Ocean Sci. Discuss., 11, C1363–C1366, 2015
www.ocean-sci-discuss.net/11/C1363/2015/

Ocean Science
Discussions
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Interactive comment on "Circulation, eddies, oxygen and nutrient changes in the eastern tropical South Pacific Ocean" *by* R. Czeschel et al.

Anonymous Referee #2

Received and published: 25 February 2015

General comment

This paper aims at describing the circulation, oxygen and nutrient changes in the eastern subtropical South Atlantic from ship cruises, floats and historical hydrographic data. This is an interesting paper being the data set valuable and, in my opinion, explored in a convenient way adding new knowledge on the circulation variability in the region and related changes in oxygen and nutrients. My main concerns are the incomplete description of the eddy field south of the domain and the uneasy reading of some parts of the ms. Saying this, in general I think the paper should be published subjected to minor revisions as detailed below.

Detailed comments

1) Page 2206, L24 'direct observations'. It would be preferable to use here and all long the text "in situ observations" instead of "direct observations"

2) Page 2207 L1-2. Please add references on HCS

3) Second paragraph page 2208. Mode water eddies are most commonly referred as Intrathermoclines Eddies or ITEs (Hormazabal et al., JGR, 2013 and references therein; McGillicuddy, JPO, 2015). Therefore I would change all long the text the term "mode water eddy" by ITE. Moreover I think that a short paragraph with the definition and references to ITEs should be added to the ms. In particular a brief description of South Pacific ITEs characteristics according to Hormazabal et al., (2013) should be also included. South Pacific ITEs have a minimum oxygen signal as it is also the case for the ITEs described in this ms. Therefore it cannot be argued that all eddy variability supply oxygen to the OMZ as claimed on L9-10 of this page.

4) First paragraph section 2. It is uneasy to read please rewrite annotating in Figure 1 the 86° W section, the 16° 45' S section and indicating de location of el Callao.

5) First paragraph page 2. What is the distance between CTD stations along the different transects of M90 and M91 surveys? How it compares with the climatological first baroclinic Rossby radius of deformation (Chelton et al., 1998, JPO)

6) Last paragraph page 2210. Please provide details about the uppermost bin depth and bin size for ADCP data.

7) First paragraph page 2211. What was the nominal depth of CTD casts?

8) Page 2212, L17. "regular situation" what is the meaning for regular "averaged situation" "climatological situation"?

9) Page 2212, L18. Please change here and all along the text "density" by "potential? density anomaly" and temperature by potential or in situ temperature.

10) Section 3. Includes both results and discussion please rename as "Result and

discussion" and rename last section as "Summary and concluding remarks"

11) Section 3.1 first sentence. I miss a figure showing also the oxygen vertical section superposed to selected isopycnals together with the ADCP section along 86°W in order to support the eastward transport of rich oxygen waters and westward transport of low oxygen waters. Although further on the text oxygen transport is discussed and compared with climatological oxygen distribution on my opinion a detailed description of the velocity and oxygen field along 86° W is needed in order to well establish the oxygen transport related to the currents system. CTD stations location should be also included at the top axis of both plots.

12) Second paragraph page 2213. The signature of the eddy field south of 15 °S need additional evidences from the potential density anomaly an oxygen fields. SSH provides only a snapshot for 21 November. For this day there is only visible the signal of an anticyclonic eddy south of the section without a clearly signal of cyclonic eddies. What were the time and dates to complete the section between 15° S to 25° S? As they are geostrophycally adjusted the eddies must have a signal in the potential density anomaly field. Please show a vertical section of this field from 15° S to 25 °S superposed to the velocity field. Cyclonic circulation must coincide with a dome shape of the isopycnals in the case that the section has crossed cyclonic eddies. In the case of the anticyclonic eddy, as the authors indicates that it is an ITE type, isopycnals must show a dome shape in the shallower layers and bowl shape in the deeper layers. Moreover if it is the case, the oxygen section should show an oxygen minimum at the ITE core.

13) Last paragraph page 2213. It is confusing and uneasy to read. This may be solved referring to a table including ship cruises dates and the corresponding EUC depth ranges and transports

14) Page 2214, L11-12. Stramma et al. (2013) sampled a shelf break ITE in November 2012. In the December 2012 16 °S transect there are not evidences of the occur-

rence/persistence of such ITE (see comments 18 below). Moroever the ITE would cause a decrease of oxygen.

15) Page 2214, L22-23. There are no evidences of an ITE in M91 16 °S section

16) Page 2215, L10-13. As PCUC transports low oxygen it would be helpful for identify its signal to overlay selected oxygen contour lines in Figure 4 sections.

17) Page 2215, L12. "The transports" please change as "The southeastward transports"

18) Page 2215, L21-21. Here again the occurrence of an ITE along 16° S in the December cruise is not well supported. ADCP section does not show any anticyclonic circulation. Moreover ITE located by Stramma et al. (2013) was along 16° 45'W not at 16 °W and in the November cruise a not in the December cruise.

19) Last sentence first paragrah page 2220. This sentence is too much speculative please read comment above

20) Last sentence page 2221. The temperature anomaly related with the ITE resemble to me very large, almost 300 km in diameter. Moreover there is no a corresponding negative oxygen anomaly. Have the authors checked the presence of this ITE in the 1993 ADCP and potential density anomaly sections?

21) Last sentence first paragraph section 3.3. This sentence is too much speculative please read comment 18 above

22) Figure 4. Please include and scale bar in km

23) Conclusions should be more concise clarifying the novels findings.

Interactive comment on Ocean Sci. Discuss., 11, 2205, 2014.