

## ***Interactive comment on “The instability of diffusive convection and its implication for the thermohaline staircases in the deep Arctic Ocean” by S.-Q. Zhou et al.***

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The article on “The Instability of Diffusive Convection and Its Implication for the Thermohaline Staircases in the Deep Arctic Ocean” is an interesting article that brings new idea to the field. So I think, it is worth to be published in Ocean Science Discussion if some minor corrections are done.

The article deals a lot with the bottom layer, but unfortunately we do not have a lot of information about it. It does not appear in Fig. 3, and it would be interesting to give the thermal and salinity gradient inside of it, even though these gradients seem pretty flat. In the definition of the salinity Rayleigh number,  $K_T$  the thermal diffusivity coefficient

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is used and not  $K_s$ , the salinity diffusivity coefficient. It would be interesting to know the reason of this choice. P1350 line 11, the PDFs of  $Ra_{TI}$  is given (as well as in P4). Is it a local measurement of  $Ta_{TI}$ ? How is  $Ra_{TI}$  measured? What is fluctuating with the time? The temperature difference?  $L$  the thickness of the layer? More information would be welcome. Author should be more explicit on the hypothesis done to obtain Equation 7 out of Eq. 5 and 6. More steps would help the reader in his understanding.

The English should be improved: P1351, line 7, I would see “it is reasonable to neglect it”, rather than “it is reasonable to be negligible” P1351, line 23, “is a small region close to the boundary” rather than “closing to” P1351, line 26, “This temperature distribution is the result of convecting rolls” P1352, line 1, “temperature gradient is the largest inside the interface” P1352, line 2, “it gets smaller and smaller as it approaches the edge of the interface” P1352, line 20, “When the set of data is large enough to have good statistics”, instead of “To the well statistical data” P1353, line 10, “cannot explain well the dynamics...” P1353, line 21, “In the laboratory experiments where a salt-stratified...” P1356, line 10, typing mistakes, there is 2 “of”

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