

## ***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 #2 for his/her constructive criticism.

Concerning the variability of the depth "h", we agree that the paper may, in its present form, lead to confusion. The depth does vary between different runs, and this will be discussed in more detail in the revised manuscript. In particular, we will discuss the correlation between the pycnocline depth, wind stress and vertical diffusivity. We will also make clear the connection between the scaling discussed and the pressure.

Concerning the impact of diffusivity, we will perform several additional simulations in order to explore a broader parameter range, in particular in the higher diffusivity regime.

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We expect that these new results will clarify if vertical diffusivity changes, qualitatively or quantitatively, the scaling behaviour described in the present manuscript. Furthermore, we will investigate the importance of the geographic distribution of diffusivity.

In the revised paper, we will also explain more clearly the rationale behind the choices for the latitude and depth of the MOC maximum, by discussing in greater detail the output of the model using other fields than the meridional overturning circulation. We will discuss in particular how the scaling is linked to the position of the boundary between the subtropical and subpolar gyres.

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