

Interactive comment on “Optimization of Biological Production for Indian Ocean upwelling zones: Part – I: Improving Biological Parameterization via a variable Compensation Depth” by Mohanan Geethalekshmi Sreeush et al.

Anonymous Referee #1

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The paper introduces a new methodology to optimize a key biological parameter, the so called compensation depth (Z_c), which is defined as the depth at which the photosynthesis equals the respiration and is a key variable in large scale biogeochemical modeling, especially in nutrient restoring models. Usually this is set as a constant value in models, however observational evidences show a spatio-temporal variability and seasonality in Z_c . In this paper a spatio-temporal varying Z_c is parameterized/derived from conventional wisdom of light attenuation at depths, minimum radiation required for production and optimal growth rate of biomass and came up with a spatio-temporally

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varying Z_c . This new parameterization has improved the model export and new production especially in the upwelling areas of the the Indian Ocean. This resulted a reduced seasonal bias in pCO_2 and CO_2 fluxes in the model (which is a caveat usually found in the constant Z_c models) by the new parameterization.

I recommend the manuscript be published but after addressing the following concerns. 1. The introduction is too long with too many unnecessary narrations. I generally have a feeling after reading Introduction several times, the paragraphs are not carrying a 'specific message per paragraphs'. Introductions required to be synchronized. 2. The biogeochemical model used in the study requires a little more details. 3. Author(s) may explore the possibility of quantifying both the biological and solubility pumps which play an important role in the Indian Ocean upwelling zones.

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