

## ***Interactive comment on “Salinity-induced mixed and barrier layers in the southwestern tropical Atlantic Ocean off the northeast of Brazil” by M. Araujo et al.***

**Anonymous Referee #2**

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The manuscript investigates the upper mass structure in the southwestern tropical Atlantic Ocean. The mixed and barrier layers depths are computed from CTD casts collected as part of REVIZEE Program, during austral winter 1995 and summer 1997.

The authors conclude that the barrier layer thickness (BLT) during winter 1995 is from 5 to 90 m (15 m on average); while during the summer it is less variable and thinner. They argued that the barrier layer (BL) formation is clearly driven by salty-induced pycnocline inside the isothermal layer (Zt).

Studying the spatial variability, spatial distribution, and dynamical mechanisms related to barrier layer in the tropical Atlantic Ocean is of huge relevance. However, the actual

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paper format is not appropriated, and needs major revision before publishing.

The text is too concise, excluding important information, mainly about the methodology. Also, the discussion is too shallow and needs to take into account other several dynamical mechanisms involved on upper ocean dynamics (see specific comments). Seasonal wind variability is not mentioned along the text, for instance.

Specific Comments:

P561 L7: Section 2.1 should bring a better description on which kind of CTD instrument were used, methods of calibration and precision/accuracy.

P561 L18: check “value” twice.

P561: the Section 2.2, from L16 to L25 needs to be re-organized. It is too confusing. Maybe it was enough just to go straight to what kind of methodology it was used in the present work. After that or along it, mention previous works.

P562 L19: I personally think the Section 3.1 could be “Water masses in the southwestern Tropical Atlantic” instead. Or simply “Water masses”. And a better water mass analysis could be provided. However, discussing water masses for the very upper ocean is not appropriated. Here there is a challenge: How to discuss mixed/barrier layer and water masses together? Is the South Equatorial Current (SEC) a first order mechanism on setting up the mixed/barrier layers? What about wind and Ekman flow? What about radiation?

P563 L1: The NAW has relatively low O<sub>2</sub> concentration. Also, change O<sub>2</sub> by “dissolved oxygen (O<sub>2</sub>)” if it was first time mentioned on text.

P563 L1 to 4: Too long sentence with too much information. Maybe you could break this sentence into several parts. Explain better the South Atlantic Water (SAW) flow from the subduction region to the Brazilian coast. The evaporation-precipitation unbalance was completely ignored by the authors. It should at least be mentioned, maybe in the introduction.

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P563 L12: figs 1b and 1c should be only one as Figure 2. Are the T/S references from Levitus? Which lat/lon? The transitional T/S should be displayed.

P563: figs 2a and 2b should be side by side. Can you really assume synopticity along this border? The cruise is 3 months longer. This should be mentioned in methodology.

P563 L18: instead of "around 10S", it should be "between 11S and 12S", not 10.

P564: the figures 3a to 4c should compose only 1 figure (plate). Maybe the graphics would be better if longitudes range from 31.5W to 41.5W. If it gets too squeezed break it into 3 figures with 2 graphics each, winter and summer side by side.

P564: Section 3.2 describes results starting from BLT. However, the graphics display a different sequence, starting from Zt. Provide a better description of results, following a linear idea, and following the sequence of graphics presented.

Maybe an additional figure showing a map of (BLTwinter minus BLTsummer) would help to display the differences between summer and winter. However the maps have different grids. . .

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Interactive comment on Ocean Sci. Discuss., 6, 557, 2009.