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Biogeosciences Discussions

Interactive comment on "ENSO-driven fluctuations in oxygen supply and vertical extent of oxygen-poor waters in the oxygen minimum zone of the Eastern Tropical South Pacific" *by* Yonss Saranga José et al.

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Dear Vincent Echevin

We appreciate your comment and we entirely agree that those references should be incorporated in the present work. We also agree that a comparison of the present study with Mogollón and Calil (2017) and Espinoza-Morriberón et al. (2019) would be interesting to discuss in this paper. We address these comments as follows:

Page 2, lines 5-8 now reads:
While the impacts of ENSO events on ocean temperature and productivity have been studied for many years (Philander, 1983; Barber and Chavez, 1983; Escribano et al., 2004; Chavez et al., 1999), impacts on the oxygen minimum zone (OMZ) *have until recently received only limited attention (Llanillo et al., 2013; Mogollón and Calil, 2017; Espinoza-Morriberón et al., 2019)* .

Page 2, line 15 Paragraph added
Previous modeling works have given details on changes in the OMZ upper limit in localized coastal regions and/or on selected ENSO events (Mogollón and Calil, 2017; Espinoza-Morriberón et al., 2019). Mogollón and Calil (2017) have shown effect of the strong El Nino (1997/1998) and La Nina (1998/1999) on the upper layer of the OMZ at three coastal upwelling centers along the Peruvian coast (Chimbote 9.4°S, Callao 12.1°S, and Pisco 14°S). But they did not assess the associated processes to the simulated OMZ changes. This was later on investigated by Espinoza-Morriberón et al. (2019). In their work, Espinoza-Morriberón et al. (2019)) argue that the changes in the upper layer of the OMZ is related to Equatorial remote forcing. Downwelling coastal trapped waves are pointed to trigger the oxygenation of the surface and subsuface layers during El Niño. Under La Niña influence, an upwelling coastal trapped waves induces a deoxygenation of the surface while a deep coastal waves ventilates the subsurface layers by bringing oxygenated Antarctic Intermediate Water toward the equator. Espinoza-Morriberón et al. (2019) further argue that the enhanced oxygen supply by the Southern Subsurface Countercurrents (or Tsuchiya jets) contributes to the reduction of the OMZ volume during El Niño events. However, none of the mentioned studies discussed the oxygen fluxes in the subtropical region of the OMZ, that contributes with about 70% on the supplied oxygenated waters into the intermediated layers of the OMZ in the ETSP at the mean state (Llanillo et al., 2018).

Page 5, line 21 now reads:
Fluctuations in the SW volume are related to changes in its upper and lower margins (Figure 4-e,f), *as simulated during the 1997/1998 strong El Nino event by Mogollón and Calil (2017)*.

Page 6, line 30 Paragraph added
This result contradicts the earlier findings of Espinoza-Morriberón et al. (2019) in which the authors related the deepening of the OMZ upper limit to the equatorial remote forcing.

Sincèrement,

Yonss José

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