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Ocean Science
Discussions

Interactive comment on "Intermediate water masses, a major supplier of oxygen for the eastern tropical Pacific ocean" *by* Olaf Duteil et al.

Anonymous Referee #2

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This paper highlights the role of intermediate waters as the O2 supply pathway for the waters of oxygen minimum zones primarily focusing on the Pacific basin. This study consists of three model simulation with different source code, resolution and biogeochemical parameterizations. In general current generation of earth system models tend to have difficulties representing this mode of oxygen supply, thus overestimating the size of low-oxygen waters. Here are main conclusions; (1) the O2 concentration of these water masses in the subtropics is biased in models. If restoring is used to correct the model bias in O2 entering into the subtropics, the tropical O2 representation improves significantly. (2) the ocean jets and eddies play major role for the O2 transport of intermediate water, as supported by the runs with different model resolutions. Coarse resolution models must rely on parameterization for this process. (3) Due to

tropical upwelling, the biases in the deep and intermediate water can impact on the entire upper ocean water column.

I think these points are not really surprising, but the authors have done a detailed, systematic analysis of oxygen responses to model resolution and source water properties to support these conclusions. In my view, this paper is publishable perhaps with a few minor revisions. Below are my technical comments. Main text has several typos. It will benefit from a careful proofreading.

Fig 2b. If I'm reading this figure correctly, it is remarkable that not a single model can capture the peak of O2 at about 800m. I think this feature should be pointed out more clearly in the main text at about page 6. The caption does not indicate which line is WOA. I think it is obvious that the observation is the thick black line, but it needs to be spelled out in the caption.

Fig 3 and main text in page 7. I really like this figure and the discussion in the main text, up to panel f. Then I'm confused. The figure caption says the panels g, h, i are zonal mean tendencies of O2. The main text talks about something different about deep O2. It doesn't even mention how these tendencies are calculated. This probably means there is some version inconsistency between Figure 3 and the main text. This obviously needs a revision.

L284 and in some other places; What is meant by the "upper layer"? I interpreted as the surface, but please be more specific (such as the surface or sigma-theta level or a z-level).

The text related to Fig 4 is confusing, if I read it correctly, the net advective transport divergence is not affected but is not shown (L262-263). Is the change in O2 concentration entirely caused by the eddy parameterization part of the transport? In my opinion, this type of budget analysis may be more interesting if it is applied to contrast the low- and high-resolution runs and separate the mean flow and (resolved or parameterized) eddy contribution.

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