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Interactive comment on “Technical note: The effect of vertical turbulent mixing on gross O₂ production assessments by the triple isotopic composition of dissolved O₂” by E. Wurgaft et al.

Anonymous Referee #1

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Estimation of marine primary production using triple isotopic composition of dissolved oxygen, which was founded in 2000, has been activated by numerous publications after 2010. Through its development, one significant issue for interactions with subsurface layer beneath the mixed layer has been raised. This study by Wurgaft, Shamir, and Angert aims to evaluate the diapycnal oxygen transfer between mixed layer and underlying waters by vertical one-dimension model including eddy diffusion process. The paper was written clearly and well organized; the argument is simple but important. Introductory section seems almost perfect because the objective and motivation of this study are clear and fashionable. I agree with future perspectives shown by authors in the discussion section. Basically, I think this paper is worth-publishing in

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Biogeosciences. However, I also think authors should pay some more efforts on their model calculation. As authors themselves pointed out, the simulated results appears to be highly dependent on the choice of eddy diffusivity, nonetheless they applied only one arbitrary value (along with one extreme value). As a consequence, it is difficult to find any persuasiveness from section 3 and 4. I strongly recommend authors to do sensitivity test by using various eddy diffusivities. An additional sensitivity test are also recommendable to change "deep" points. These results may make readers understand how significant these parameters are.

I have another two questions to avoid confusion.

Q1. Authors prescribed a depth of single layer to 10 m in both Section 3 and supplementary document. But in the Table 1 and 2, ones digits of all depths were 5. Why? More specifically, authors prescribed an uppermost layer to 10 m, whereas the thinnest mixed layer in Table 2 was 5 m. Why?

Q2. Authors let the uppermost layer been in equilibrium with atmospheric oxygen both for concentration and isotopes. How about mixed layer? Is it always equilibrated with atmosphere both for concentration and isotopes?

Please refer following minor comments as well.

P14241L15-16: equilibrium concentration of O₂ with atmosphere

P14241L16: equilibrium 17D with atmospheric O₂

P14242L25: Replace "takes place" to "dominates"

P14244L19: Remove comma between "column" and "represented"

P14244L21: Replace "so that [O₂] would remain fully mixed" to "so as to let oxygen in the ML fully mixed"

P14245L25: Authors never define the correspondence of model days with real months.

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