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Biogeosciences
Discussions

Interactive comment on "Modeling the seasonal cycle of the oxygen minimum zone over the continental shelf off Concepción, Chile (36.5° S)" *by* J. Charpentier et al.

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We are deeply thankful for the useful comments of the anonymous reviewer. All your comments have been considered to enhance the revised version of this paper. About your general comment, mechanism of the contribution of the Equatorial Subsurface Waters (ESSW) to the seasonal OMZ in the region has not been clearly established before. Furthermore, relative contribution of biological processes enhanced by upwelling, and advection of 'foreign' waters is not clear from observations. Besides, reducing advection of poorly oxygenated waters also should reduce mixing processes, which leaves all the oxygen to be consumed in the surface by biological processes, as is cor-

rectly represented by our sensitivity analysis. Otherwise, despite our model does not reproduces accurately oxygen concentrations, it reproduces the seasonal cycle fairly well, which is our ultimate goal. Keep in mind that our 'observed' concentrations are monthly averaged data, and we are not trying to reproduce a specific period. About the paper restructuration, it has been done in order to improve the readability of the manuscript.

Detailed comments

Page 7229: lines 26:28. This section has been removed and this subject is properly explained in the analysis of the data.

Page 7231: lines 16:17. The series is described in the model input data section.

Page 7232: line 5. All your concerns now are explained in the "input data" section.

Page 7233: line 20, Page 7234: line 3 and Page 7237: line 20. Correction are been added to the text

Page 7236: section 4.1. The model starts at January 1st of an hypothetical typical year.

Page 7238: eq 2 and eq 3. During summer, the result that indicates that consumption is higher than production in the zone is realistic, as was shown by previous works in the area (Escribano and Schneider, 2007; Vargas et al., 2007). The date when production and consumption data were taken has been added. Also, units for equations 2 and 3 are now on the text.

Page 7239: eq 6. The parameterization of NOP for bio 2 was presented earlier by Thomas et al. (1990). We decided to include this theoretical approach looking for a good NOP representation that improves our model. The main difference between bio1 and bio2 is that the first is based purely on data, while the last is mostly theoretical (besides, of course, that bio 1 yields net consumption near the surface, while bio2 is the opposite).

Page 7239: eq 7. Dz must be included in the equation because we are using volumetric flux. The O2sat notation has been corrected. All the parameterizations used are mentioned in the text.

Section 4.2.This section of the text was modified.

Figure 7. The caption of the figure has been modified. The panel d shows the shape of the function described by bio2, and varies in amplitude and vertical distribution over time. Because of this, we show only generic axes.

Figure 8b. The difference on model setup between curves A, B and C shown on Figure 8b is the biological parameterization, wind input and vertical mixing are the same in this cases. Kz was chosen to be constant based on sensitivity tests (see Section 3.3). The best fit between bio1 and bio2 depends on the modeled season; we select bio1 because it's based on observations.

Figure 8a. Parameterizes NOP during winter is not negative for all depths in neither both parameterizations.

References

Escribano, R., and Schneider, W.: The structure and functioning of the coastal upwelling system off central/southern Chile, Progress In Oceanography, 75, 343-347, 2007.

Thomas, F., Garcon, V., and Minster, J. F.: Modelling the seasonal cycle of dissolved oxygen in the upper ocean at Ocean Weather Station P, Deep Sea Research Part A. Oceanographic Research Papers, 37, 463-491, 1990.

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Interactive comment on Biogeosciences Discuss., 9, 7227, 2012.