

Wang et al. present a basin-scale ocean circulation model coupled to a dynamic ecosystem carbon cycle model which they apply to the tropical Pacific in order to assess the role of the parameterizations of vertical mixing and of the oxygen uptake during DOM remineralisation for the asymmetric shape of the OMZs in the tropical Pacific.

I understand that this manuscript has already gone through several review rounds. I have gone through the replies to the comments made at the previous round and find that the authors have satisfactorily replied to the comments of the two reviewers. The text has been extensively rewritten.

There are only a few minor questions and comments that I would like to make at this stage.

Line 155: why "Monthly"?

Response: We have removed "monthly".

Lines 208-209: "700-100 m" should be "700-1000 m", I guess.

Response: We have corrected as "700-1000 m".

I have one question about the nutrient consumption rate terms in equations (B8) and (B9), not raised in the previous reviews, as far as I can see. At first both look like classical Monod terms. However, they are more complicated than that, as the N_S_UP and N_L_UP are not concentrations and A_UP is not a half-saturation constant: N_S_UP and N_L_UP (from equations (B11) and (B12), resp.) are actually rate-law expressions themselves, composed of a hyperbolic function (Monod factor) in NO_3 (with half-saturation constants K_S_NO3 and K_L_NO3 , resp.) multiplied by a hyperbolic inhibition factor depending on NH_4 , with an inhibition constant K_NH_4 ; A_UP is a Monod factor in NH_4 , which uses K_NH_4 as a half-saturation constant. I have never seen this nested usage of Monod factors and Monod factors with inhibition in Monod functions before. The resulting uptake rate expressions look highly non-linear to me and I expect them to come close to their maximum values only in very narrow concentration ranges and leading to small values for most NO_3 - NH_4 concentration combinations. What is the rationale behind these rather convoluted formulations?

Response: Thank you for the constructive comments. Equations (B8-B9, B11-B13) are for the uptakes of ammonium and nitrate, with a preferential uptake of ammonium, which are the same as those (eq. 8 and eq. 9) used in Vallina and Le Quéré (2008).

We used Monod functions for the growth rates of small and large phytoplankton (see eq. B14- B17).

$$Q_A = \frac{A}{k_A + A} \quad (8)$$

$$Q_N = \frac{N \cdot (1 - (A/k_A + A))}{k_N + N} \quad (9)$$

There are a few typesetting problems with symbols used in the equations (B3) and following and their names in the table named Appendix B.

Response: We have corrected the typesetting problems with symbols used in the equations (B1-B4, B9) and other places.

Please notice also the repeated "zootoplankton" instead of "zooplankton" in that table.

Response: We have corrected as "zooplankton".

Finally: please have the text proof-read by a proficient English speaker/writer. There remain numerous English errors (missing articles, ill-formed sentences, ...).

Response: We have carefully checked the whole manuscript and had a proof-read by a proficient English speaker/writer.

Reference:

Vallina, S. M. and Le Quéré, C.: Preferential uptake of over in marine ecosystem models: A simple and more consistent parameterization, *Ecological Modelling*, 218, 393-397, 2008.