

Interactive comment on “Water masses and zonal current in the Western Tropical Atlantic in October 2007 and January 2008 (AMANDES project)” by A. C. Silva et al.

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Thank you for your comments and suggestions. We tried to improve the quality of written in the new version of the paper, and also the presentation and discussion of the results. Please find hereafter the answers about the scientific concerns.

Main concerns: The aim of the paper stated on page 1956, line 24, has been modified in the text. The references such as Schott et al. 1998 and Stramma and Schott 1999, suggested by the reviewer were included in the new version of the paper.

Specific Concerns:

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1. Should the Western Boundary Undercurrent (WBUC) be the Guiana Undercurrent as in previous publications? Ok, it has been corrected.
2. Line 20, page 1955: It is unclear what “These eastward currents” refer to. Ok, it has been reviewed in the text.
3. Line 5, page 1958: “Means of vertical velocity section: : :” is confusing. The two cruises hardly had any overlap in velocity measurements. In fact the paper only shows current measurement during the 1st cruise. Where does the mean come from? Also “vertical velocity” is easily confused with the upwelling/downwelling. Ok, it has been corrected in the text.
4. 1st two paragraphs of Section 3.1: It is hard to say from these measurements that whether the WBUC or GUC claimed in the manuscript is just part of the NBC retroflection, or even part of an eddy. In previous data analysis (Colin and Bourlès, 1994), the WBUC was showed in the same location as observed in the paper. The anticyclonic eddies observed in surface by Fratantoni et al. (1995) had a larger horizontal scale while compared with the structure observed in the paper.
5. The northwestward or southeastward velocity, rotated along the shelf, should be shown in Fig.2, instead of the eastward velocity. What happens to the NBC record below 280m in Fig.2b? Ok, it has been reviewed in the text and figure. The transect 2 is located near the shelf break, that could create disturbance in the data. Therefore we did not consider the measures below 150 m depth.
6. Line 18, page 1959: “the thermocline” needs to be defined (20C isotherm?), or better to use the specific isopycnals. Ok, it has been modified in the text.
7. The analysis and conclusions in Section 3.2 Water Masses Analysis are not convincing. Three “bold lines” –they are still hard to see in Fig.3a– are used to “define typical features of the North Atlantic Water (NAW), South Atlantic Water (SAW) and Eastern Atlantic Water (EAW)”. Comparison of the observed station profiles and these “typical”

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profiles are used to determine origins of the observed water masses. Where are these “typical” profiles obtained? How “typical” are they? It is unlikely that one single profile can be used to define the typical property for each of the water masses, especially in the upper thermocline including the Central Waters. In fact they are not typical to me in representing the low oxygen of the NACW and SACW. - Where are these “typical” profiles obtained? The quality of Fig. 3 has been improved in the new version of the paper. In the ACW layer, different origins for the water masses can be identified. Following earlier studies in the area (Metcalf and Stalcup 1967; Cochrane et al. 1979; Wilson et al. 1994; Bourlès et al. 1999a), typical T/S signatures for NAW, SAW and EAW obtained from recent oceanographic cruises in surface water layer - the French ETAMBOT and CITHER cruises: NAW (Lat 12.30°N, Long 47.75°W), SAW (Lat 4.69°S, Long 35.10°W) and EAW (Lat 0.75°S, Long 30.43°W) - are plotted together with the AMANDES data profiles.

Similarly, the analysis of AAIW transformation (Section 3.3) also depends on records at single locations to characterize origins of the water masses. Without giving insights on the possible physical processes, the overly simplified mixing model may yield misleading conclusions. The difference in two observation periods may not be due to the impact of seasonal forcing down to intermediate level as claimed in the last paragraph of section 3.3, but more likely due to the differences in station locations and their relative location to migrating NBC retroreflection and even NBC rings.

Following the reviewers' comments, this paragraph has been clarified and shortened. However, the assumption that differences in the composition of AAIW between fall and winter could reflect seasonal forcing although we added the hypothesis of an effect of the sampling site variation.

8. Fig.8 is missing. Ok, It has been corrected.

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