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Biogeosciences Discussions

Interactive comment on "Oxygenation variability off Northern Chile during the last two centuries" *by* J. A. Díaz-Ochoa et al.

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Dear Antje,

Herewith, I send you the review of the manuscript bg-2010-166 by Díaz-Ochao et al. entitled "Oxygenation variability off Northern Chile during the last two centuries" that has been submitted to Biogeosciences.

The manuscript of Díaz-Ochao et al. is an integrated study on the variability of oxygenation and bio-productivity in laminated sediments of the Mejillones Bay during the last two centuries. Although sediments offshore Northern Chile and the Mejillones Bay in particular have been investigated regarding recurring changes in biological productivity that is well preserved by the typical productivity proxies in the anoxic sediments

of the oxygen minimum zone, so far laminated sediments have not been studied in detail and be compared with ENSO events to uncover perseverative changes in oxygenation of bottom water/surface sediments. Consequently, this manuscript is useful to acquire a better understanding about the link between the variability of ENSO events, biological productivity, and bottom water anoxia. The manuscript fits well in the scope of Biogeosciences and I recommend its publication. However, the manuscript needs some reorganisation (my suggestions are incorporated in the pdf of the manuscript) and most importantly the authors should clearly demonstrate their novel contribution which will enlarge the knowledge about the Chile continental margin ecosystem.

Best regards,

Anja

Review of the manuscript bg-2010-166 by Díaz-Ochao et al. entitled "Oxygenation variability off Northern Chile during the last two centuries" submitted to Biogeosciences:

General comments

- I would have expected that the authors try to correlate the obtained paleo-proxy profiles to the laminated sediments. This seems to be possible at least for the sediments deposited before 1960, e.g. peaks correlate with darker intervals Mo/Al, V/Al, (lycopane + n-C35)/n-C31, CaCO3 and others. I could imagine that this combination together with the correlation with the ENSO events would highly upvalue the manuscript.

- The authors should explain what new findings and interpretations about the Mejillones Bay they can add to that one of Vegas et al. (2007), Vargas et al. (2007), and Valdes et al. (2004) except that the Bay experienced an additional shift towards higher productivity and enhanced anoxic conditions in the bottom water since 1960.

- The authors arguing with productivity and bottom water oxygenation proxies but quite often they do not provide the reader with the information if enrichment or depletion of a specific proxy is indicating oxygenation or anoxia, intensified or less productivity.

Detailed comments

Title:

- The title should be changed as to reveal that the investigation reflects the conditions in the Mejillones Bay and not the entire continental margin off Northern Chile. The depositional environment is different which is clearly expressed by the lamination of the sediments in the Mejillones Bay.

Suggestion: Oxygenation variability in the Mejillones Bay, off Northern Chile, during the last two centuries.

Abstract:

- I have only a few suggestions and comments which are incorporated in the pdf of the manuscript (ms).

Introduction:

- The authors might want to integrate the use of later on discussed proxies (see general comment).

- I incorporated very few further comments in the pdf of the ms.

Study area:

- I have only a few suggestions and comments which are incorporated in the pdf of the ms.

Material and methods:

- This section is partly incomplete (not all information needed is provided); see my comments incorporated in the pdf of the ms.

- Some results are described in this section, this should be transferred to the results section see my comments incorporated in the pdf of the ms.

- I incorporated further comments in the pdf of the ms.

Results:

4.1

- In general, I found paragraph 4.1 rather unstructured. It would be very helpful for the reader if the authors could restructure this paragraph.

- Additionally, I disagree with some of the described observations; see my comments incorporated in the pdf of the ms.

4.3

- I disagree with some of the described observations; see my comments incorporated in the pdf of the ms.

- The authors refer to particular species but do not indicate were to find the information. They are not listed in the table.

Discussion:

5.1

- This paragraph contains some interpretations that are based on "over-interpreation" of some profile signals.

- Some observation are imprecise; see my comments incorporated in the pdf of the ms.

- Line 10 on page 4997: It is not clear if the peaks or the troughs are related to ENSO events. It seems that the authors correlate the trough to reduction in La Nina events. Sentence should be rewritten.

- In line 14 same page the authors state that Mo/Al and V/Al profiles correlate positively with biogenic opal but they do not inform us about the information which is gained by that observation.

5.1.1

- I found it rather surprising that Mo/Al and V/Al anti-correlate with S! This is particularly striking within the spongy layer and at the highest V/Al peak. The authors do not comment on that, however, I think they must have noticed that fact. It might well be that additional explanations are needed to account for the Mo/Al and V/Al peak. According to Emerson Huested (1991 [Mar. Chem. 34, 177-196]), Brumsack Gieskes (1983 [Mar. Chem. 14, 89-106]) and Lewan Maynard (1982 [GCA 46, 2547-2560]) Mo and V can be incorporated into anoxic sediments by complexation of organic matter. I am not too familiar with the (Lycopane+n-C35)/n-C31 proxy but I would suggest that the very good correlation between this organic proxy and Mo/Al and V/Al is supporting this explanation. I would appreciate if the authors would try to explain this obvious anti-correlation.

- Line 9 on page 4998: To short; the sentence like it is does not explain why the described finding supports the statement that sulfur is mainly incorporated in sulfides. Please rewrite.

- Line 11 same page: Yes, it is right that the S concentration in sediments generally increased but the authors do leave out the fact that there are two distinct interruptions; the first one in the spongy layer and the second one about around 1940. Can the authors explain this interruptions?

Tables:

- Tables should be renumbered according to their appearance in the text. Consequently, table 1 should become table 2 and vice versa.

Figures:

- I have only a few suggestions and comments which are incorporated in the pdf of the ms.

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/7/C1844/2010/bgd-7-C1844-2010-supplement.pdf

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Interactive comment on Biogeosciences Discuss., 7, 4987, 2010.