Figure 2 is somewhat confusing with different vertical and horizontal scales for the same data. The zoomed aspect is a good idea, but I think that the graphs should at least be rearranged, with shallower graphs above deeper one, and perhaps the deeper ones should have a depth minimum at the place where the shallower ones end. Also, a box around the region that is zoomed in could be usefull, e.g. for the upper layer oxygen data, so that it looks more like an inset. For the TO plots on the bottom, I think a box around the region that is zoomed in will be helpful too. I also wondered about the variability in a given station, because the CTD data is shown as one line from a representative cast, while the zooplankton data is an aggregate. Some comment or presentation of the variability, at least of O2 would be useful. As thin lines of the same color, or a shaded region around the O2 perhaps. This may not be possible and may make the graphs too busy, so even just a note in the text or some supplementary figures would help alleviate concerns about that variability.

For figures 4-10 it might be helpful to have a title to the overall figure, describing which category each group of species belongs to and/or what type of data it represents, simply for quick reference, as they are all very similar. In the published manuscript the caption will be with the figure so this may not be necessary, but because they are all so similar, there might be a way to set them apart.

Some other specific comments:

Table 3 appears unfinished. I think the first column with data names should be reformatted and split into multiple columns for the different metadata and using actual words and not abbreviations (e.g. “D” and “N”)

The discussion of oil presence in *E. inermis* is interesting, but the text presents data not shown in any figures, and it would be better to note that this data is not shown or show it. In particular the inclusion of the percentages of individuals with oil in them should be cited in some way, and perhaps an indication of how many individuals were observed. If this is not a fully quantified number (e.g. if it is anecdotal) it may still be important and worthy of inclusion but it needs some documentation.

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