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Ocean Science Discussions

Interactive comment on "Tropical Extra-tropical thermocline water mass exchanges in the community climate model v.3 Part I: the Atlantic Ocean" *by* I. Wainer et al.

I. Wainer et al.

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" [...] In particular, many analyses were done on isopycnal surfaces, but the isopycnals chosen seemed random (see specific comments below). This makes it hard to digest the conclusions..."

The choice of the isopycnals was not random as suggested by reviewer 1. Quite the opposite: the reason for using different isopycnal surfaces, is the fact that the core of the EUC is at a different depth for each model run. The isopycnals chosen are exactly the ones that cross the EUC core at 30W. The density range (24.5-26.5) was chosen because it is where the core density of the EUC is found in the observations (e.g. Molinari et al 2003, Schott et al, 2004). The idea is to understand how water feeds into the EUC in the models (which is why understanding STC' s is important)

so the calculations were thought to be done in the appropriately averaged layer that corresponds to the density surfaces in the EUC.

page 61, line 9, "Black contours ...": You mean, white contours representing isopycnal surfaces are also superimposed? yes - this was corrected in the text

page 61, line 24 onward, "The wind field itself is predominantly zonal..., the weak upwelling ...are a direct result of the too-weak winds" : I am guessing by 'weak upwelling' you mean equatorial upwelling, not the upwelling at 8S, is that right? Although up until then the paragraph was about the unrealistic upwelling and wind stress curl at 8S. I am not sure I understand the message of this paragraph.

There is both: anomalous upwelling at 8S (see arrows pointing up in FIG1 for the coupled models) and weak equatorial upwelling.

page 62, line 7-8, "Only waters less or near the 26.5 kgmĹ-3... EUC": How do we know? 26.5 isopycnal was not shown on Fig.1. Is this true for POP2, T42,T85 respectively or for all cases?

The 26.0 σ_θ is plotted. It is true for all cases and also noted in the observational work cited above.

page 62, line 13, "...22.5 kgmĹ-3 for the T42...": Again, 22.5 sigma-theta was not even shown so I can't judge if this is correct or not.

23 σ_θ is plotted

page 62, paragraph starting with line 20, line 21: change "core level" to "EUC core level"

This was corrected in the text

page 63, line 2, "...poleward of 20N":22N is more accurate. A negative anomaly is centered at 20N.

This was corrected in the text

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Page 66, second paragraph: It was stated here that PV contours and salinity were plotted on different isopycnal surfaces for T42, T85 and POP3. Fig.5 caption doesn't reflect this.

This was corrected in the text

page 66, 4th paragraph: Why are the streamlines shown on different isopycnals than those for PV contours and salinity distribution (Fig5) for the POP3 and T85? (T42 uses 24.3 sigma-theta consistently for PV, salinity and streamline) I understand EUC core density differs between the different runs, but for each run, why do you use different densities for PV/ salinity, and streamline distributions, respectively?

Fig 5 (salinity and PV) and FIG 9 (floats) are at the same ispycnal (25.3 σ_θ). Since streamlines only work at the exact depth of the core, they were drawn at the respective EUC core level for each model run.

page 69-70: The Lagrangian floats were lunched on yet another isopycnal surface. Why is that? page 70, line 10, "...averaged between 24.5 < sigma-theta< 26.5 ...": Where do "24.5" and "26.5" come from? Streamlines (Fig. 6) were shown on isopycnals ranging from 24.3 to 25.0. You don't just pick up these numbers randomly(!), especially considering that the study region has complex circulation pathways and water mass characteristics.

The floats were launched at σ_θ=25.3. Same as in the PV/salinity plots in Fig. 5. According to observations (citations above), the EUC core can be found anywhere in the range 24.5kgm^{-3}< σ_θ<26.5 kgm^{-3}.

Interactive comment on Ocean Sci. Discuss., 3, 55, 2006.