Author's response to

Referee Comments 2 (Anonymous)

The manuscript presents a very readable and physically motivated discussion of how the overturning stream-function and the tendency potential are evaluated from ocean model data. The manuscript is ready for publication. Two small things.

We thank the anonymous reviewer for reviewing our manuscript, the positive feedback and your comments. We answer them in blue below and reference our manuscript changes with line numbers in the revised manuscript.

(1) I wasn't sure how Figure 3(a) was constructed. Did I miss something, or is a bit more explanation needed?
Thank you for the comment. We changed the formulation to make it more clear.
Manuscript changes: We

- changed the lines 233-236 to: "We evaluate the salinity and temperature bins in which the volume fluxes across the sea surface (evaporation, precipitation, river run off, ice melting and freezing) is entering the ocean (panel a) in Fig. 3). We then solve the Poisson equation with this quantity as source term [...]."

(2) Lines 475 and 476 seem to be in conflict. Line 475 says that the impact of fluctuation terms on a monthly time scale is negligible, while line 476 says that the eddy induced velocities contribute significantly to the stream function.
Thank you for your comment. Line 475 is mentioning the fluctuation (correlation) terms of the Reynolds decomposition (second term in eq. (6)) while line 476 is referring to the not resolved and parameterised subgrid processes. We added these clarifications to the text in Sect. 7.
Manuscript changes: We

- changed the lines 496-500 to: "Ideally, the stream function is computed from the mass or volume transports as model output variables but we show that the impact of fluctuation terms on a monthly time scale is negligible when computing the volume transports from time averaged velocities and time averaged layer thicknesses instead of using the time averaged volume transports. Conversely, the eddy induced velocities, as they are used in coarse ocean models to representing the unresolved, parameterised subgrid processes, contribute significantly to the stream function."