

## ***Interactive comment on “Reconstructing past variations in environmental conditions and paleoproductivity over the last ~ 8000 years off Central Chile (30° S)” by Práxedes Muñoz et al.***

### **Anonymous Referee #2**

Received and published: 22 October 2018

The authors present a multi-proxy approach based on two sediment cores examining terrestrial or biogenic inputs, sediment oxygen levels and primary productivity to study variations in past oceanographic and climatic changes along the Chilean coast. They suggest that their observations of wetter condition, lower productivity and the higher oxygen levels during the last 2000 years are coupled to the higher El Niño frequency.

The authors present a large range of biogeochemical and microfossil proxies and the results are worth to be published. However, I agree with referee #1 that the discussion of the results is not sufficient and needs substantial alteration, more in-depth interpretation of the own data as well as comparison to relevant literature.

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Overall I have several major issues that need to be addressed

1. The Discussion is too short especially in comparison to the methods section. There is actually room for more detailed interpretations, for example the Nitrogen isotopes are not explained or discussed at all. The connections between sentences and paragraphs are often weak or confusing, there is some refinement needed and the reader must be led more through the text, especially the discussion. As the manuscript reads now it appears as you randomly choose some results to discuss one after the other. For example see paragraphs starting in lines 521 and 537. To further strengthen the discussion add more comparisons to local studies such as (Contreras et al., 2007; Díaz-Ochoa et al., 2010; Fukuda et al., 2013; Mohtadi et al., 2008; Ortega et al., 2012).

2. Through the whole manuscript the authors refer to suboxic/anoxic conditions, however, the values given for the water station 16 seems to be well above the suboxic value of  $<0.2$  ml/L. For station 1 it's really hard to distinguish if the values may be lower sometimes. I think the value ranges for oxic/suboxic/anoxic need to be given in the introduction. Also, while water values are presented the oxygen levels discussed refer to the sediment which needs to be made much clearer. Just because you have low oxygen in the water column this does not necessarily make the underlying sediments anoxic.

3. Add a discussion of the nitrogen isotope data. And compare to previous studies, such as (De Pol-Holz et al., 2006; 2007; Verleye et al., 2013).

General remarks:

The figures are often not focused, the labels are too small, and in figure 10 the age should be plotted on the y-axis as in the other figures.

I would like to see a more comprehensive conclusion, so far it's more a summary.

Suggestion: try to reduce information in methods and results section. Is the exact

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Munsell chart colour really needed?

For example get rid of Line 181 to 183.

Specific remarks:

Figure 1: Please add the surface circulation for the area.

Figure 2: unsharp and colors are hard to distinguish, this needs revision, I suggest to use a color range that is more appropriate to highlight the DO values of the low end of the scale more. Numbers in this plot need to be larger as well.

Figure 5: I think the accumulation rates for TOC should be given here instead of just (%), further please add the core number directly behind a.) and b.) in the figure.

Figure 10: I suggest to also put the Age on the Y-axis here as in all the other figures.

Line 35 – add “The” before Coquimbo

Line 78 to 83: rephrase, you cannot refer to “these boundary current ecosystems” in one sentence and then explain it afterwards.

Line 131-132: maximum Chl a concentrations of ...

Line 209-216: remove this paragraph, the section is already long and you only list the following chapters here.

Line 218: change the comma to a dot.

Line 384- 390. This was a bit confusing as a southern and northern area are introduced, but both cores studied are in the southern area?

Line 720: “Past environmental changes are analogue...” please specify these changes clearly here.

Line 724: “in this regard”, it’s not clear what you are referring to

Line 726: Studies based on pollen records ... There is a citation missing here!

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Line 747-51: rephrase, improve the connection to the sentence before by first saying that you see indications of higher continental inputs due to increased rainfall, than which of your data shows this and which other studies support this observation. I further suggest to split this sentence in two.

Line 759: rephrase “peak drying”

## References

Contreras, S., Pantoja, S., Neira, C., Lange, C.B., 2007. Biogeochemistry of surface sediments off Concepción (36°S), Chile: El Niño vs. non-El Niño conditions. *Progress in Oceanography* 75, 576–585. doi:10.1016/j.pocean.2007.08.030

De Pol-Holz, R., Ulloa, O., Dezileau, L., Kaiser, J., Lamy, F., Hebbeln, D., 2006. Melting of the Patagonian Ice Sheet and deglacial perturbations of the nitrogen cycle in the eastern South Pacific. *Geophys. Res. Lett.* 33, L04704. doi:10.1029/2005GL024477

De Pol-Holz, R., Ulloa, O., Lamy, F., Dezileau, L., Sabatier, P., Hebbeln, D., 2007. Late Quaternary variability of sedimentary nitrogen isotopes in the eastern South Pacific Ocean. *Paleoceanography* 22, PA2207. doi:10.1029/2006PA001308

Díaz-Ochoa, J.A., Pantoja, S., De Lange, G.J., Lange, C.B., Sánchez, G.E., Acuña, V.R., Muñoz, P., Vargas, G., 2010. Oxygenation variability in Mejillones Bay, off northern Chile, during the last two centuries. *Biogeosciences Discuss.* 7, 4987–5009. doi:10.5194/bgd-7-4987-2010

Fukuda, M., Harada, N., Sato, M., Lange, C.B., 2013. 230 Th-normalized fluxes of biogenic components from the central and southernmost Chilean margin over the past 22,000 years. *Geochemical ...* 1–17.

Mohtadi, M., Rossel, P., Lange, C.B., Pantoja, S., Böning, P., Repeta, D.J., Grunwald, M., Lamy, F., Hebbeln, D., Brumsack, H.-J., 2008. Deglacial pattern of circulation and marine productivity in the upwelling region off central-south Chile. *Earth and Planetary Science Letters* 272, 221–230. doi:10.1016/j.epsl.2008.04.043

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Ortega, C., Vargas, G., Rutllant, J.A., Jackson, D., Méndez, C., 2012. Major hydrological regime change along the semiarid western coast of South America during the early Holocene. *Quaternary Research* 78, 513–527. doi:10.1016/j.yqres.2012.08.002

Verleye, T.J., Martinez, P., Robinson, R.S., Louwye, S., 2013. Changes in the source of nutrients associated with oceanographic dynamics offshore southern Chile (41°S) over the last 25,000years. *Quaternary Research* 80, 495–501. doi:10.1016/j.yqres.2013.07.002

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