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Interactive comment on “Meridional transport of salt in the global ocean from an eddy-resolving model” by A. M. Treguier et al.

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We thank the reviewer for his/her suggestions to improve the clarity of our presentation.

First major remark:

"The first and most important point of clarification that I think should be made is that the current authors define $\langle v \rangle$ and $\langle S \rangle$ to represent GLOBAL depth-zonal averages, not basin section averages as done by Wijffels."

We understand the reviewer's point, but we prefer to keep the focus of our paper on an analysis of meridional fluxes on the global scale, rather than inter-basin exchanges. The information conveyed in Fig.6 is only meant to complement the global analysis by showing how individual basins contribute to the total global eddy salt flux.

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We have tried to clarify our presentation in the following manner:

- page 2296, line 2, we now refer to "a section (or an ensemble of sections) bounding a closed region of the ocean", rather than "a section bounding an ocean basin".

- page 2305, line 10, after the sentence "For the first component we prefer ... not over a section area.", we add the following text:

"Note also that when the zonal mean is taken for the global ocean, inter-basin exchanges such as the flow through Bering Strait contribute to the "recirculation", which differs from the analysis of Wijffels 1992 where the recirculation is estimated independently in each ocean basin, and the flow through Bering Strait is considered as a separate component of the global balance. "

Second major remark:

"A smaller detail is that it is asserted in the introductory material that EQ 9 is exact, though the authors need to give themselves some wiggle room in explaining FIG 4 that there are additional terms related to both mass (volume) transport in frozen water and from storage terms for non-equilibrium conditions. Perhaps it would be better to spell out these contributions to the balance equations in the derivations, rather than bury them in the discussion."

We agree with the reviewer and we have added the missing term in EQ. 9, namely the storage term due to the tendency of the volume (variation of the elevation of the free surface).

TECHNICAL COMMENTS:

PAGE 2307, line 8-9: the change in volume comes from the imbalance of E-P-R, as explained at the end of section 2. We have now added this precision in the text page 2307. Note that the methods for closing the water balance are questionable in a model such as ours, because the evaporation E is recalculated at each time step from the model sea surface temperature using bulk formulae, so that the net (E-P-R) is prog-

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nostic and cannot be balanced "a priori" using the atmospheric state and the runoffs alone. Rather than applying an ad-hoc method which could remove a physical seasonal signal or lead to instabilities on long time scales, we have preferred to let the sea level drift during the model integration.

All the other technical comments have been addressed.

Interactive comment on Ocean Sci. Discuss., 10, 2293, 2013.

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