

## ***Interactive comment on “Quantifying thermohaline circulations: seawater isotopic compositions and salinity as proxies of the ratio between advection time and evaporation time” by Hadar Berman et al.***

### **Anonymous Referee #2**

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The concept of ‘strength of the thermohaline circulation’ and the simple model behind can look appealing for those who are interested in simple explanations for complex problems – which is the essence of modelling –. However, the real meaning of this parameter  $\gamma$  is not clear. Contrary to the claim of the title, this parameter cannot help quantifying thermohaline circulations.

First of all, thermohaline circulation is related to the water circulation induced by buoyancy gradients and is driven by heat and freshwater fluxes, while the authors consider evaporation only. The concept behind  $\gamma$  could be meaningful in those regions that are dominated by evaporation but is certainly not applicable to the general thermohaline

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circulation.

The concept of 'strength of the thermohaline circulation ' could be related to the ratio of evaporation vs horizontal transport but has nothing to do with the physical mechanisms driving the thermohaline circulation.

Second, there are conflicting hypothesis in the discussion shown by the authors. On the one hand, they consider only those regions where the water moves slowly. But, on the other hand, they completely ignore diffusion against advection. This is not consistent. Evaporation should be compared with more robust transport time scales.

Third, the conclusions rely on a very few experimental data and lack therefore any statistical significance.

I would suggest that the authors drop the first part of their title (*Quantifying thermohaline circulations*) and focus on the second part (*seawater isotopic compositions and salinity as proxies of the ratio between transport time scale and evaporation time*) using a more extensive data sets from a single region.

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