

Interactive comment on “Reconciling the north–south density difference scaling for the Meridional Overturning Circulation strength with geostrophy” by A. A. Cimatoribus et al.

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We would like to thank Referee #1 for his/her comments, in particular since he/she appreciated our effort to clarify some points which are rather confused and sparse in the present literature.

> My main criticism is that "the MOC" is never actually defined, resulting in many ambiguities...

This is indeed a very important point, which will be clarified at depth in the new version of the manuscript, in particular by adding a clear definition of the MOC as area integral of the meridional velocity.

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Concerning the overturning in isopycnal coordinates, our focus in this work has rather been on the overturning in depth coordinates, mainly because most of the previous work focuses on this quantity. While we would like to keep the focus on this quantity, we are aware of the importance, and difference, of the overturning in isopycnal coordinates. We will address this issue with the results presently available, as we foresee that the low time resolution (yearly averages) of the model output may make the transformation to isopycnal coordinates difficult. The overturning in isopycnal coordinates may in fact provide a more natural way to identify the latitude of the maximum overturning.

> On a related note, I would have appreciated some discussion of what might happen in a higher resolution (eddy resolving) model...

We agree that this is an interesting question, and will mention it in the revised manuscript. However, we have to stress that our present results do not allow any direct inference on the behaviour of an eddy resolving model. We expect that the arguments presented in this work can be applied to an eddy resolving model only if the long term statistically steady state is considered.

We will further improve the manuscript following the referee's suggestions concerning the notation, in particular by adding a table as reference for the meaning of the variables.

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