**Ocean Science
Discussions**

Interactive comment on "Water mass transformation in the North Atlantic over 1985–2002 simulated in an eddy-permitting model" *by* R. Marsh et al.

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Both referees show great interest to the topic which is treated in the paper, and recognise the validity and rigour of the scientific method. They also agree that substantial results are reached, but not always clearly outlined. Both referees also consider that the paper could be improved, and provide comments for that. I find their comments pertinent and they should all be discussed and answered by the authors.

When discussing the review, I suggest the authors to give a particular attention to:

- the concern of Referee #2 that they should clarify the questions they want to address. I also have the feeling, after reading the paper, that a very substantial amount of work have been done, but it is not clear why it was done. Is it for the purpose of model

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validation? or to provide quantitative analysis of the balance between production and consumption of water masses? or to compare the variability of the consumption of mode waters with that of the production?, ... As a consequence, the paper appears somewhat as a report of experiment, rich of scientific results, but not exploited in a well defined direction, and conclusions appears short in regard of the work presented.

- the vagueness of the definition of "Mixing" as noted by Referee #1. In addition to referee's comment, the horizontal mixing scheme should be included in the discussion.

- As mentioned by Referee #1, the comparison with SOC fluxes should be motivated. It seems to me that a comparison with the original NCEP fluxes would have better enlightened the model behavior. The analysis proposed here points out biases in SOC, already pointed out by other studies, but brings little to the model.

- I suspect it is not possible, considering the way the model output were archived, to proceed to the decomposition of Gmixing as suggested by Referee #1. This type of separation certainly requires some specific on-line diagnostic to be carried out. However, I recommend a reference to the paper of Griffies et al. and a discussion of its relevance to the present work.

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